A Temporal Perspective of Merger and Acquisitions: The Effect of Entry Time, Pace and Rhythm on Post-Acquisition Performance in the Energy and Power Industry

Master's thesis International Management

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Abstract

Extant research has shown that firms do generally not benefit from acquiring other organizations. Scholars have identified multiple conditions that effect post-acquisition performance, however limited attention is given to the effect of timing on post-acquisition performance. By building upon research on temporal perspective, this thesis examines the effect of entry time in an industry wave, pace and rhythm on post-acquisition performance in the Energy and Power industry. First, drawing on literature about first-mover advantages and bandwagon effect, I argue that entry time in an industry merger wave affects post-acquisition performance. In line with the theoretical model, the results of this study show a curvilinear effect between entry time and post-acquisition performance, with early movers gaining the highest post-acquisition performance. Second, by using a longitudinal perspective I examine the effect of rhythm and pace on post-acquisition performance. Building from the notions of organization routines, organization learning, time compression diseconomies and absorptive capacity I build a theoretical argument why and how the pace and rhythm of a firm's merger and acquisition activities matters. The results however show no or very limited support for the formulated hypotheses. Surprisingly, some of the results suggest an opposite relation between the two concepts and post-acquisition performance as expected. By investigating these relationships theoretically and empirically, this study contributes to the literature on a temporal perspective of strategic actions and the general literature on M&As, particularly in the Energy and Power industry.

Keywords: *Merger and acquisitions; temporal perspective; entry time; pace; rhythm; post-acquisition performance; Energy and Power industry.*

Content

1. Introduction

Organizations have been acquiring other organizations and merging with them more and more. The last two decades have witnessed some of the largest mergers and acquisitions (M&As) transactions in the business world. In 2017 companies announced over 50,600 transactions with a total value of more than 3.5 trillion USD (Imaa, 2018). The term merger and acquisition is often used as an umbrella-term for many different types of corporate restructuring. Even though both terms refer to corporate reorganizations that serve to transfer ownership control from one firm (the target) to the other (the acquirer), strictly speaking, there exist some differences between the two types: in a merger, two companies agree to combine their enterprises in one single company (both companies lose their independence), whereas in an acquisition, one company purchases another firm (and thus becomes its owner).

M&As are a popular strategic tool for organizations for achieving corporate expansion and growth. Different theories exist concentrating on the question of why mergers occur, and researchers have identified numerous antecedents of M&As (see for an overview e.g. Haleblian, Devers, McNamara, Carpenter & Davison, 2009). However, the primary reason for M&As is to achieve synergy by integrating two or more business units in a combination with an increased competitive advantage (Barney, 1988; Singh & Montgomery, 1987; Porter, 1985). Synergy occurs when two or more activities, units or companies are combined in such way that they are worth more together than the sum of their value when they are apart. In other words, the sum should be larger than its parts: 1 + 1 = 3. In general, three types of synergies can be distinguished: (i) financial synergies which result in lower costs of capital, (ii) operational synergies which result in lower costs of production, and (iii) managerial synergies which result in an enhancement of the management abilities of the firm (Trautwein, 1990). Despite the high number of M&As, prior research on post-acquisition firm performance demonstrates that acquiring firms generally do not benefit from making acquisitions in both the short- and long-term (Faulkner, Teerikangas, & Joseph, 2012; Haleblian et al.,2009). Several studies suggest that more than the half of M&A transactions fail to achieve their objectives and acquisitions were often found to reduce acquiring firm value (Haleblian et al., 2009; Moeller, Schlingemann, & Stulz, 2003). Because of this, scholars have increasingly focused on the moderators of the acquisition-performance relationship: why does only a minority of the acquisitions lead to value creation? Prior research uncovered multiple conditions that affect post-acquisition performance, such as payment type, managerial experience, firm size and regulations (see for an overview Haleblian et al., 2009).

Although the extensive literature on M&As in strategic literature, limited attention is given to the effect of timing on post-acquisition performance. Timing is a “hidden and unrecognized dimension of strategy that has the potential to create competitive advantage” (Shi, Sun, & Prescott, 2012, p. 165). Time has long been one of the least researched dimensions of business strategy (Das, 1991; Ramaprasad & Stone, 1992), but since the 1990s strategic scholars have given more attention to the role of timing.

The dimension of time is often distinguished in clock time, which is determined by clocks and calendars, and event time, which is determined by the occurrence of meaningful events (Ancona, Okhuysen & Perlow, 2001; Berends & Antonacopoulou, 2014; Bluedorn & Denhardt, 1988). Nowadays, the temporal dimension of strategy is embedded in a wide range of phenomena (Shi & Prescott, 2012), such as first-mover advantages (Lieberman & Montgomery, 1988), organizational learning (Berends & Antonacopoulou, 2014), strategic planning (Das, 1991) and the resource-based view (Dierickx & Cool, 1989). However, only recently a temporal perspective – focusing on when and under what conditions firms should accelerate, slow down and coordinate their M&A activities – is gaining increased popularity in M&A research (Shi & Prescott, 2012). While there are a variety of temporal constructs and approaches, this thesis will look to the effect of entry time in an industry merger wave and the pace and rhythm of M&As on post-acquisition performance. By theoretical and empirical testing these relations, I aim to examine three research gaps.

The first research gap this thesis examines is the effect of entry time in an industry merger waves on post-acquisition performance. Extensive research has shown that M&As often occur in merger waves (see, e.g. Haleblian, McNamara, Kolev & Dykes, 2012; Harford, 2005; McNamara, Haleblian & Dykes, 2008). Merger waves can be defined as periods of intense and concentrated merger activity in an industry (Andrade, Mitchell, & Stafford, 2001; Fuad & Sinha, 2017; Harford, 2005). Entry time refers to the relative timing of a firm's merger of acquisition compared to its competitors in an industry merger wave (Dykes & Kolev, 2018; Fuad & Sinha, 2017). Drawing on literature on first- and late-mover advantages (Lieberman & Montgomery, 1988) and bandwagon effect (Abrahamson & Rosenkopf, 1993), I build a theoretical argument that the entry time in an industry merger wave matters. Despite extensive research on first-mover advantage in strategic literature, only a few scholars have considered the effect of entry time on a firm's post-acquisition performance (see, e.g. Andonova, Rodriguez & Sanchez, 2013; Carow, Heron & Saxton, 2004; Fuad & Sinha, 2017; McNamara et al., 2008; Steigner & Sutton, 2015). These studies showed equivocal findings. For example, the studies of Fuad and Sinha (2017) and Carow et al. (2004) showed that early movement in a M&As wave is positively related to post-acquisition performance. However, in a research of privately held firms, Andonova et al. (2013) found an opposite effect. In their study, they found a late-mover advantage: firms that acquired late in waves showed stronger post-acquisition performances than early ones. Moreover, McNamara et al. (2008) found in a study of US firms a curvilinear relation between the position in a M&A wave and post-acquisition performance: firms that acquired at the peak of the wave experienced the worst post-acquisition performance. By drawing upon the concepts of first-mover advantage, bandwagon effect and late-mover advantage, this thesis attempts to extend prior research by exploring the relation of entry time on post-acquisition firm performance on short- and long-term.

The second research gap this thesis examines is the role of *pace* and *rhythm* on post-acquisition performance. Drawing from the notions of organizational learning (Argote, 1999), organization routines (Nelson & Winter, 1982), time compression diseconomies (Dierickx & Cool, 1989) and absorptive

capacity (Cohen & Levinthal), I build a theoretical argument that the pace and rhythm of M&A activities affects a firm's post-acquisition performance. *Pace* refers to the average number of M&As that a firm carry out per year over a given time period (Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). Firms often engage in multiple M&As to execute their strategy (Haleblian, Kim, & Rajagapalan, 2006; Schipper & Thompson, 1983), which can result in a high pace or a low pace of M&A activities. Various scholars have examined the relation between the pace of strategic actions – such as corporate strategic changes (Klarner & Raisch, 2013), alliance portfolio expansion (Hashai, Kafouros, & Buckley, 2018) and firm internationalization (Lin, 2014; Lin, 2012; Vermeulen & Barkema, 2002; Wagner, 2004) – and firm performance, with mixed results. Moreover, a limited number of scholars have addressed the impact of the pace of M&A activities on post-acquisition performance (Haleblian & Finkelstein, 1999; Hayward, 2002; Laamanen & Keil, 2008; Nadolska & Barkema, 2007). Building on the notions of absorptive capacity and time compression diseconomies, the major part of scholars has found that pace negatively affects firm performance (Hashai et al., 2018; Klarner & Raisch, 2013; Laamanen & Keil, 2008). However, from an organization learning and organizational routine perspective, it can be reasoned that a high pace of M&As also has advantages. For example, firms may benefit from the learning effects from previous M&As and the creation of acquisition capabilities. In line with these advantages, some scholars have found a positive linear (Haveman, 1992) or curvilinear (Hayward, 2002; Kusewit, 1985) relation between pace and firm performance. Building on these contradictory arguments and mixed findings, this thesis attempts to extend prior research by exploring the role of pace on post-acquisition performance in the Energy and Power Sector. Building on previous research, I argue that the relationship between the pace of M&As and post-acquisition performance is characterized by a U-shaped pattern. Firms that follow an average pace are likely to benefit from the advantages of a high pace of M&As and simultaneously decreases the negative effects of a high pace.

Rhythm is defined as the pattern of variability in the frequency of M&As over a specified time period (Ancona & Chong, 1996; Prescott & Shi, 2008). Unlike the pace marker, rhythm captures not only the average number of changes in the give time period but also the temporal patterns of those changes. The rhythm of M&As thus centers on multiple changes and the temporal distance between them (Kunisch, Bartunek, Mueller, & Huy, 2017). In this thesis, I differentiate three forms of rhythm: (i) an even-paced, which indicates a constant and predictable rhythm, (ii) an event-paced rhythm, which indicates an irregular and unpredictable rhythm, and (iii) an even-event-paced rhythm, where M&As follow an even-paced rhythm for a time, but are responsive to opportunities in the environment (Shi & Prescott, 2012). Only recently, researchers have begun to explore the rhythm patterns of M&A activities (Laamanen & Keil, 2008; Shi & Prescott, 2011; Shi & Prescott, 2012; Prescott & Shi, 2008). However, the amount of research to this phenomenon is still limited (Kunisch et al., 2017). This thesis contributes therefore to the M&A literature by addressing the motion of rhythm in the Energy and Power Sector. Building on organization theory, behavioural theory and information-processing theory, previous research suggests a positive relationship between an even-paced rhythm, i.e. a regular and predictable

pattern of M&As, and firm performance. This positive relation can be reasoned by for example a better utilization of a firm's absorptive capacity (Vermeulen & Barkema, 2002), a reduction of time pressure diseconomies (Laamanen & Keil, 2008; Vermeulen & Barkema, 2002), and the creation of routines (Brown & Eisenhardt, 1997; Shi & Prescott, 2012). However, an even-paced rhythm can also have some disadvantages, such as the creation of blind spots, the development of ritualized behaviour, and the suppression of creativity (Shi & Prescott, 2012). Drawing on these theories, I argue that the relationship between the rhythm of M&As and post-acquisition performance exhibit an inverted U-shaped pattern, with an even-event paced rhythm gaining the highest performance and an event-paced rhythm the lowest.

The third research gap this thesis examines is the moderation effect of rhythm. Drawing on prior research and combining different perspectives, this study explores the role of rhythm in the relations between (i) entry time and post-acquisition performance and (ii) pace and post-acquisition performance. Prior research has shown that the number of acquisitions performed by a firm moderates the relation between the position in an acquisition wave and acquisition returns (McNamara et al., 2008). Building on the work of McNamara et al. (2008), I argue that rhythm moderates the relationship between entry time in a merger wave and post-acquisition performance in a way that the relation is weaker for firms following an even-paced rhythm. Subsequently, drawing on the literature on pace and rhythm, I argue that firms that expand quickly may reduce the negative effects of this strategy by following an even-paced rhythm, as they may reduce the managerial costs associated with a high pace of M&As by increasing the learning effects (Hashai et al., 2008; Klarner & Raisch, 2013; Laamanen & Keil, 2008; Vermeulen & Barkema, 2002), reducing time compression diseconomies and risk overload (Dierickx & Cool, 1989; Klarner & Raisch, 2013; Hashai et al., 2008), and reducing the likelihood that practices of prior experiences are unavailable, inaccessible and/or inapplicable (Hashai et al., 2018; Hayward, 2002). In other words, I expect that firms following a rapid but even-paced rhythm are more likely to generate higher post-acquisition performance, than firms following a rapid but event-paced rhythm.

This thesis focuses on the Energy and Power industry, which covers all firms involved in the production and sale of energy, including fuel extraction, manufacturing, refining and distribution. I selected this industry because it has experienced various developments in the last decades that led to an increasing number of M&As in the industry. Especially, since the 1990s the number of M&As in the energy sector has trended upward and is expected to continue for the foreseeable future (Franklin, n.d). This trend can be explained by various developments in the environment such as the deregulation of the sector in various countries (Kishimoto, Goto & Inoue, 2017; Verde, 2008), an increasing shift to renewable energy sources (Eisenbach, Ettenhuber, Schiereck, & von Flotow, 2011; Yoo, Lee & Heo, 2013) and massive forces of technology, globalization, industry transformation and entrepreneurial innovations (Kumar, 2012; Leggio & Lien, 2000). As a result, firms in the Energy and Power Sector have been forced to change their business models, resulting in an increasing number of M&As (Kishimoto et al., 2017; Verde, 2008). Moreover, due to these developments, the fact that access to

energy is one of the most important needs for human development, in both developed and developing nations (Gaye, 2007), and the Energy and Power industry has a tremendous impact on the economy (Bartunek, Jessel & Madura, 1993), it is of great importance to identify moderators in the relationship between M&As and post-acquisition performance.

This research will contribute to strategic management research as it attempts to sharpen the temporal lens on strategic actions and in particular M&As, which can generate important new insight for organization research (Kunisch et al., 2018; Shi & Prescott, 2012). Only a limited number of scholars have paid attention to the question when, in which pace and in which rhythm to make M&As to achieve superior post-acquisition performance (Shi et al., 2012). Moreover, to my knowledge, this is the first research which focuses on the effect of timing in the Energy and Power industry. For researchers and practitioners, it is of major importance to know if entry time, pace and rhythm affects post-acquisition performance. This research has therefore practical implication for business practice because it shows whether these three constructs influence post-acquisition performance. If it is shown that time moderates the relation between M&As and performance, scholars, policy makers and managers can better anticipate on this. For example, if it is found that the pace and rhythm of M&As influence post-acquisition performance, managers can attempt to create a specific pattern in their M&A strategy.

In sum, this thesis aims to address the following research question: *When and in which pace and rhythm do M&As need to be taken to increase the likelihood of post-acquisition success in the Energy and Power Sector?* More specifically, this study tries to answer the following four questions:

1. Does entry-time in an industry merger wave affects post-acquisition performance in the Energy and Power Sector
2. Does the pace of M&A activities – defined as the average number of M&As that a firm carry out over a given time period – affects post-acquisition performance in the Energy and Power Sector?
3. Does the rhythm of M&A activities – defined as the pattern of variability in the frequency of M&As over a specified time period – affect post-acquisition performance in the Energy and Power Sector?
4. Does rhythm affect the relationships between (i) entry time and post-acquisition performance and (ii) pace and post-acquisition performance in the Energy and Power Sector?

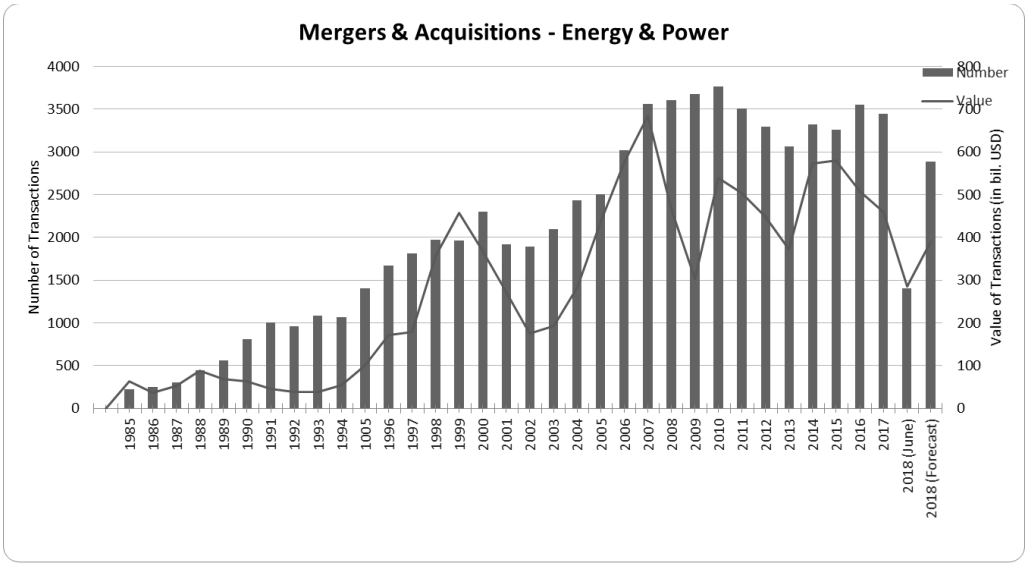
The remainder of this thesis is organized as follows. First, the theoretical framework is given and hypotheses are developed. Next, the methodology is presented. The methodology section contains a brief description of the sample, the identification of industry merger waves and an overview of the variables included in the analyses. Next, the results of analysis are presented and discussed. Finally, the theoretical and practical implications of these finding and directions for future research are addressed.

2. Theoretical Framework and Hypotheses

2.1. Industry background: Energy and Power industry

This study focuses on the Energy and Power industry, which covers all firms involved in the production and sale of energy, including fuel extraction, manufacturing, refining and distribution. Till the early 1990s, the global Energy and Power industry was characterized by a small number of extremely large firms (Bartunek et al., 1993). However, since the 1990s the Energy and Power industry have changed dramatically due various developments in the environment, resulting in an enormous growth of the number of M&As (see figure 1). First, since Christensen and Greene (1976) demonstrated that a small number of extremely large firms are not required for efficient production, scholars and policy makers have gradually recognized that electric power generation is no longer a natural monopoly due to the development of cost-effective technologies (Kishimoto et al., 2017). This resulted in the liberalization of the Energy and Power industry in various countries (such as the United Kingdom, the United States, and the members of the European Union). The purpose of liberalization is to allow competition to enter the Energy market, in favour of consumers. Second, since global warming has become a topic of social and political interest, the energy industry is undergoing major changes (Eisenbach et al., 2011). For example, governments stimulate organizations to invest in the renewable energy industry, such as the use of solar, wind, hydro, geothermal and tidal energy sources (Eisenbach et al., 2011) and the demand for renewable energy sources is increasing (Yoo et al., 2013). Third, massive forces of technology, globalization, industry transformation and entrepreneurial innovations have led to a changed business environment in the Energy industry (Kumar, 2012; Leggio & Lien, 2000).

FIGURE 1
Number of M&As in the Energy and Power industry. Retrieved from Imaa (2018).



Due to these developments, established organizations were forced to change their business models and various new ventures entered the market (Kishimoto et al., 2017; Markard & Truffer, 2006; Verde, 2008), resulting in a rapid growth of the industry over the last decades. Electrics utilities now have to compete for customers in the fields of power generation, trading and sales (Markard & Truffer, 2006). The growth and transformation in the Energy industry have led to a strong increase in M&As (Eisenbach et al, 2011). By acquiring other companies, firms attempt to create appropriate economic rents for shareholders (Holburn & Vanden Bergh, 2012), through economies of scale and scope (Becker-Blease, Goldberg & Kaen, 2008; Holburn & Vanden Bergh, 2012), synergies (Bartunek et al., 1993; Brahma, Boateng, & Ahmad, 2018) and the adaption of new technologies and knowledge (Kishimoto et al., 2017). Examples of recent M&A transactions in the Energy and Power sector are the acquisition of BG Group by Royal Dutch Shell for $53 billion and the merger between Sunoco Logistics Partners LP and Energy Transfer Partners LP.

As stated in the introduction, prior research on post-acquisition firm performance have shown that acquiring firms generally do not benefit from making acquisitions in both the short- and long-term (Faulkner et al., 2012; Haleblian et al., 2009). Research on M&As in the Energy industry reports mainly similar results (Becker-Blease et al., 2008; Bartunek et al., 1993; Berry, 2000; Brahma et al., 2018; Datta, Kodwani & Viney, 2013; Leggio & Lien, 2000).[1] However, some of these studies shows that the negative effect between M&As and post-acquisition performance in the Energy industry is smaller compared to other sectors (Becker-Blease et al., 2008; Datta et al., 2013). This can be explained by the fact that acquisitions by utility firms, such as electric utilities, are subject to a unique set of circumstances which may influence the creation of economic rents. First, the Energy industry is characterized by a high degree of government involvement. M&As are therefore often subject to straight regulations imposed by regulators (Bartunek et al., 1993; Berry, 2000; Holburn & Vanden Bergh, 2012; Leggio & Lien, 2000; Datta et al., 2013). For example, regulators may impose restrictions regarding to geographical proximity of the target and they may want to attain much of the merger's economic benefits for the customers, leaving little for shareholders (Berry, 2000). Second, utility firms usually had notable cash obligations in the form of common stock dividends in the past, resulting in low cash flows to purchase potential targets (Bartunek et al., 1993; Berry, 2000). Third, due to the protectionism of the Energy industry till the 1990s, companies in the Energy industry have little experience in acquiring and integrating other companies (Datta et al., 2013). Fourth, the Energy industry are marked by some distinct economic characteristics, such as a low-price elasticity (Brahma et al., 2018) and a high degree of stability and inertia (Markard & Truffer, 2006). Due to these circumstances, the Energy industry may differ from other industries, which affect the relation between acquisitions and post-acquisition performance. These differences must be taken into account in the remainder of this research.

[1] See differentially: Kwoka & Pollit, 2001.

2.2. Industry Merger Waves and the Role of Entry Time

2.2.1. Merger waves

It is well known that M&As often occur in merger waves (see, e.g. Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008). Merger waves can be defined as periods of intense and concentrated merger activity which exhibit a wave-like pattern (Andrade et al., 2001; Fuad & Sinha, 2017; Harford, 2005). A merger wave begins with an impressive increase in the number of M&As relative to the prior period. Subsequently, this intense period of activity reaches a plateau, which can continue for a few years. Finally, there is a significant drop in the overall activity as the number of M&As returns to pre-wave levels (Haleblian et al, 2012).

Over 50 percent of all acquisitions in the United States that occurred between 1890 and 1990 took place during one of four merger waves (Stearns & Allan, 1996) and five major merger waves occurred during the last century (Martynova & Renneboog, 2008; Stearns & Allan, 1996). The first merger wave, also called the Great Merger Wave, occurred at the turn of the century and was largely characterized by horizontal consolidation of industrial production (1897–1903). The second merger wave took place during the 1920s and tended to consist of vertical mergers between small companies left outside the monopolies created during the previous wave. The third merger wave occurred during the 1960s, and consisted of a high number of diversifying takeovers, i.e. mergers between unrelated firms, that led to the development of large conglomerates. However, the conglomerate structures created during the third wave had become inefficient by the 1980s such that companies were forced to reorganize their businesses. This led to the fourth merger wave, which focused on increased specialization. The fifth merger wave occurred at the turn of the last century (1993–2001) and consisted of both horizontal and vertical mergers which allowed organizations to compete in the globalizing market.

Next to these aggregate merger waves, various research documents a clear clustering of waves within industries (Andrade et al., 2001; Carow et al., 2004; Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008; Mitchell & Mulherin, 1996; Mulherin & Boone, 2000). Based on the findings of Harford (2005), industry merger waves can be explained by the neoclassical model:

> *(…) once a technological, regulatory, or economic shock to an industry's environment occurs, the collective reaction of firms inside and outside the industry is such that industry assets are reallocated through mergers and partial-firm acquisitions. This activity clusters in time as managers simultaneously react and then compete for the best combinations of assets.* (Harford, 2005, p. 533).

In other words, industry merger waves are driven by economic, regulatory and technological shocks. However, not all shocks will lead to a merger wave; whether a shock leads to a merger wave depends on if there is sufficient overall capital liquidity presented. In other words, both industry-level shocks and

sufficient capital liquidity are required for a merger wave to occur. In case there is not sufficient capital liquidity involved, economic, regulatory and technological shocks may lead to M&As but not to an industry merger wave.

The related industry in this thesis, the Energy industry, experienced a number of shocks in the past decades which have led to various merger waves in the industry (Leggio & Lien, 2000; Verde, 2008). An example of a regulatory shock in the related industry is the liberalization of the energy sector in various countries, which have led to an increasing number of M&As with foreign or national companies (Verde, 2008). For example, the liberalization of the US energy industry (introduced by the Energy Policy Act of 1992) have led to a merger wave during the period 1994-2003 in the United States (Kwoka & Pollitt, 2010). Moreover, various other economic and/or technological industry shocks have necessitated transformation of the Energy and Power sector, such as the increasing shift to renewable energy sources (Yoo et al., 2013) and massive forces of technology, globalization, industry transformation and entrepreneurial innovations (Kumar, 2012; Leggio & Lien, 2000).

2.2.2. First-mover advantages

Exactly thirty years ago, Lieberman and Montgomery (1988) introduced the most prevalent framework to explain the entry time – firm performance relationship: the first-mover advantage framework. This framework argues that a firm that enters a given market before its rivals gains a competitive advantage (Lieberman and Montgomery, 1988). First-mover advantage can be defined as "the ability of pioneering firms to earn positive economic profit" (Lieberman and Montgomery, 1988, p. 41). In other words, by acting early relative to peers, companies may establish a sustainable competitive advantage by acquiring and developing valuable, rare, non-substitutable and inimitable resources (Barney, 1991; Penrose, 1959). The first-mover advantage framework represents an important concept in strategic management literature and business practice, and has been supported in various other disciplines, such as economics, marketing, consumer behaviour and entrepreneurship/innovation literature. Prior research has shown that first-movers have long-term market share advantages, which arise from (i) technological leadership, (ii) pre-emption of assets, and (iii) the creation of buyer switching costs (Lieberman & Montgomery, 1998). Building on the first-mover advantage framework, prior research has shown that entry time – defined as the relative timing of a product, business or a competitive action of a firm compared to its competitors (Dykes & Kolev, 2018; Fuad & Sinha, 2017) – is often critical to a firm's success (Zachary, Gianiodis, Payne & Markman, 2015).

Although the extensive literature on first-mover advantage, only a limited number of researchers have addressed the notion of first-mover advantage in industry merger waves. Prior research of US- and India-firms shows that the timing of participation in an industry merger wave matters, as early movers outperform later ones (Carow et al., 2004; Fuad & Sinha, 2017; McNamara et al., 2008). Carow et al. (2004) found in a study of U.S. mergers and acquisitions, that early-mover acquisitions within an industry merger wave leads to a higher total shareholder returns than acquisition made later in the

industry wave. Building on the findings of Carow et al. (2004), McNamara et al. (2008) found strong support that acquisition return exhibits a U-shaped pattern over the period of an acquisition wave, with early movers gaining the highest returns. In other words, companies acting early and late in industry waves are more likely to experience positive acquisition returns, and companies acting during the middle stages of the industry waves the worst. In line with the above studies, Fuad and Sinha (2017) found that Indian business groups benefit from acting early in a merger wave. However, to my knowledge, there is no study which examined the effect of entry time on post-acquisition performance in the Energy and Power industry.

Building on prior research on entry-time, I argue that entry time in a merger wave is a critical factor as early-movers benefit from asymmetric information to pre-empt their competitors, which provide early-movers various advantages (Carow et al., 2004; Fuad & Sinha, 2017; McNamara et al. 2008). This is because of several reasons. First, early-movers may benefit from asymmetric information by acquiring a target at a lower price than its competitors. An early-mover acquire may possess superior information that allows it to identify opportunities before rivals perceive their true value. In other words, an early-mover has more information about a target's value than other capital market investors. As a result, early-movers position themselves to serve the market more effective and efficient than their late-moving competitors (McNamara et al. 2008). Moreover, stock prices within an industry increase significantly when takeover attempts are announced (Rosen, 2006) which will result in higher prices later in the wave. Second, building on the resource-based view, firms can achieve a sustainable competitive advantage by acquiring or developing resources that are valuable, rare, non-substitutable and inimitable (Barney, 1991; Penrose, 1959). Early-movers with superior asymmetric information have access to a greater pool of targets than late-movers, allowing firms to benefit from 'cherry-picking'. By acting early in a merger wave, firms can acquire the target that has the greatest potential. This may result in higher economic profits (Makadok, 2001), abnormal acquisition returns (Barney, 1988; Carow et al., 2004) and economic rents (McNamara et al., 2008). Third, cherry-picking may also lead to an increased chance of the possibility to benefit from synergies. This is because early-mover are better able to identify, purchase and restructure assets that procures synergies: i.e. 1+1=3 (Barney, 1988). These synergies may arise due economies of scope in production, market power or informational economies (Mahoney & Mahoney, 1993). Especially in the Energy sector, early-movers may benefit more from cherry picking as the pool of potential M&A targets for utilities firms is already often limited due to stringent requirements and more regulatory inspection (Berry, 2000).

In sum, the above arguments suggest that early-movers are likely to create advantages through the selection of superior combinations of resources which may lead to a sustainable competitive advantage (Barney, 1991; Carow et al., 2004; Fuad & Sinha, 2017; Penrose, 1959;). Firms moving later in a wave are more likely to face higher stock prices and a limited pool of potential targets, reducing the possibility to achieve superior post-acquisition performance. However, prior research has found several moderators in the relationship between entry time and firm performance, such as country, culture and

degree of institutional development and legal arrangements (see for an overview Dykes & Kolev, 2018).[2] Furthermore, McNamara et al. (2008) found that industry munificence and market stability moderate the relation between entry time in an industry wave and post-acquisition performance. Industry munificence moderates the negative trend in returns over the course of a merger wave. In more munificence markets firms often undertake M&As to facilitate growth, resulting in greater competitors for targets. Especially later in a wave the competition will lead to higher costs of acquisitions, resulting in a stronger trend between entry time and post-acquisition performance in more munificent industries. Further, the degree of market dynamism moderates the negative relation between entry time and post-acquisition performance, in way that in more stable industries the relation is stronger. This moderation effect is reasoned by stating that the ability of early movers to establish technological leadership is greater in stable than in dynamic markets. In more dynamic markets, the value of moving early is uncertain, as any advantage a firm stakes out can be quickly eroded or imitated. Additionally, firms in stable markets are more likely to acquirer inferior assets as technological uncertainty is less likely to exist. Identification and acquisitions of potential targets depends more on intractable resource endowments and know-how than on luck or opportunity. Building upon the above, I expect a strong negative trend between entry time and post-acquisition performance in the Energy and Power industry, as this industry is characterized by a munificence and stable market. Early movers in an industry merger wave are more likely to have superior post-acquisition performance. Accordingly, I propose the following:

> ***Hypothesis 1:*** *There is a negative relationship between entry time in an industry wave and post-acquisition performance in the Energy and Power Sector.*

2.2.3. First-mover disadvantages and bandwagon effect

In spite of the above mentioned first-mover advantages, several scholars have argued that being a late mover can also bring some advantages as well (e.g. Andonova et al., 2013; Boulding & Christen, 2001; Lieberman & Montgomery, 1998; Shankar, Carpenter, & Krishnamurthi, 1998; Suarez & Lanzolla, 2005). Prior research on late mover advantages in M&As have shown that firms acting late in an industry merger wave may experience superior post-acquisition performance. McNamara et al. (2008) found some evidence that U.S. firms do better acting later in a merger wave in dynamic markets. Further, a research of privately held firms shows that firms that perform M&As late in waves show stronger performance than early ones (Andonova et al., 2013). In other words, they found evidence for late-mover advantages in merger waves. In line with Andonova et al. (2013), Steigner and Sutton (2015) found in a study of U.S. acquirers, that late-movers tend to outperform early-movers in cross-border

[2] In particular with regard to internationalization.

acquisitions in countries with similarities to the U.S., in terms of language, legal system, shareholder protection and culture.

There are various arguments in favour of the existence of a late-mover advantage in industry merger waves. First, late movers may be able to "free ride" on some of the costs shouldered by the first-mover. For example, late-movers might be able to save innovation costs by freeriding on early movers' investments in areas such as R&D and infrastructure (Steigner & Sutton, 2015). Second, when entering a market first, pioneers may face various large technological and market uncertainties, which may result in cost disadvantages (McNamara et al., 2008; Shankar et al., 1998; Steigner & Sutton, 2015). Late movers may avoid these costs associated with market dynamics, by solution of technological and market uncertainty (Lieberman & Montgomery, 1998). Third, early movers may face disadvantages caused by shifts in changes in the market, including changes in technology, customer needs and product market. Late movers are better able to develop resource sets better fitted to the dynamic environment, and therefore may create an advantage over first movers (Andonova et al., 2013; McNamara et al., 2008). However, as the Energy industry is a relative stable market with an inelastic demand, it is expected that late movers in the Energy industry do not benefit from some of the above-mentioned benefits as companies in other, more dynamic, industries. On the other hand, due to the increasing interest in renewable energy sources, the energy industry has as entered a transition period in which innovation has become more important than ever. Companies have to search new ways to develop reliable, affordable and clean energy to getting a significant reduction of greenhouse gases (Bosetti, Carraro, Massetti, & Tavoni, 2008; Kammen, 2006; Liserre, Sauter, & Hung, 2010; Sagar, & Van der Zwaan, 2006). Therefore, it is expected that especially firms focusing on renewable energy sources benefit from some of the late-mover advantages. Further, acquiring firms can learn from previous acquisitions of other acquirers in the country (Francis, Hasan, Sun & Waisman, 2014), which may result in higher post-acquisition performance for late movers. Fourth, from a resource dependence theory perspective (Pfeffer & Salancik, 1978), it can be argued that firms in a rapidly growing market, such as the Energy industry, experience less adverse effects of acting late in a merger wave (Gomez, Lanzolla & Maicas, 2016). Due to the fast-growing market, the pool of potential targets will not reduce exponential to the number of M&As performed. As a result, at any point in time, there will be sufficient potential targets to allow firms to acquire firms with good potentials (Gomez et al., 2016; Suarez & Lanzolla, 2007). In other words, high market growth has the potential to allow followers in a merger wave to successfully engage in M&As.

Building on the above, I expect that late movers in the Energy sector may reduce some of the negative effects of being a late mover, resulting in an improvement of their post-acquisition performance. Firms acting in the peak of a wave however do not benefit from both first-mover advantages and late-mover advantages. As a result, I expect firms acting at the peak of the wave to have the worst post-acquisition performance. Next to this, firms acting in the peak of a wave are likely to face significant costs due to the so-called bandwagon effect (Abrahamson & Rosenkopf, 1993). Bandwagons

are diffusion processes in which firms increasingly adopt a strategic action, due to the social pressure caused by a growing number of others undertaking the same action (Fiol & O'Connor, 2003). This implies that many firms will enter a merger wave, not because of their individual assessments of the strategic value of undertaking acquisition or merger, but because they follow a going acquisition trend. Due to the bandwagon effect, firms acting at the peak of a wave may face various disadvantages. First, firms following a going trend may follow different decision processes than early adopters (McNamara et al., 2008). As McNamara et al. (2008) states, "firms following a bandwagon restrict the scanning they undertake, are less likely to consider contradictory information, and are less mindful in their decision evaluation" (p. 116). In other words, firms acting in the peak of the wave are less likely to undertake an extensive analysis of the strategic actions and implications, and therefore less accurate in their decision assessment. Poorly made decision will likely lead to inferior post-acquisition performance. Second, firms jumping on a bandwagon may experience greater acquisition costs since they collectively bid up the prices of the remaining targets (McNamara et al., 2008). This may result in an overpayment for a target or acquisitions not in line with a firm's strategy. Moreover, prior research has shown that the bandwagon effect is enhanced in munificence industries, that is, in an industry with a high growth rate (McNamara et al., 2008). As the Energy industry shows a high growth rate, it is expected that firms acting at the peak of a wave will show inferior post-acquisition performance.

Drawing upon theory on early-mover advantages, bandwagon effect and late-mover advantages, I argue that post-acquisition performance exhibit in a curvilinear relation over a wave period. However, I suspect that late mover advantages do not outweigh first-mover advantages and therefore post-acquisition performance will bottom out after the peak of the wave has passed, but showing some improvements as the wave completes itself. Accordingly, I propose the following:

> ***Hypothesis 2:*** *The relationship between entry time in an industry merger wave and post-acquisition performance in the Energy and Power Sector is characterized by a U-shaped pattern, with early movers gaining the highest returns.*

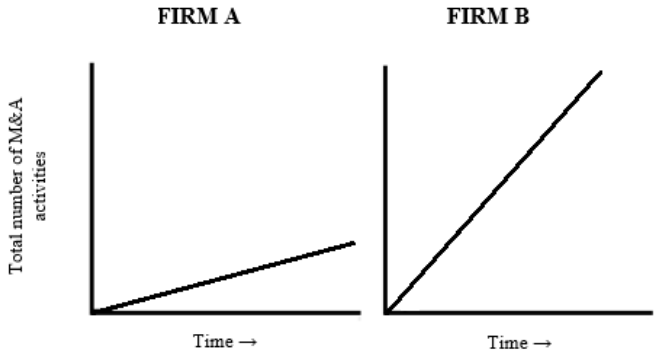
2.3. The Pace of M&As

Firms often engage in repetitive acquisitions to execute their strategy (Haleblian et al., 2006; Schipper & Thompson, 1983), which can result in difference between firms in the pace and rhythm of their M&A strategy. Pace is defined as the average number of M&As that acquirers carry out per year over a given time period, which is the most-used definition of pace in management research (Kusewit, 1985; Laamanen & Keil, 2008; Lin, 2014; Vermeulen & Barkema, 2002; Wang, Ning, & Zhang, 2017).[3]

[3] Also called acquisition rate or frequency rate. Klarner and Raisch (2013) use another definition of pace, namely "the time spam between sequential changes". This definition looks only between the time span between two events. This research however attempts to picture the influence of multiple events on post-acquisition performance. The definition used by Klarner and Raisch (2013) is therefore limited in compare to the definition used in this study. Therefore the definition mentioned in the article is used.

Figure 2 illustrates a high and low pace of M&A activities. A low pace is characterized by a low average number of M&As per year (firm A). On the other hand, a high pace is characterized by a high average number of M&As per year (firm B). Pace must be differentiated from the notion of speed, as pace involves multiple events over a specific period (Laamanen & Keil, 2008). Speed, on the other hand, refers to the time it takes to carry out any acquisition process and focuses therefore on a single event (Shi et al., 2012). Vermeulen and Barkema (2002) were the first which investigate the role of these concepts on firm performance. Building on their research, I expect that the pace with which firms engage in M&As affects an acquirer's post-acquisition performance.

FIGURE 2
Low and high pace of expansion patterns



2.3.1. Advantages of a high pace

Drawing on previous literature on pace, it can be argued that a high pace of M&As has several advantages. First, building on work from organization learning theory it is often argued that firms with previous acquisition experience outperform those without such experiences (Haleblian & Finkelstein, 1999). Organizational learning refers to processes by which organizations encode inferences from experience into knowledge or routines for the future (Argote, 1999; Muehlfeld, Sahib, & Van Witteloostuijn, 2012). Acquiring firms face various difficulties associated with M&As, such as differences in corporate cultures and management styles, retrenchments, the increased size and management scope of the combined company and cultural differences, such as language, business practices and national cultures (Nadolska & Barkema, 2007). To overcome these disadvantages, organizations need to develop acquisition capabilities. Acquisition capabilities can be defined as "the knowledge, skills, systems, structures, and processes that a firm can draw upon when performing acquisitions", and "include organizational skills such as the ability to identify suitable acquisition targets, negotiate the deal, and manage the integration process" (Laamanen & Keil, 2008, p. 664). As the creation of valuable acquisition capabilities require multiple acquisitions (Haleblian & Finkelstein, 1999), firms that frequently engage in multiple acquisitions may benefit from organization learning and the creation of acquisition capabilities (Hayward, 2002; Laamanen & Keil, 2008). In other words, firms

have to learn from previous acquisitions to develop the knowledge and routines needed to overcome the challenges associated with M&As (Nadolska & Barkema, 2007). Moreover, serial acquires are more likely benefit from access to new resources and external knowledge from the targets, which may result in the creation or adoption of new and more efficient routines and processes (Hashai et al., 2018).

Second, organization theory scholars have argued that a high pace of organization change prevent firms from inertia and facilitate organizational adoption (Klarner & Raisch, 2013). Inertia refers to a firm's ability to response to change and the time it takes to obtain, process and evaluate information from its environment (Steen, 2008). Moreover, a low pace of organizational change may lead to the development of routines, which in turn can give rise to inertia (Hannan & Freeman, 1984) and competency traps (Levinthal & March, 1993). As a result, organizations can become inflexible and unable to adopt to changing environment conditions, which can be detrimental for a firm's long-term development (Gresov, Haveman & Olivia, 1995). Therefore, a high pace of M&As can help organizations to overcome inertia and enhances firm flexibility (Hashai et al., 2018; Klarner & Raisch, 2013), which subsequently enhances firm profitability.

Third, a high pace of M&As increases the likelihood that the inferences from the prior experiences are available, accessible and applicable (Hayward, 2002). For example, a (too) long period of time between acquisition may result in the dissolution of the personnel that took part in previous acquisitions processes, leading to the loss of valuable knowledge and experiences. As a result, firms are less able to apply knowledge gained from earlier experiences (Laamanen & Keil, 2008; Hashai et al., 2018).

Next to these explanations, scholars have mentioned various other explanations why firms that change fast may be more successful than firms who are stable. For example, Hashai et al. (2018) argue that firms that expand their alliance portfolios quickly may be more successful than firms that expand their alliance portfolios slowly, because of greater product differentiation, faster product development cycles and an enlargement of the customer base. These reasons may also apply to firms that engage in multiple M&A acquisitions rapidly. For example, if a firm acquires another firm in another country they may enter a new market, which increases their customer base, which subsequently may lead to higher post-acquisition performance. Further, Klarner and Raisch (2013) argue that a fast-paced organization change can facilitate the development of routines for change, i.e. routines that enhance organization change. For example, the establishment of a change routine to continuously screen for potential acquisition targets (Barkema & Schijven, 2008).

2.3.2. Disadvantages of a high pace

Next to the advantages of a high pace of M&As, various scholars argued that firms are less likely to realize the full profit potentials of M&As when they engage in multiple M&As in a (too) high pace. As stated before, serial acquirers may benefit from the development of acquisition capabilities and routines. However, developing these valuable acquisition capabilities and routines requires sufficient time (Hayward, 2002; Laamanen & Keil, 2008). In case of a (too) high pace of M&As, firms may not

fully benefit from the learning effects of previous M&As, due to a firm's limited absorptive capacity. Absorptive capacity refers to a firm's ability to acquire, assimilate, transform, and exploit new knowledge (Zahra & George, 2002). Previous research has shown that firms with a high level of absorptive capacity benefit more from, for example, international venturing (Zahra & Hayton, 2008) and alliances (Lin, Wu, Chang, Wang, & Lee, 2012). Thus, firms have to take their absorptive capacity into account to fully benefit from their strategic event. In case of a (too) high pace, firms may not fully benefit from their strategic actions. Moreover, a (too) high pace of M&As may lead to time compression diseconomies (Dierickx & Cool, 1989; Hashai et al., 2018; Klarner & Raisch, 2013; Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). Time compression diseconomies can be defined as "inefficiencies that occur when things are done faster" (Jiang, Beamish & Makino, 2014, p. 115) and emerge due to bounded rationality and limited cognitive scope (Vermeulen & Barkema, 2002). In case of M&As, this may lead to a deterioration of the identification of potential synergies (Hashai et al., 2018), a reduction of learning effects and the development of acquisitions capabilities (Laamanen & Keil, 2008), difficulties in changing organization routines (Hashai et al., 2018), and a reduction of the chance of a successful post-merger integration (Shrivastava, 1986). Especially in the Energy and Power sector it is suggest that companies need sufficient time to fully benefit from their acquisitions, as most companies have little experiences with M&As due to the protectionism of the Energy industry till the 1990s. The level of a firm's absorptive capacity is namely largely a function of the firm's level of prior related knowledge (Cohen & Levinthal, 1990), resulting in a low absorptive capacity for many firms in the Energy industry (in particular in the 1990s) (Datta et al., 2013).

In sum, it can be argued that a high pace of M&As has both advantages and disadvantages. In line with these mixed arguments, previous research has shown inconsistent findings regarding the relationship between pace and post-acquisition performance. In a study of Israel high technology firms, Hashai et al. (2018) found that expansion speed increases both firm revenues and managerial costs. But as they found that the managerial costs rice more than the revenues, the net effect showed a negative relation between the speed of the alliance portfolio expansion and profitability. In line with Hashai et al. (2018), Laamanen and Keil (2008) found in a study of U.S. public firms that a high acquisition rate negatively affected the acquirer's performance. However, Hayward (2002) and Kusewitt (1985) found that there is an inverted U-shape relationship between acquisition pace and post-acquisition performance. In other words, firms that engage in M&A activities on a moderate level achieve the highest post-acquisition performance.

Building on these contradictory arguments in favour for either a high or low pace, I expect that the relationship between the pace of M&As and post-acquisition performance is characterized by a U-shaped pattern. Firms that follow an average pace are likely to benefit from the advantages of a high pace of M&As and simultaneously decreases the negative effects, by creating sufficient time between M&As to learn from previous experiences. Accordingly, I propose the following:

Hypothesis 3: *The relationship between the pace of M&As and post-acquisition performance in the Energy and Power sector is characterized by an inverted U-shaped pattern.*

2.4. The Rhythm and Predictability of M&As

As mentioned before, firms often engage in repetitive acquisitions to execute their strategy (Haleblian et al., 2006; Schipper & Thompson, 1983), which may lead to a specific pattern of M&A activities over time. Other than pace, rhythm captures not only the average number of changes in the give time period but also the temporal patterns of those changes. The rhythm of M&As centers on multiple changes and the temporal distance between them (Kunisch et al., 2017). Drawing upon historical sociology, Shi and Prescott (2011) empirically identified seven different sequence patterns of small and medium-sized pharmaceutical firms' acquisitions and alliances initiatives over their life history. Moreover, examining the seven patterns from a meta-level, there appears to be three meta-sequence patterns: (i) a predictable pattern, (ii) an unpredictable pattern, and (iii) non-players. Predictable patterns imply that firms keep, most of the time, a predictable rhythm to their strategy, doing one or two acquisitions or alliances every year or every other year. Unpredictable patterns show an irregular rhythm of acquisition or alliances initiatives. Last, some firms do not show a specific pattern because they did not perform, or to a very limited extent, acquisition or alliances during the period studied.

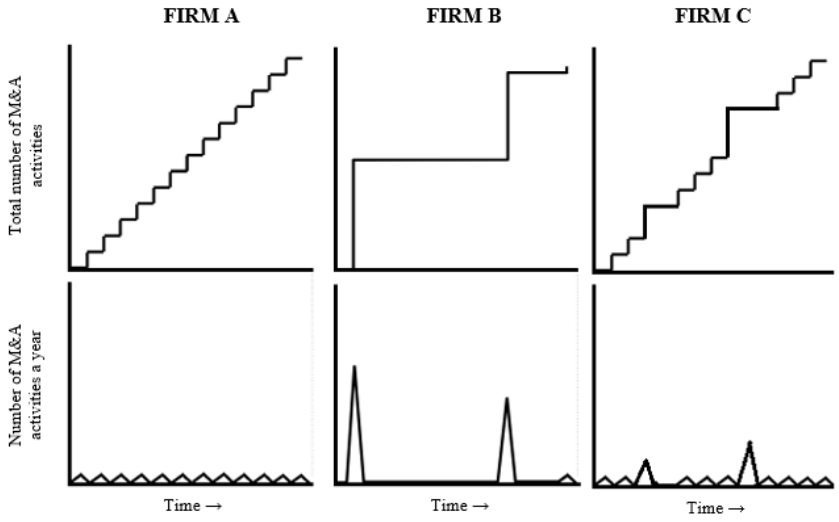
In this thesis rhythm is defined as the pattern of variability in the frequency of M&S activity over a specified time period (Ancona & Chong, 1996). Variability of the acquisition rate is a measure of the sequencing of a firm's acquisitions in an acquisition program (Laamanen & Keil, 2008). In line with Shi and Prescott (2012), I distinguish three rhythm patterns: (i) an even-paced rhythm, (ii) an event-paced rhythm, and (iii) an even-event-paced rhythm. Figure 3 illustrates these rhythms. The upper graphs depict the number of M&As performed by the firm. The bottom graphs depict the change in M&As. An even-paced rhythm is characterized by low variability in the timing of repetitive M&A activities, which indicates a constant and predictable rhythm (firm A). An event-paced rhythm is when there is a low variability in the timing of repetitive M&A activities, which indicates an irregular and unpredictable rhythm (firm B). Moreover, firms can follow an even-event-paced rhythm, where M&As follow an even-paced for a time but are responsive to opportunities in the environment (firm C).

2.4.1. Advantages of an even-paced rhythm

Drawing on the notions of organizational learning (Argote, 1999), organization routines (Nelson & Winter, 1982), time compression diseconomies (Dierickx & Cool, 1989) and absorptive capacity (Cohen & Levinthal), prior scholars have theorized and found empirical support that an even-paced rhythm of acquisitions is positively related to performance. For example, Vermeulen and Barkema (2008) reasoned that there is a positive relationship between a constant and predictable rhythm and

performance and Laamanen and Keil (2008) argues that a constant and predictable rhythm contributes to a smoother utilization of the managerial capacities. Building on these studies, I argue that an even-paced rhythm outperforms event-paced rhythm for the following reasons.

FIGURE 3
Rhythmic and irregular expansion patterns. Adapted from Vermeulen & Barkema (2002).[4]



First, firms following an even-paced rhythm are better able to utilize a firm's absorptive capacity (Vermeulen & Barkema, 2002). Firms that acting in a regular and predictable pattern are more likely to interpret and absorb their experiences because they can relate them to similar action in their recent past. As a result, firms are more flexible and capable to implement and absorb changes. Prior research generally suggests a positive relationship between a firm's absorptive capacity and firm performance (Cohen and Levinthal, 1990; Zahra and George, 2002). Additionally, an event-paced rhythm, involving large peaks of rapid expansion followed by long periods of inactivity, may lead to overload of organizations or managers, which decreases the absorptive capacity and decision quality (Vermeulen and Barkema, 2002). Moreover, a firm's absorptive capacity will be reduced by periods of inactively (Cohen & Levinthal, 1990; Eisenhardt & Martin, 2000; Vermeulen and Barkema, 2002).

Second, partly due to lower absorptive capacity, firms following an event-paced rhythm are more likely to face time pressure diseconomies (Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). These time pressure diseconomies can have negative effects on the decision-making process (Payne, Bettman & Johnson, 1993), that could compromise the quality of their analysis (Laamanen & Keil, 2008). Moreover, an even-paced rhythm of M&As contributes to an effective and smooth utilization of the managerial attention (Laamanen & Keil, 2008). Since M&As require a significant amount of time, time constraints can have negative effects on the M&A process (Penrose, 1959). An event-paced rhythm,

[4] An even-event-paced (Firm C) has been added by the author.

with a large peak of expansion, can strain the organization to the limit of its capacity (Kusewitt, 1985; Shaver, 2006), which negatively impacts the amount of information gathered (Christensen-Szalanski, 1980) and negotiation behaviour (Saorín-Iborra, 2007). This is especially the case in the Energy and Power sector, as electric utilities firms have little experiences with M&As. A too high pace of M&As may therefore lead to not fully exploit the benefits of M&As.

Third, an even-paced rhythm enables organizations and managers to pace their work, synchronize their energies, and reach a state of 'flow', as Brown and Eisenhardt (1997) found for six firms adopting innovation in the computer industry. Transitions at predictable times are therefore more likely to create a focusing flow of attention that enhances performance. Moreover, being in a 'flow' enhances routine development because managers acquire acquisitions and alliance know-how in a smooth and consistent way, which can increase the knowledge regarding target identification, integration processes, due diligence, deal negotiation and the establishment of a dedicated alliance function (Shi & Prescott, 2012). As the Energy industry is characterized by a high degree of stability and inertia (Markard & Truffer, 2006), a state of 'flow' can help firms to overcome the adverse effects of inertia. For example, firms may become more flexible, thereby increasing a firm's profitability.

Fourth, as described in section 2.3., firms that frequently engage in multiple acquisitions are likely to benefit from organization learning and the creation of acquisition capabilities (Haleblian & Finkelstein, 1999; Hayward, 2002; Laamanen & Keil, 2008). However, building valuable capabilities requires sufficient time; a very long or very short interval between two events hampers the development of capabilities (Hayward, 2002). Firms following an event-paced rhythm may suffer from short intervals in the peaks of rapid expansion and from long intervals in the periods of inactivity. On the one hand, very short intervals may result in time compression diseconomies, making firms unable to draw meaningful inferences from recent acquisitions (Hayward, 2002) and accumulate capabilities (Laamanen & Keil, 2008). On the other hand, in case of long periods of inactivity, inferences from prior experience may be unavailable, inaccessible and inapplicable (Hayward, 2002). For example, employees and managers that took part in previous acquisition processes may have left the firm. Thus, firms following an even-paced rhythm are more likely to create acquisition capabilities, which in return affect post-acquisition performance (Hayward, 2002; Laamanen & Keil, 2008).

In summary, these arguments suggest that firms following an even-paced rhythm are likely to have superior post-acquisition performance. Accordingly, I propose the following:

> ***Hypothesis 4:*** *An even-paced rhythm is positively related to post-acquisition performance in the Energy and Power sector.*

2.4.2. Disadvantages of an even-paced rhythm

Notwithstanding the above, it can be reasoned that an even-paced rhythm also has some disadvantages. For example, Shi and Prescott (2012) reasoned and empirical found in a research in the

pharmaceutical industry, that the relationship between the rhythm of acquisitions and firm performance is characterized by an inverted U, such that an even-event-paced rhythm outperforms an even- and event-paced rhythm. This relation can be argued by various reasons.

First, an even-paced rhythm can lead to the creation of blind spots if managers overwhelmingly rely on their routines. As a result, managers may oversee potential opportunities. Second, the development of routines may also have some disadvantages due the creation of inertia (Hannan & Freeman, 1984; Klarner & Raisch, 2013; Shi & Prescott, 2012). In case of a high inertia, firms may not adjust their routines to new information, which can harm firm performance (Gresov et al., 1995). For example, firms with a high level of inertia do not adjust their routines to technological or regulatory developments in their environment, resulting in sluggish performance results relative to rivals. Third, routines may lead to a reduction in creativity of managers, which subsequently result in inflexible organizations. Flexibility of organizations is particularly important in unstable environments or when the environment changes. Due to inertia and the decreasing creativity, firms are less likely to adapt their strategies to changing environment conditions and to explore and exploit new business opportunities, which may lead to lower post-acquisition performance (Burgelman & Grove, 2007). Especially in the Energy industry, which is characterized with a high level of inertia and changes, firms will experience difficulties to adjust their routines to developments in the environment. This will further strengthen the effect of inertia and inflexibility on firm performance. Firms in the Energy and Power industry who successfully overcome inertia and inflexibility are therefore more likely to response to external change, and thus experience higher firm performance. In other words, firms that following an unregularly rhythm, making them more likely to overcome inertia and inflexible, are more likely to response to developments in the environment. Fourth, Shi and Prescott (2012) argue that firms following an even-paced rhythm are easily caught on competitors' radars, which reduces the possibility of surprise actions. M&As are namely easily caught on competitors' radars, as it needs a public announcement. From an action and reaction point of view (Grimm & Smith, 1997), a predictable rhythm may result in counter actions from competitors. For example, by influencing the capital market or preparing a M&A on the same target. However, there is no clear evidence that firms actively manage surprises (Shi & Prescott, 2012).

Drawing on the above arguments, I argue that firms following an even-event-paced rhythm are more likely to take advantage from both the benefits of an even-paced rhythm (such as the creation of routines and the enhancement of the firm's adoptive capacity) and an event-pace rhythm (especially the responsiveness to opportunities in the environment). Further, an event-paced rhythm ensures that the adverse effects of an even-paced rhythm are limited. Therefore, I infer that an even-event-paced rhythm will lead to the highest performance. However, I still expect the benefits of an event-paced rhythm outweigh the disadvantages. I argue therefore that the relationship between the rhythm of M&As and post-acquisition performance exhibit an inverted U-shaped pattern, with an even-event-paced rhythm

gaining the highest post-acquisition performance and an event-paced rhythm the lowest. Thus, I propose the following:

> ***Hypothesis 5:*** *The relationship between the rhythm of M&As and post-acquisition performance in the Energy and Power sector exhibit an inverted U-shaped pattern, with event-paced rhythm gaining the lowest returns.*

2.4.3. Rhythm as moderator in the relationship between entry time and post-acquisition performance

Although I expect to find a curvilinear relation between entry time and post-acquisition performance, rhythm is likely to moderate this relation. Drawing upon theory based on entry time and rhythm, I expect that firms following an even-paced rhythm are more likely to have steadier post-acquisition performance over an entire wave. Contrary, firms following an event-paced rhythm are more likely to experience the adverse effects of the bandwagon effect, time compression diseconomies and limited absorptive capacity.

As described before, firms following an even-paced rhythm are likely to benefit from various advantages. First, firms following an even-paced rhythm are likely to have a higher absorptive capacity (Cohen & Levinthal, 1990; Eisenhardt & Martin, 2000; Vermeulen & Barkema, 2002) and better able to utilize the absorptive capacity (Vermeulen & Barkema, 2002). By acting early in a wave, firms can acquire the target that has the greatest potential. Subsequently, due to a higher absorptive capacity and better utilization of their absorptive capacity, firms following a regular rhythm are more likely to benefit from the potentials of a superior target. These firms are therefore more likely to benefit from acquiring and developing valuable, rare, non-substitutable and inimitable resources, which enhances their sustainable competitive advantage (Barney, 1991; Penrose, 1959). Further, these firms are more likely to benefit from the advantages of M&As, such as economies of scale and scope, synergies and the adaption of new technologies and knowledge. Contrary, firms following an event-paced rhythm are more likely to experience time compression diseconomies (Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). An event-paced rhythm, involving large peaks of rapid expansion followed by long periods of inactivity, can strain firms to the limit of its capacity (Kusewit, 1985; Shaver, 2006), which decreases the ability to benefit from the advantages from M&As. This is particularly important in the Energy and Power industry, as firms experience disadvantages due to a lower absorptive capacity resulting from limited experiences with M&As and a high level of inertia. Firms following an even-paced rhythm have, in general, more time between their M&As, making them better able to benefit from the advantages of M&As. Moreover, especially in the Energy industry firms are more likely to benefit from 'cherry-picking', as the pool of potential M&A targets is already often limited due to stringent requirements (Berry, 2000). Due to a higher absorptive capacity, firms following an even-paced rhythm are more likely to maximize these advantages.

Second, firms following an even-paced rhythm are more likely to benefit from organizational learning and the creation of acquisition capabilities (Haleblian & Finkelstein, 1999; Hayward, 2002; Laamanen & Keil, 2008), which subsequently enhances the ability to benefit more from first-mover advantages. In contrary, very long or very short intervals between two M&As hamper the development of acquisition capabilities. As a result, firms following an event-paced rhythm are less likely to benefit from first-mover advantages, such as economies of scale and scope, synergies and the adaption of new technologies and knowledge.

Third, firms following an even-paced rhythm are less likely to suffer from costs associated with the bandwagon effect. These firms are more likely to engage in M&As due to internal routines, making them less sensitive for ongoing trends. Firms are likely to stick to their own routines, regarding e.g. target identification, deal negotiation and post-acquisition integration processes, regardless of bandwagon pressures. As a result, firms are less likely to experience costs due to bandwagon pressures, such as an overpayment for a target or acquisitions not in line with a firm's acquisition strategy or routine (McNamara et al., 2008).

These arguments suggest that rhythm moderates the relationship between entry time in a merger wave and post-acquisition performance. Firms following an even-paced rhythm have steadier post-acquisition performance over an entire wave; the relationship between entry time and performance is weaker. Accordingly, I propose the following:

> ***Hypothesis 6:*** *The rhythm of M&As moderates the effect of entry time on post-acquisition performance in the Energy and Power sector. For an even-paced rhythm, the relation is weaker.*

2.4.4. Rhythm as moderator in the relationship between pace and post-acquisition performance

Building on a recent research of Hashai et al. (2018) – who found empirical support that a regular alliance portfolio expansion rhythm decreases the positive effects of a higher expansion speed on managerial costs, and therefore decreases the negative effects of a higher expansion speed on profitability – I argue that rhythm moderates the relationship between pace and post-acquisition performance. Drawing on the notions of absorptive capacity and time compression diseconomies, it is argued that firms following a (too) high pace of M&As face various disadvantages. For example, these firms are less likely to benefit from learning effects and the creation of acquisition capabilities (Laamanen & Keil, 2008), to identify potential synergies (Hashai et al., 2008), and to change their organization routines (Hashai et al., 2018). Especially in the Energy industry a (too) high pace of M&As may negatively affects post-acquisition performance, as most companies have a low absorptive capacity, due to little experiences with M&As because of the protectionism of the industry till the 1990s. However, drawing on the theory on pace and rhythm I argue that firms following a rapid and constant

rhythm are likely to reduce some of the negative effects between pace and post-acquisition performance. This moderation effect can be explained by the following reasons.

First, firms following an even-paced rhythm are more likely to have a greater absorptive capacity (Cohen & Levinthal, 1990; Eisenhardt & Martin, 2000; Vermeulen & Barkema, 2002) and are better able to utilize their absorptive capacity (Vermeulen & Barkema, 2002). As absorptive capacity drives time compression diseconomies, it can be argued that these firms are less likely to experience the adverse effects of time compression diseconomies. Contrary, firms following an event-paced rhythm, involving large peaks of rapid expansion followed by long periods of inactivity, are more likely to experience time compression diseconomies (Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). Time pressure diseconomies can have negative effects on the decision-making process (Laamanen & Keil, 2008; Payne et al., 1993), causing difficulties in identifying targets with the greatest potentials (Hashai et al., 2008). As a result, firms are less likely to benefit from acquiring and developing valuable, rare, non-substitutable and inimitable resources, which subsequently may diminish their sustainable competitive advantage (Barney, 1991; Penrose, 1959). Contrary, firms following a rapid but regular rhythm are more likely to avoid (some) these time compression diseconomies, making them better able to identify superior targets.

Second, an even-paced rhythm increases predictability (Hashai et al., 2008), making firms better able to interpret and learn from their experiences in the past and relate these to similar organization routines and operations that are required for future activities (Hashai et al., 2008; Klarner & Raisch, 2013; Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). As a result, firms can become more efficient in planning, implementing and adapting new M&A activities. Due to the combination of a higher absorptive capacity and the ability to learn more from previous experiences, firms are therefore more likely to benefit from learning effects and the development of acquisition capabilities. In turn, this enables firms to benefit more from M&As and simultaneously decreases the (managerial) costs associated with M&As.

Third, from an organization learning and organizational routine perspective, developing and adapting organization capabilities and routines requires sufficient time (Hayward, 2002; Laamanen & Keil, 2008). In case of a (too) high pace, firms may not fully benefit from the learning effects from previous M&As due to a firm's limited capacity. Contrary, firms following an even-paced rhythm are better able to pace their work, synchronize their energies and reach a state of 'flow' (Brown & Eisenhardt, 1997). Being in a 'flow' enhances routine development because managers acquire acquisitions and alliance know-how in a smooth and consistent way, which subsequently enhance the M&A process (Shi & Prescott, 2012). As the Energy industry is characterized by a high degree of stability and inertia (Markard & Truffer, 2006), a state of 'flow' can help firms to overcome the harmful effects of inertia. For example, firms may become more flexible and are better able to change their organization routines.

Fourth, a too long period of inactivity increases the likelihood that the practices of prior experiences are unavailable, inaccessible and/or inapplicable (Hashai et al., 2018; Hayward, 2002). For example, information may be unavailable because of dissolution or movement to another division of the personal that took part in previous acquisitions processes (Laamanen & Keil, 2008). This may lead to the loss of valuable knowledge and experiences (Laamanen & Keil, 2008), which in turn may lead to higher managerial costs, as firms will need to redevelop the necessary skills, routines, and structures to effectively re-engage in new M&As (Hashai et al., 2018).

These arguments suggest that maintaining an even-paced rhythm is likely to allow firms to reduce some of the negative effects of a high pace of M&As. I therefore expect firms that follow both a rapid and even-paced rhythm to generate higher post-acquisition performance than firms that follow a rapid but event-paced rhythm. Accordingly, I propose the following:

> ***Hypothesis 7:*** *The rhythm of M&As moderates the effect of pace on post-acquisition performance in the Energy and Power sector. For an even-paced rhythm, the relation is weaker.*

3. Methodology

The goal of this thesis is to study the relation between timing and post-acquisition firm performance for firms in the Energy and Power sector. This chapter provides an overview of the research method and statistical procedures used in this thesis. First, the industry context is addressed. Second, the sample and the selection method are described. Next, the process of identifying merger waves will be described in detail. Last, the variables used in this study are operationalized.

3.1. Sample

Data on acquisitions and their details was retrieved from two databases: Thomson One and Thomson Reuters Eikon. These databases contain financial and business information, as well as data about mergers and acquisitions, such as information on transactions announced, completed, type of payment, and deal attitude. From the Thomson One database, I identified all publicity disclosed deals announced and completed between 1 January 1993 and 31 December 2012, having a transaction value of at least USD 1 million and acquirer macro industry "Energy and Power" (in line with e.g. Fuad & Sinha, 2017).[5] This resulted in an initial sample of 7,648 deals of 2,825 firms across 18 industries based on 2-digit SIC code.

3.2. Identification of merger waves

To investigate first-mover advantages in M&A, I first identified industry merger waves in the initial data sample. For this, I assessed industry merger waves from 1993 through 2013. To identify waves in each of these industries I used a two step-procedure, which is consistent with prior research (Carow et al., 2004; Fuad & Sinha, 2017; Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008). In the first step, potential waves are identified by calculating the number of completed acquisitions in each two-digit Standard Industrial Classification (SIC) code by year. I use as 3-digit SIC code classification in order to identify a reasonable number of merger waves. This study uses similar criteria to that of Carow et al. (2004). First, to ensure that the industries have sufficient number of acquisitions, only industries with 60 or more total acquisitions between 1993 and 2013 are included. Second, I require that there are 10 or more acquisitions in at least one year over the sample period. Third, I looked for relatively short periods – maximum six years – of heightened acquisition activity. In line with McNamara et al. (2008), I require an acquisition pattern in which the peak year within the wave duration was at least twice of the first and the last year of the wave.

[5] Requirements:
1. Acquire public Status: Public;
2. Date Announced between 01/01/1993 to 12/31/2012;
3. Date Effective/Unconditional between 01/01/1993 to 12/31/2012;
4. Deal status: Completed;
5. Deal value between 1 million to high;
6. Percent of shares owned after transaction between 51 and high;
7. Acquirer Macro Industry: Energy and Power.

In the second step, I wanted to validate whether each increase in industry acquisition activity was a true wave and not a random occurrence (Fuad & Sinha, 2017; Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008). To do so, I follow the logic of Harford (2005) by assessing whether acquisition frequency increased by an amount greater than would be expected by chance. This was done by first calculating the total number of acquisitions that occurred during each presumed industry merger wave. Then, I simulated 100 distributions of acquisitions over the same wave period, randomly assigning each of the acquisitions to one of the years in the wave period. Subsequently, I assessed the likelihood that the number of acquisitions in the peak year would have occurred by chance. In line with previous research, the peak wave years were compared to the simulated distribution set and those which exceeded the 95th percentile in the simulated set were identified as not occurring by chance (Fuad & Sinha, 2017; Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008).

The above process identified eleven unique merger waves occurring in eight different industries (as defined by three-digit SIC code, see Appendix A). Table 1 contains the industries that experienced waves, the wave years, the number of observed acquisitions in the wave and the peak year(s).

TABLE 1
Industry merger waves

3-digit SIC codes	Industry description	Wave duration	# of acquisitions in the wave	Peak year(s)	Simulation
138	Oil and Gas Field Services	1/1/1995 – 1/12/2000	223	1997	0%
138	Oil and Gas Field Services	9/1/2004 – 31/12/2009	308	2006	1%
291	Petroleum Refining	26/3/2002 – 31/12/2004	33	2003	2%
353	Construction, Mining, and Materials Handling	5/5/1995 – 1/12/2000	83	1997	2%
353	Construction, Mining, and Materials Handling	31/1/2006 –15/12/2010	55	2008, 2009	4% / 4%
361	Electric Transmission and Distribution Equipment	10/3/1997 –18/12/2002	42	2000	4%
362	Electrical Industrial Apparatus	21/6/2004 – 1/10/2008	46	2007	2%
494	Water Supply	29/1/1996 – 7/11/2001	86	1999	3%
494	Water Supply	3/4/2006 – 17/9/2010	34	2008	0%
495	Sanitary Services	21/1/1994 – 10/12/1999	252	1997	1%
951	Administration of Environmental Quality	10/2/2003 – 5/11/2008	49	2007	4%

3.3. Variables

3.3.1. Dependent variables

The dependent variable in this thesis is post-acquisition performance. Post-acquisition performance was measured by two accounting measures: return on equity and return on assets.

Return on equity. Post-acquisition performance is first measured by the return on equity (ROE) metric. This measure evaluates how efficiently a firm uses its resources and is one of the most widely used overall measure of corporate financial performance (Rappaport, 1986) and a common measure of post-acquisition performance (Berrioategortua, Olasagasti, & Florencio, 2018; Klarner & Raisch, 2013; Rani, Yadav, & Jain, 2015).

ROE is measured as follows:

$$Return\ on\ equity\ (t) = \frac{net\ income\ (t)}{total\ equity\ (t)}$$

Return on assets. Another often used measure for organizational performance in the academic literature is return on assets (ROA) (Andonova et al., 2013; McNamara et al., 2008; Shaw, Park, & Kim, 2013; Tangpong, Abebe & Li, 2015; Vermeulen & Barkema, 2002). ROA is a similar measure as ROE, but focus on the profitability of a firm relative to the amount of money invested in the firm. ROA is thus an indicator of how efficiently invested money in the firm is used. ROA is measured as follow:

$$Return\ on\ assets\ (t) = \frac{net\ income\ (t)}{total\ assets\ (t)}$$

Post-acquisition performance is measured on both short and long term. Short term post-acquisition performance is calculated as the ROE and ROA in the first year after completion of the M&A action. Long term post-acquisition is calculated as the average performance of the three to five years after the date effective, depending on data available. Both measures were averaged and adjusted for the industry performance on both short and long term (Cannella & Hambrick, 1993; Klarner & Raisch, 2013; Krishnan & Park, 2002). The industry-adjusted performance measures are a more reliable measure, as it controls for industry events unrelated to the merger. For this, I computed each firm's industry-adjusted ratio as the difference between the firm's raw ROE and ROA ratio and the corresponding statistics for the mean ROE and ROA in each industry (see Appendix C).[6] To calculate the average ROE and ROA for each industry, I distinguished seven umbrella industries based on their SIC codes (Mining, Construction, Manufacturing, Transportation & Public Utilities, Wholesale trade, Retail trade, and Public Administration).

3.3.2. Independent Variables

The independent variables in this research are (i) position in a merger wave, (ii) pace, and (iii) rhythm. The measures build on the conventional measures used in acquisition research.

Entry time within a merger wave. The first independent variable is a firm's entry time in a merger wave. To calculate the timing of firm action within a merger wave I used the ratio of the number of days that each acquisition occurred after the first acquisition in the wave divided by the "total number of days in the wave" (Haleblian et al., 2012, p. 1043). Thus, the value of the variable ranged from zero – for the

[6] To calculate the mean ROE and ROA of each industry I used the winsorized data (using a 98 percent winsorization value) of the dependent variables and post-acquisition performance, in order to prevent the data from being affected by extreme outliers.

first acquisition – to one, for the last acquisition in the wave. An early mover will therefore be identified by values closer to zero, and late-movers will have values closer to one. In case two of more acquisition occurred on the same day, the same timing value is given.

Pace. The second independent variable is pace. Pace indicates in how many M&A activities a firm is engaged in a certain period of time. In line with prior research (e.g. Laamanen & Keil, 2008; Lin, 2014; Vermeulen & Barkema, 2002; Wang et al., 2017) pace is measured as the average number of M&A activities per year, by calculating the total number of M&A activities divided by the number of years since the firm's first M&A and the year of the firm's last M&A. A large number indicates a fast-paced M&A process. Before entering pace in the analysis, I first used log transformation to reduce its skewness and kurtosis.

Rhythm of M&A activities. Rhythm, or predictability, of an acquisition program was measured as a variability of M&A activities frequency, which was measured through the kurtosis of the first derivative of the M&A activities over time. This variable measure how concentrated in time the change in the number of M&A activities is and has been used in the international management literature (Lin, 2012; Lin, 2014; Shi & Prescott, 2012; Vermeulen & Barkema, 2002; Wang et al., 2017). I measured the rhythm of firms over the initial sample that have engaged in more than three M&A activities within the time frame. The kurtosis of the distribution is measured by the following formula:

$$kurtosis = \{\frac{n(n+1)}{(n-1)(n-2)(n-3)}\sum\left(\frac{x_i - x_m}{s}\right)^4\} - \frac{3\,(n-1)^2}{(n-2)(n-3)}$$

Where n is the number of observations, x_i is the number of M&A activities in year i, and s is the standard deviation of the number of M&A activities. Moreover, rhythm is transformed by using log transformation to reduce its kurtosis.

A regular and predictable rhythm results in a relatively flat distribution and therefore a low kurtosis. An irregular and unpredictable rhythm, involving large peaks of rapid expansion followed by long periods of inactivity, results in a relatively concentrated distribution and therefore a high kurtosis. In other words, how higher the values of rhythm (unpredictability), the more concentrated in time the M&A activities are. An even-event-paced rhythm falls between the two. The rhythm of an acquisition program is only calculated for firms that engaged in more than three acquisition in the time spam. Before entering pace in the analysis, I used log transformation to reduce its skewness and kurtosis.

3.3.3. Control Variables

In order to measure the effects of the temporal constructs on firm performance, it is important to control for variables that might affect the relations of interest in this study. Following prior research on entry time in M&A waves and rhythm of M&A activities, the empirical analysis includes several control variables.

Firm size. Prior research has indicated that firm size influences performance (Haleblian et al., 2009; Hitt, Hoskisson, & Kim, 1997; Shi & Prescott, 2012). The size of a firm may affect performance for various reasons. For example, larger companies are more likely to benefit from economies of scale and to cope more successfully with possible market changes and high-risk situation, because of diversification of activities (Serrasqueiro & Nunes, 2008). Thus, I might expect firm size to be related to post-acquisition performance. Firm size is operationalized as the log of the number of employees in a firm one year prior to the M&A activity to reduce its skewness and kurtosis.

Prior performance of acquiring firm. Various research found evidence that prior performance of the acquiring firm is related with post-acquisition performance (Heron & Lie, 2002; Kusewit, 1985; Morck, Shleifer & Vishny, 1990). Prior research has shown that firms with better financial performance are more likely to make better acquisitions (McNamara et al., 2008; Morck et al., 1990). Prior performance was measured by computing industry-adjusted performance by subtracting the median industry ROE value from firm-level ROE measured at the end of the year before an acquisition year (McNamara et al., 2008, see Appendix C).

Acquisition rate. Various scholars have argued that the acquisition rate, defined as the number of acquisitions that acquires carry out over a given time period, affects post-acquisition performance, in a way that a high acquisition rate is negatively related to acquirer performance (Laamanen & Keil, 2002; McNamara et al., 2008). In line with this, I control for the acquisition rate. To measure acquisition rate is calculated the total number of M&As that acquires carry out over the time spam in this study. I use log transformation to reduce its skewness and kurtosis.

Acquire-to-target relatedness. Prior scholars have reasoned that related acquisitions, i.e. acquisitions in similar markets and industries, are more likely to be successful, than unrelated acquisition (Homberg, Rost & Osterloh, 2009***;*** King, Dalton, Daily & Covin, 2004; Kusewitt, 1985). Related acquisitions are more likely to benefit from potential synergies between acquirers and targets, which provide greater scope for economies of scale and scope (Singh and Montgomery, 1987). Acquire-to-target relatedness is often measured according to the SIC-code (Haleblian & Finkelstein, 1999; Laamanen & Keil, 2008; McNamara et al., 2008; Morck et al., 1990). In line with this, I measured acquire-to-target relatedness using the two-digit SIC codes in which an acquirer and a target operated. I classified an acquirer and a target as ‘related’ if they had at least one two-digit SIC code in common among the top three in which they operated at the time of the acquisition. Otherwise, they were classified as "unrelated". I coded unrelated acquisitions as ‘0’ and related acquisitions as ‘1’.

Attitude. Previous research has shown that the attitude underlying an acquisition affects post-acquisition performance (see e.g., Hitt, Harirrison, Ireland & Best, 1998, and Morck et al., 1988). An acquisition can either be friendly or hostile. A friendly acquisition is a takeover in which the initial bid of the acquirer is approved by the management of the target firm. A hostile takeover is an acquisition in which the initial bid of the acquirer is neither negotiated with the target’s management nor approved by the target’s management. In that case, potential targets may take action to defend against a hostile

takeover, such as adopting a poison pill defence or arranging to be acquired by a "white knight," that make it less likely acquirers will succeed (Finkelstein & Haleblian, 2002; Haleblian & Finkelstein, 1999; McNamara et al., 2008; Morck et al., 1988). Moreover, a hostile acquisition may attract multiple bidders who drive premiums higher (Browne & Rosengren, 1987), which results in lower acquirer returns. Thus, the attitude of the acquisition may influence post-acquisition performance. A friendly acquisition is more likely to create profits in contrast to hostile acquisitions. Using the attitude categories presented in the Thomson One database, I coded hostile acquisitions as '1', neutral acquisitions as '2' and friendly acquisitions as '3'.

Geographic distance. Building on transaction cost theory and international business theory, it can be argued that the geographic distance between the acquirer and the target negative impacts the post-acquisition performance of a firm (McCarthy & Aalbers, 2016). In line with this, various scholars found that domestic M&As, i.e. M&As between two firms operating in the same country, outperform cross-borders M&As, i.e. M&As between two firms operating in different countries (Eckbo & Thorburn, 2000; Moeller & Schlingemann, 2005). I coded domestic M&As as '0', and cross-border M&As as '1'.

Industry. Industry is taken as a control variable to control for industry effects (for example for differences in economic growth and performance). I classified four umbrella industries, namely: (i) mining, (ii) manufacturing, (iii) transportation & public utilities, and (iv) public administration.

FIGURE 4
Summary of the causal relationships discussed and the research hypotheses advanced

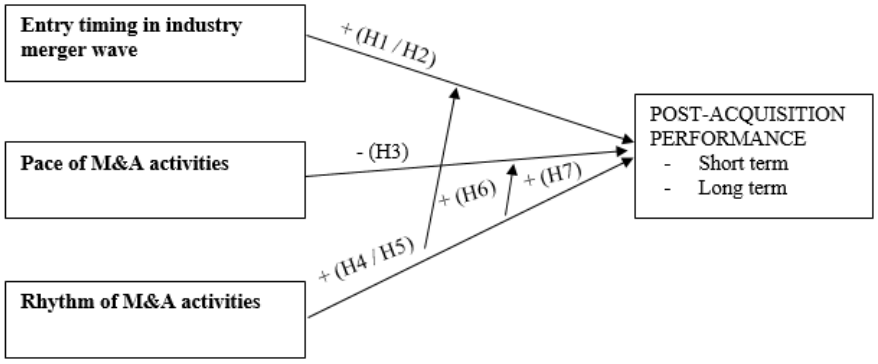


TABLE 2
Variables

Variable name	Variable label	Unit	Main references	Categories	Transformation
Dependent variables					
Post-acquisition performance	Return on assets (ROA) (short term) (US$)	Net income / total assets (t+1)	Andonova et al., 2013; McNamara et al., 2008; Shaw et al., 2013; Tangpong et al., 2015; Vermeulen & Barkema, 2002.	Scale: -113.34 – 96.02	Winsorization and industry-adjustment
	Return on assets (ROA) (long term) (US$)	(ROA (t+1) + ROA (t+2) + ROA (t+3) + ROA (t+4) + ROA (t+5)) / 5		Scale: -136.10 – 52.97	Winsorization and industry-adjustment
	Return on equity (ROE) (short term) (US$)	Net income / total equity (t+1)	Berrioategortua et al., 2018; Klarner & Raisch, 2013; Rani et al., 2015	Scale: -42.53 – 59.60	Winsorization and industry-adjustment
	Return on equity (ROE) (long term) (US$)	(ROE (t+1) + ROE (t+2) + ROE (t+3) + ROE (t+4) + ROE (t+5)) / 5		Scale: -19.72 – 25.93	Winsorization and industry-adjustment
Independent variables					
Entry time	Entry time in industry merger wave	Number of days that each acquisition occurred after the first acquisition in the wave / total number of days in the wave	Haleblian et al., 2012	Scale: 0-1	
Pace	Pace of M&A activities	Total number of M&As / the number of years since a firm's first M&A and the year of the firm's last M&A.	Laamanen & Keil, 2008; Lin, 2014; Vermeulen & Barkema, 2002; Wang et al., 2017	Scale: 0.33 – 9.20	Log transformation
Rhythm	Rhythm of M&A activities	$kurtosis = \frac{n(n+1)}{(n-1)(n-2)(n-3)} \{\sum \left(\frac{x_i - x_m}{s}\right)^4\} - \frac{3(n-1)^2}{(n-2)(n-3)}$	Lin, 2012; Lin, 2014; Shi & Prescott, 2012; Vermeulen & Barkema, 2002; Wang et al., 2017	Scale: -7.38 – 109.72	Log transformation
Control variables					
Firm size	Number of employees in acquirer firm	Number of employees (t-1)	Haleblian et al., 2009; Hitt et al., 1997; Shi & Prescott, 2012	Scale: 48 – 364,528	Log transformation
Prior performance of acquiring firm	Three-year average ROA for the three full pre-acquisitions years preceding the acquisition (US$)	(ROA (t-1) + ROA (t-2) + ROA (t-3))/3	Heron & Lie, 2002; Kusewit, 1985; McNamara et al., 2008; Morck et al., 1990	Scale: -38.10 – 22.12	Winsorization and industry-adjustment
Acquisition rate	Total number of M&As	Total number of M&As	Laamanen & Keil, 2002; McNamara et al., 2008	Scale: 4 - 46	Log transformation
Acquire-to-target relatedness	Acquire-to-target relatedness (SIC2)	Two groups	Haleblian & Finkelstein, 1999; Homberg et al., 2009; King et al., 2004; Kusewitt, 1985; Laamanen & Keil, 2008; McNamara et al., 2008; Morck et al., 1990	0. Unrelated M&A; 1. Related M&A	Dummy
Attitude	Attitude of M&A	Three groups	Hitt et al., 1998, and Morck et al., 1988	1. Hostile; 2. Neutral; 3. Friendly	Dummy
Geography	Country of acquirer and target	Two groups	Eckbo & Thorburn, 2000; McCarthy & Aalbers, 2016; Moeller & Schlingemann, 2005	0. Domestic M&A; 1. Cross-border M&A	Dummy
Industry	Industrial code (SIC)	SIC categories, four groups		1. Mining; 2. Manufacturing; 3. Transportation & Public Utilities; 4. Public Administration	Dummy

4. Results

This chapter provides the results of the analytical analysis performed. First, an overview of the data sample is provided using descriptive statistics and the correlation matrix. Second, the data preparations are discussed testing the data for the relevant assumption. Third, the results of the regression analysis are given.

4.1. Descriptive statistics

4.1.1. Data preparation

In this research I use multiple regression analysis to analyse the relationship between multiple independent variables and four dependent variables (see table 2). In order to conduct multiple regression, I first prepared the data by, inter alia, creating dummy variables, centering variables, computing interaction and squared terms and transformation of some variables.

First, to proceed multiple regression analysis all the used variables need to be measured on a metric scale. All the dependent and independent variables in this research are measured on a metric scale. The control variables relatedness, attitude, geography and industry are however measured on nominal scale. Therefore, I created a dummy variable for these variables. By dummying it will be measured on a metric scale, because there will be an interval created between zero and one.

Second, to enter the interaction effects in the multiple regression analysis I computed the interaction term between (i) the mean-centered log-transformed rhythm of M&A activities and the mean-centered variable entry time, and (ii) the mean-centered log-transformed rhythm of M&A activities and the mean-centered variable pace. Furthermore, to see if there is a curvilinear relation between the independent variables and post-acquisition performance, I calculated the quadratic terms of the independent variables.

Third, in the multiple regression analysis only cases with values on all the variables are included, resulting in a large decrease of the sample. First, firms of which the acquiror's Sedol is not available (700) and those that had extensive missing information on the dependent variables, return on equity and return on assets are excluded from the sample (2,419). After these eliminations, the data set contains 3,191 deals with various variables. However, due to the fact that only a limited number of M&As occurred in one of the eleven identified merger waves, a large number of the remaining cases had missing values on the variable 'entry time' (2,499). A rule of thumb used when assessing missing values is that under the ten percent of missing values for an individual case or observation can generally be ignored (Hair, Black, Babin, & Anderson, 2010). Normally, variables with more than ten percent missing values should be excluded from the analysis. However, in this case I expected a large amount of missing values, because only a limited number of M&As occurred in the identified merger waves. Therefore, entry time will be not excluded from the analysis. Further, the rhythm of M&A activities is only calculated for firms that engaged in more than four M&A in the time spam. This resulted in 164

missing cases. For 377 cases I had no information on the number of employees in the acquirer. Lastly, of 17 cases no information on the attitude of the deal was available. This resulted in a final sample of 519 events. The variables which include missing variables are tabulated in Appendix B. The Little's MCAR test is significant, and therefore we can conclude that the missing data is not missing at random (X^2 (58) = 325.925, p < .05). This is probably because various acquirers occur multiple times in the data, as they engaged in multiple M&As in the time spam. Moreover, in Appendix B a comparison of the missing data and the data in the analysis is given.

After data collection and the above-mentioned adjustments, the data set contains 519 deals with various variables. Before analysing the hypotheses formulated in the literature review section, I first evaluated the variables in the model. A descriptive statistic of the continuous variables in the analysis is shown in Appendix D. Several remarks can be made reviewing Appendix D. First, by looking to the distribution of the original values of the dependent variables and prior performance, it is noticed that there is a large range between most values. Therefore, the data was analysed for outliers before calculating the industry averaged performance measures and performing the analysis. Outliers are observation points that are distinctly different from the other observations in the data sample. To ensure that the results were not being driven by outliers, I winsorized the dependent variables and prior performance using a 98 percent winsorization value. Appendix E shows the descriptive statistics for the dependent variables and prior performance after winsorization and industry-adjustment. The kurtosis of the ROE measures are still somewhat high, however transformation of the winsorized data did not improve the normality. However, in case of a sample size with 200 or more cases the impact of normality diminishes. Therefore, I accepted the level of kurtosis and included the winsorized values of the dependent variables in the analysis.

Second, as can be seen in Appendix D, the kurtosis and skewness of some of the continuous variables are (very) high, which indicates a non-normal distribution. This assumption is further enhanced by the large standard deviation as compared to the mean. Positive values of kurtosis indicate a too peak distribution with too much scores in the tail, whereas negative values indicate a flat and light-tailed distribution (Field, 2013). Positive values of skewness indicate too many low score in the distribution, and thus a right-skewed distribution. Negative values of skewness indicate a left-skewed distribution. To reduce the impact of non-normality in the analysis, I transform the data to check if this leads to better values of kurtosis and skewness. Three transformation were tried: (i) log transformation, (ii) square root transformation and (iii) reciprocal transformation. All transformations require positive values; therefore, I added a constant to all variables with negative values. The constant compromised of the largest negative value plus 1. An overview of the results of the different transformations can be found in Appendix F. By reviewing Appendix F, several remarks can be made. First, none of the transformation methods lead to better normality on post-acquisition performance data. Therefore, no transformation method was applied on the dependent variables. Second, the independent variables 'pace' and 'rhythm' and the control variables 'size' and 'number of acquisitions' show improvements after log

transformation. Therefore, I replaced the variable ‘pace’ by ‘Log_pace’, ‘rhythm’ by ‘Log_rhythm’, ‘Size’ by ‘Log_size’ and ‘Number of acquisitions’ by ‘Log_Number of acquisitions’.

4.1.2. Univariate analysis and bivariate analysis

The univariate analysis and the correlations between all variables which were used in the multiple regression analysis are shown in Appendix G and Appendix H. Correlations indicate an association between two variables which can have a value between -1 and +1. The correlation matrix is a useful tool for getting a rough idea of the relationship between variables in the model. A correlation coefficient of values of ± .1 represent a small effect, ± .3 a medium effect, and ± .5 a large effect (Field, 2013). The Pearson correlation is shown between two continuous variables and the Spearman correlation between one or more ordinal variables. The descriptive statistics and correlations of the variables used in this study are presented in Table 3. As expected, all dependent variables correlate strongly with each other, with a *r* correlation coefficient of .56 and higher. The independent variable entry time correlates not significantly with the other two independent variables. Pace and rhythm however correlate high with each other (*r* = .68). High correlations between independent variables may indicate multicollinearity problems, which are assessed in the following paragraph. Entry time correlates with ROE and ROA short term (respectively *r* = - .21 and *r* = - .22), but not on the long term. On the other hand, rhythm correlates with ROE and ROA long term (respectively *r* = .11 and *r* = .12), but not on the short term. The control variable size correlates significantly with ROE short term (*r* = . 12), ROE long term (*r* = . 13), entry time (*r* = .16), pace (*r* = .21), rhythm (*r* = -.11), both interaction effects (*r* = -.11 and *r* = -.13) and the number of acquisitions (*r* = .26). Prior performance correlates with all of the post-acquisition performance measures, entry time (*r* = .15) and the number of acquisitions (*r* = .21). The number of acquisitions correlates highly with pace (*r* = .83). This is probably because companies who engage in multiple acquisitions also have a high average number of acquisitions. Lastly, the number of acquisitions correlates with ROE short term (*r* = .09) and rhythm (*r* = -.48).

TABLE 3
Descriptive Statistics and correlation matrix (N=519)

Variables	*M*	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. ROE – short term	0.00	17.01	-52.22	45.10																		
2. ROE – long term	0.00	10.67	-37.80	26.06	.61**																	
3. ROA – short term	0.00	6.35	-20.15	15.56	.91**	.60**																
4. ROA – long term	0.00	3.68	-10.63	8.52	.56**	.93**	.64**															
5. Entry time	0.49	0.24	0.00	1.00	-.21**	-.05	-.22**	-.05														
6. Pace	0.39	0.27	0.00	1.00	.07	-.05	.09	-.09	.04													
7. Rhythm	0.92	0.28	0.00	1.00	-.00	.11*	-.00	.12**	-.00	-.68**												
8. Entry timing*rhythm	-0.00	0.24	-0.37	.33	.01	-.07	-.01	-.07	.15**	-.04	.04											
9. Pace*rhythm	-0.05	0.26	-0.43	.06	.00	-0.04	.06	-.01	-.05	.02	-.64**	-.14**										
10. Size	3.78	0.82	1.68	5.56	.12**	.13**	.05	.06	.16**	.21**	-.11*	-.11*	-.13**									
11. Prior performance	0.00	4.78	-19.42	13.18	.18**	.26**	.25**	.27**	.15**	.08	-.05	-.05	.01	.07								
12. Number of acquisitions	1.08	0.29	0.60	1.66	.09*	.04	.07	.05	.08	.83**	-.48**	-.48**	-.04	.26**	.21**							
13. Relatedness	0.54	0.50	0	1	-.09*	-0.07	-.07	-.05	-.05	-0.02	.00	.08	.14**	-.20**	.01	-.13**						
14. Attitude – Friendly	0.98	0.12	0	1	-.03	-0.08	-.04	-.09*	.01	.04	-.03	.04	-.08	.01	.02	.03	-.02					
15. Attitude - Neutral	.01	0.10	0	1	.09*	.11*	.08	.09*	.03	-.02	.04	-.04	.06	.00	.02	-.03	.01	-.79**				
16. Geography	0.28	0.45	0	1	.04	.01	.08	.04	.01	-.13**	.05	.03	.02	.25**	-.03	-.13**	.01	-.06	.07			
17. Industry – Mining	0.39	0.49	0	1	.06	-0.05	.07	-.04	-.18**	-.16**	.13**	.12**	.21**	-.30**	.10*	-.20**	.27**	-.06	.00	-.10*		
18. Industry – Manufacturing	0.31	0.46	0	1	-.08	-0.05	-.01	.01	.02	-.12**	.09*	.05	-.05	.15**	-.09*	-.00	-.18**	.05	-.02	.24**	-.53**	
19. Industry – Transportation & Public Utilities	0.28	0.45	0	1	-.01	.08	-.08	.03	.17**	.28**	-.19**	-.17**	-.19**	.24**	-0.03	.24**	-.08	.08	.03	-.11*	-.49**	-.41**

*Significant: *p <.05, ** p <.01*

4.2. Assumptions

To empirically test the hypotheses formulated in the literature review section I made use of multiple regression analysis. Before conducting a regression analysis, it is important to check the underlying assumptions. If at least one assumption is violated, this can be damaging to the quality of the research results (Field 2013).

4.2.1. Normally distributed errors

The first assumption is normally distributed errors, which means that the differences between the model and the observed data are most frequently zero or close to zero. When the data is not normally distributed this can influence the correlation, linearity and homoscedasticity. To check if the errors are normally distributed, I used the histograms and normal probability plots of the standardized residuals (see figure 1 to 4 of Appendix I). The histograms are (except for some outliers) quite normally distributed. The normal probability plots show that the distribution follows the comparison line. When the distribution is near the comparison line – which shows normality – the data is normally distributed (Hair et al., 2010). Based on those two tests I assume that the assumption of normality of errors is met.

4.2.2. Linearity

Regression analysis assumes that the relations between the independent and the dependent variables are linear (Field, 2013). Therefore, I checked if the relation between the independent and dependent variables in this model are linear by using a scatterplot based on ZRESID (the standard residuals, or errors) and ZPRED (the standardized predicted values of the dependent variable based on the model) (figure 5 of Appendix I). If there is a linear relationship in this model, the dots do not form a clear pattern: all the positive and negative residuals are spread around the horizontal zero-line. The scatterplot indicates that regression model seems to be linear and therefore the assumption of linearity is met.

4.2.3. Homoscedasticity

Another assumption of regression analysis is that at each level of the predictor variables, the variance of the residual terms is constant. In other words, the error variances (residuals) need to be consistent for every expected Y (Field, 2013). Violation of this assumption (and thus heteroscedasticity), invalidates confidence intervals and significance tests but does not invalidate the model parameters (Field, 2013). To determine the homoscedasticity, we used the scatterplot again (figure 5 of Appendix I F). If there is a consistent pattern the variance will be not constant. The scatterplot does not display a clear pattern, such as a triangle. Therefore, I assume homoscedasticity.

4.2.4. Independent errors

Regression analysis assumes that each predicted value is independent, which means that the predicted value is not related to any other prediction (Hair et al., 2014). In other words, for any two observation the residual terms should be independent. To check for this assumption, I conducted the Durbin-Watson test, which test for serial correlations between errors (Field, 2013). The Durbin-Watson provides a value between 0 and 4. According to Field (2013) a value near 2 is considered good while any value under 1 or above 3 can be considered problematic. With this assumption violated, the estimates of the model parameters will still be valid but not optimal (Field, 2013). The Durbin-Watson test shows scores between 1.437 and 1.874 (see Appendix I, table 1) and therefore the assumption of independent errors is met.

4.2.5. Multicollinearity

A final additional concern is multicollinearity, which exist when there is a strong correlation between two of more predictors (Field, 2013). Multicollinearity is assessed through the variance inflation factor (VIF) and tolerance value. The results are concerned to be problematic if the VIF value becomes higher than 10 or 1/VIF becomes lower than 0.10. Most variables have a Variance Inflation Factor (VIF) of more than 1, which means that there is an indication of some association between the independent variables. However, the dummy variable 'Industry - Mining' has a VIF of more than 10, which is a cause for concern (Field, 2013). Therefore, I deleted this variable from the analysis and after deletion I assume that this assumption is met for the Models 1-7. However, Models 9 and 10 includes both the squared variables of the independent variables as the interaction effects. These variables show (very) high VIFs, which is expected as I expect these variables to correlate highly (see Appendix I, table 2). Therefore, I do not consider this problematic. However, due to the high collinearity I have to take into account that models 9 and 10 may not be fully reliable (Field, 2013). As collinearity increases so do the standard errors of the *b* coefficients. As a result, the *b* coefficients in the sample are less likely to represent the population and therefore less trustworthy. Therefore, I keep this in mind when interpreting the results.

4.3. Regression analysis

The regression analysis examines the effect of the independent and control variables on each dependent variable. Tables 4 to 7 show the regression results for models used in the study. Model 1 contains the control variables. In Models 2, 4 and 6, the main effects of the independent variables are added separately. To assessing the predicted curvilinear performance effects of the independent variables, models 3, 5 and 7 additional contains the squared term of the independent variables. Further, to test whether the analysed effects are complementary or to some degree substitutive, I also analysed the full model. Model 8 contains the main effects of the independent variables and the control variables. Model 9 contains the control variables, the linear effects and the interaction effects. Lastly, Model 10 contains

the linear, curvilinear and interaction effects. Although the models are strongly statistically significant, the proportion of variance explained is somewhat limited. However, given the number of factors that can influence post-acquisition performance, this result is not surprising and similar to other studies assessing post-acquisition firm performance (McNamara et al., 2008; Haleblian & Finkelstein, 1999). The control variables in Model 1 together explain 7 to 10% in the variance in the independent variables with a F-ratio between 4.01 and 6.11. The best model in terms of predictive power is the full model (M10), which explain 18 to 24 percent of the variance in the dependent variables.

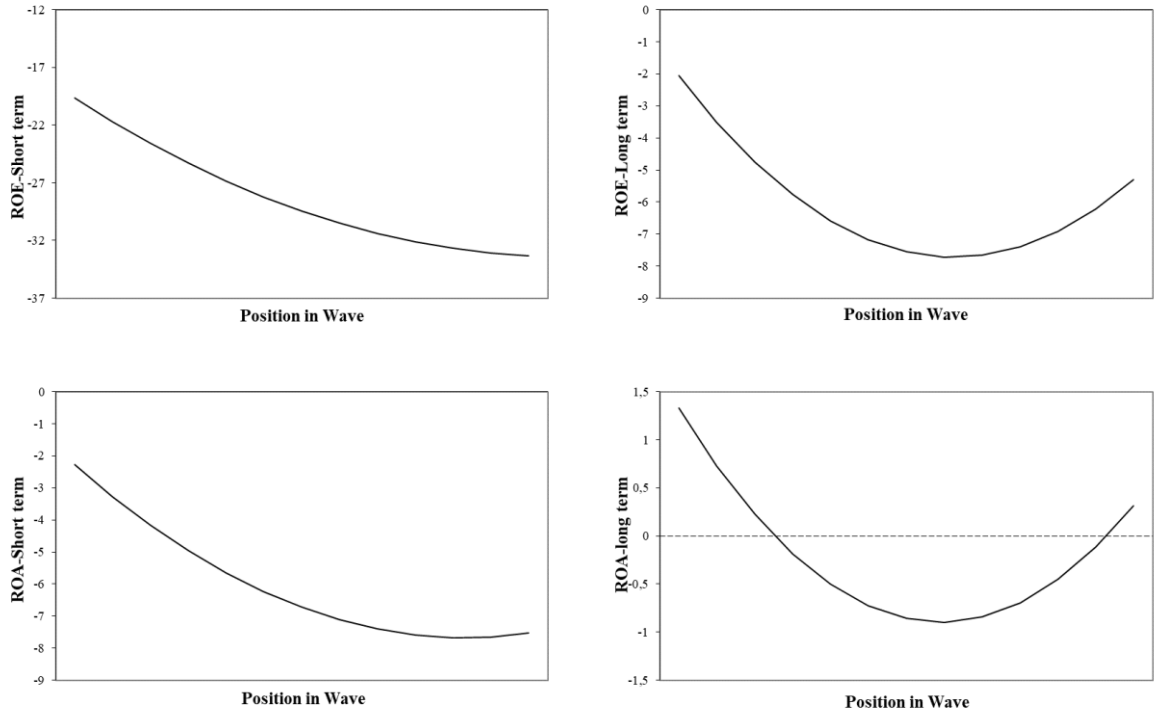
Consistent with expectations, I note that prior performance is positively related to all post-acquisition performance measures ($p < .001$). Acquirers with better performance prior to the acquisition, show significant higher post-acquisition performance on both the short and long term. Further, I only found a significant relation between firm size and ROE long term ($p < .01$), the dummy variable attitude neutral and ROE short term ($p < .05$) and the dummy variable geography on ROA short term ($p < .05$). This implies that larger firms exhibit on average significantly higher ROE changes over the three to five-year time period; deals with a neutral attitude experiences on average higher ROE changes on the short term; and cross-border mergers are more likely to experience higher ROE on short term. Contrary to expectations, the number of M&As, a friendly take-over, relatedness and industry are unrelated to post-acquisition performance in the control model (Model 1).

Hypothesis 1 predicts that post-acquisition performance will decline as an acquisition wave progresses. Model 2 displays the model that include the isolated linear effect of entry time on post-acquisition performance. This adjustment improves the overall fit of the model (ΔR^2 between 1% and 8%). The results from these models provide support for this Hypothesis (ROE-short term: *bèta* = -.27, $p < .001$; ROE-long term: *bèta* = -.11, $p < .05$; ROA-short term: *bèta* = -.88, $p < .001$; ROA-long term: *bèta* = -.10, $p < .05$). Entry time is therefore negatively related to post-acquisition performance. Firms that engage in M&As early in a merger wave are more likely to experience higher post-acquisition performance on the short and long term. Model 8, which includes all linear effects, shows similar results. Taken together, these results provide strong support for Hypothesis 1.

Hypothesis 2 predicts curvilinear performance effects over a wave period, with early movers gaining the highest returns. In line with this hypothesis, all base position variables in Model 3 are negative (ROE-short term: *bèta* = -.27, $p < .001$; ROE-long term: *bèta* = -.10, $p < .05$; ROA-short term: *bèta* = -.88, $p < .001$; ROA-long term: *bèta* = -.09, $p < .05$), and the squared position terms positive (ROE-short term: *bèta* = .09, $p < .001$; ROE-long term: *bèta* = .20, $p < .05$; ROA-short term: *bèta* = .16, $p < .001$; ROA-long term: *bèta* = .25, $p < .05$). The curvilinear relation is further confirmed by a significant F-change between Model 2 and Model 3 (ROE-short term: $\Delta F = 5.10$, $p < .05$; ROE-long term: $\Delta F = 22.57$, $p < .001$; ROA-short term: $\Delta F = 14.73$, $p < .001$; ROA-long term: $\Delta F = 35.81$, $p < .001$. Figure 5 demonstrates that the pattern of results matches the hypothesized effects, especially in the long term. It should be noted that the values of the dependent variables displayed in the figures are inaccurate, because not all control variables are standardized. Although the patterns, and therefore the

interpretations are correct. Almost the same results are found in the full model (Model 10). Hypothesis 2 is thus supported.

FIGURE 5
Curvilinear Effects Entry time



Hypothesis 3 suggest a curvilinear effect between the pace of M&As and post-acquisition performance, in a way that firms that follow an average pace are having superior post-acquisition performance (inverted U-shape). Surprisingly, I found in Model 5 a significant opposite effect of the pace of M&As on post-acquisition performance long term. The base position variables in Model 5 are negative (ROE-long term: *bèta* = -.30, $p < .001$; ROA-long term: *bèta* = -.43, $p < .001$) and the squared position term positive (ROE-long term: *bèta* = .27, $p < .001$; ROA-long term: *bèta* = .23, $p < .001$). This resulted in a U-shape pattern: firms that have a low pace of M&As, in such that they have a low average of M&As per year in the time-spam, are more likely to experience superior post-acquisition performance. An average pace however leads to the lowest post-acquisition performance. Figure 6 demonstrates the curvilinear relation of the variables. No significant relation is found on the post-acquisition performance measures on the short term in Model 5. However, the full model (Model 10) shows a significant curvilinear effect between pace and post-acquisition performance short term in the other direction. The base position variables in Model 10 are higher (ROE-short term: *bèta* = .64, $p < .01$; ROA-short term: *bèta* = .48, $p < .05$) and the squared position term are lower (ROE-short term: *bèta* = .41, $p < .05$; ROA-short term: *bèta* = .33, $p < .05$). Figure 7 shows the curvilinear relation between pace and the short-term performance measurements. Firms following a high pace of M&As are therefore more likely to experience superior post-acquisition performance in the short term. However, in the long

term a high pace of M&As will lead to lower post-acquisition performance. Taken together, these results do not support Hypothesis 3.

FIGURE 6
Curvilinear Effects between Pace and Post-Acquisition Performance Long Term

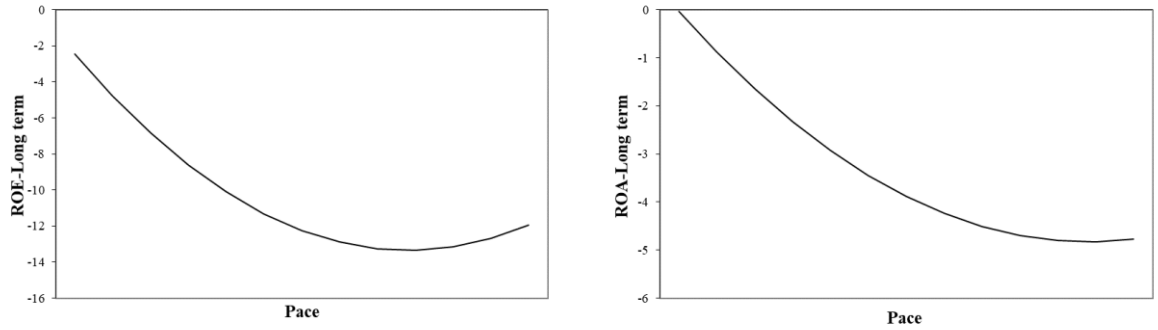
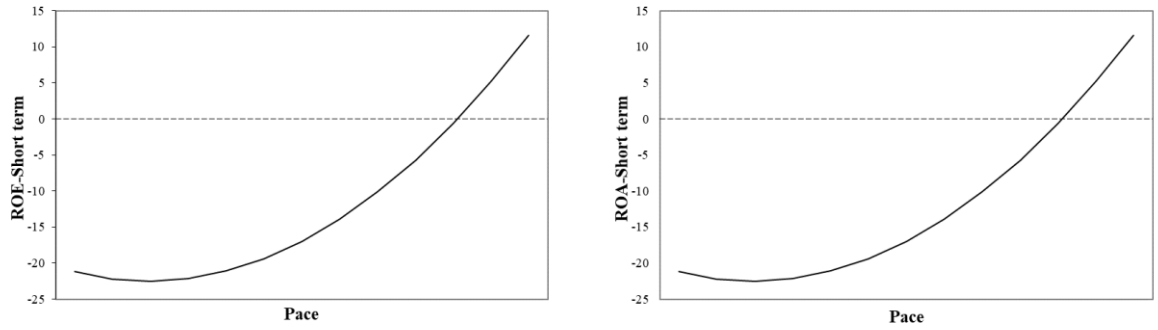


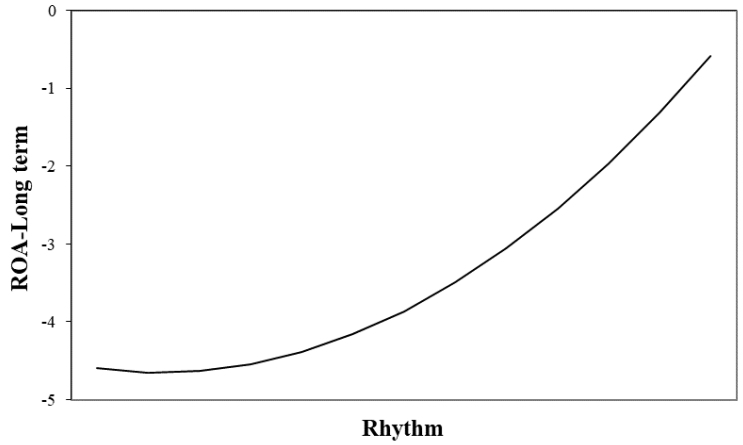
FIGURE 7
Curvilinear Effects between Pace and Post-Acquisition Performance Short Term



Next, I tested Hypothesis 4 that suggest a negative relation between rhythm and post-acquisition performance: firms that follow an even-paced rhythm, and thus have low kurtosis, are more likely to exhibit greater post-acquisition performance. To test this Hypothesis, I entered rhythm to the base model (Model 6). Model 6 shows only a significant relation between rhythm and post-acquisition performance on the long term (ROE-long term: *bèta* = .15, $p < .01$; ROA-long term: *beta* = .18, $p < .001$). Contradictory to the expectations, firms that follow an event-paced rhythm are more likely to experience superior post-acquisition performance. However, when looking to the R^2 statistics, it is note that rhythm explained a small amount of the variation in the dependent variable (ΔR^2 between 1 and 2 percent). The effect of rhythm on post-acquisition performance is thus very limited. Moreover, when analysing Model 8, including all independent variables and control variables, the linear the linear effect of rhythm on the performance measures long term disappears. In other words, the effect of rhythm on post-acquisition performance is likely to be substitutive. Further, Model 9, including all interaction terms in one model, shows a positive significant effect between rhythm and post-acquisition performance (ROE-short term: *bèta* = .30, $p < .05$; ROA-short term: *bèta* = .25, $p < .05$). In other words, when adding the interaction effects, the relation between rhythm and post-acquisition becomes significant. Contradictory to the expectations, these results suggest a positive relation between rhythm and post-acquisition performance, which implies that firms that follow an unregularly rhythm are more likely to experience superior post-

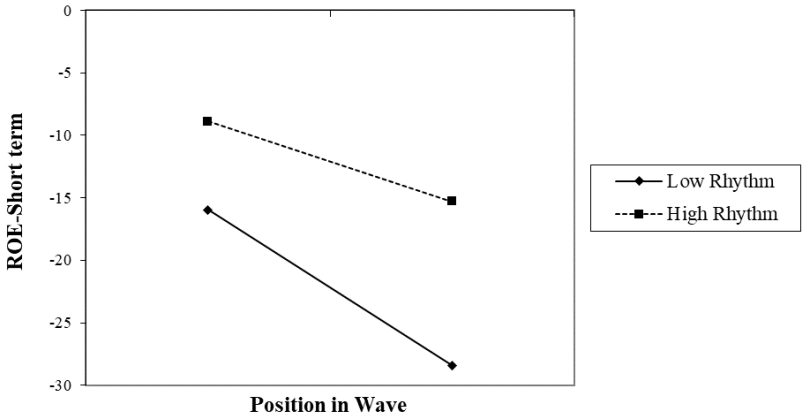
acquisition performance. However, as I already stated in the assumptions section, Model 9 may not be fully reliable due multicollinearity between the predictors. The *b* coefficients in the sample are less likely to represent the population and therefore less trustworthy. As a result, we cannot attach too much value to this effect. In sum, the results provide no support for Hypothesis 4. Subsequently, Hypothesis 5 predicts a curvilinear relation between rhythm and post-acquisition performance, in a way that firms that following an average rhythm gaining the highest returns (inverted U-shape). The squared position term for all post-acquisition performance measures in Model 7 are insignificant, indicating that Hypothesis 5 is not supported. However, the full model (M10), including all curvilinear relations and interaction terms in one model, shows a significant curvilinear relation between rhythm and Return on Assets in the long term (see figure 8).

FIGURE 8
Curvilinear Effect between Rhythm and Post-Acquisition Performance Long Term



Subsequently I tested Hypothesis 6, which predicts that rhythm moderates the effect of entry time on post-acquisition performance. In Model 9 I tested the moderation effect of rhythm on the linear relation between entry time and post-acquisition performance. I only found a significant moderation effect of rhythm on the relation between entry time and ROE short term (bèta = .09, $p < .05$). The moderation effect is shown in figure 9. The interaction effect is positive, which demonstrates that the negative relationship between entry time and ROE short term is weaker when firms follow an unpredictable and unregularly rhythm. In other words, firms following an even-paced rhythm are more likely to suffer from the adverse effects of acting late in a merger wave. Surprisingly, this moderation effect is in the opposite direction than expected. On the other hand, when looking to the moderation effect of rhythm and pace on the long term, I notice a negative moderation effect, which is in line with the expectations. This moderation effect is however not significant. Moreover, in Model 10 I tested if rhythm moderates the curvilinear relation between entry time and post-acquisition performance. No support for this is found. In sum, Hypothesis 6 is not supported.

FIGURE 9
Moderation effect entry time-rhythm



Finally, in order to test Hypothesis 7, which predicts that the rhythm of M&A activities moderates the relation between pace and post-acquisition performance, I entered the interaction term of rhythm and pace in Models 9 and 10. Only a positive moderation effect is found for the dependent variable 'Return of Assets Short Term' (bèta = .20, $p < .05$). The positive interaction effect demonstrates that the positive relation between pace and ROA-short term is weaker when firms follow an unpredictable and unregularly rhythm (see Figure 10). In other words, firms following a regular rhythm are more likely to suffer from the adverse effects of a high pace. Contrary, firms following an unregularly rhythm are more likely to overcome the negative effects of a high pace. As before, this moderation effect is in the opposite direction than expected. Subsequently, I tested if rhythm moderates the curvilinear relation between pace and post-acquisition performance. However, no support for this is found. In sum, Hypothesis 7 is not supported.

FIGURE 10
Moderation effect pace-rhythm

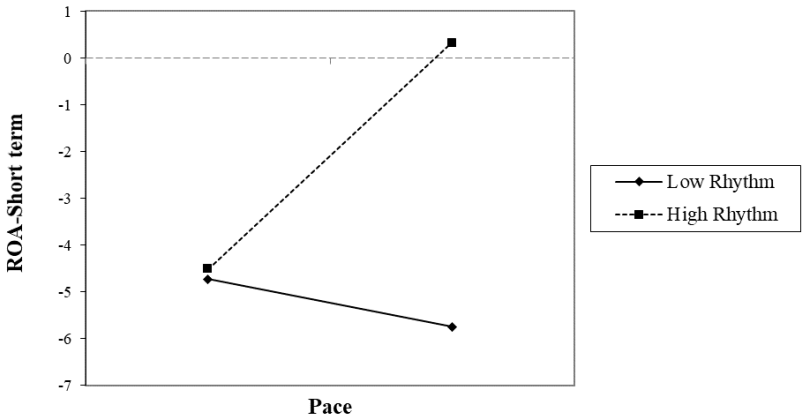


TABLE 4 Multiple regression analysis with return on equity short term as dependent variable (N = 591; standardized regression coefficients (bèta))

DV: ROE-Short term																				
Variables	**M1**		**M2**		**M3**		**M4**		**M5**		**M6**		**M7**		**M8**		**M9**		**M10**	
Constant	-21.66*	(10.65)	-26.79*	(10.3)	-29.44**	(10.32)	-18.74	(11.59)	-19.55	(11.6)	-23.31*	(10.79)	-22.94*	(10.86)	-23.81*	(11.26)	-17.14	(11.9)	-16.99	(11.82)
Test of hypotheses																				
Entry time			-0.27***	(3.10)	-0.27***	(3.09)									-0.27***	(3.10)	-0.28***	(3.14)	-0.29***	(3.14)
Entry time squared					0.09*	(10.50)													0.14**	(11.35)
Pace							0.05	(4.99)	0.03	(5.11)					0.11	(5.86)	0.30*	(8.57)	0.64**	(12.65)
Pace squared									0.07	(10.05)									0.41*	(29.81)
Rhythm											0.05	(3.06)	0.06	(3.36)	0.09	(3.58)	0.30*	(7.47)	0.45**	(9.84)
Rhythm squared													-0.02	(5.33)					0.14	(12.17)
Entry time x rhythm																	0.09*	(11.01)	0.10*	(11.04)
Entry time squared x rhythm																			-0.05	(43.31)
Pace x rhythm																	0.17	(22.99)	0.75**	(66.87)
Pace squared x rhythm																			0.44	(134.49)
Control variables																				
Firm size	0.09	(1.03)	0.12*	(0.99)	0.12*	(0.99)	0.09	(1.03)	0.09	(1.03)	0.09	(1.03)	0.09	(1.03)	0.12**	(0.99)	0.13**	(1)	0.13**	(1)
Prior performance	0.16***	(0.16)	0.19***	(0.15)	0.20***	(0.15)	0.16***	(0.16)	0.17	(0.16)	0.15**	(0.16)	0.15**	(0.16)	0.20***	(0.16)	0.20***	(0.15)	0.21***	(0.16)
Number of acquisitions	0.05	(2.83)	0.05	(2.73)	0.06	(2.73)	0.01	(4.82)	-0.01	(4.87)	0.08	(3.25)	0.07	(3.3)	-0.01	(4.70)	-0.06	(5.13)	-0.14	(5.32)
Relatedness	-0.07	(1.54)	-0.06	(1.48)	-0.06	(1.48)	-0.07	(1.54)	-0.06	(1.57)	-0.06	(1.54)	-0.06	(1.55)	-0.06	(1.49)	-0.06	(1.49)	-0.04	(1.51)
Attitude – Friendly	0.10	(9.7)	0.11	(9.36)	0.12	(9.33)	0.09	(9.72)	0.10	(9.72)	0.10	(9.7)	0.10	(9.71)	0.11	(9.37)	0.10	(9.33)	0.13	(9.29)
Attitude – Neutral	0.18*	(12.23)	0.20**	(11.8)	0.20*	(11.76)	0.18*	(12.23)	0.18	(12.26)	0.18*	(12.23)	0.18*	(12.24)	0.20**	(11.80)	0.19**	(11.77)	0.21**	(11.7)
Geography	0.05	(1.77)	0.05	(1.71)	0.04	(1.7)	0.05	(1.77)	0.06	(1.78)	0.06	(1.78)	0.05	(1.78)	0.05	(1.72)	0.05	(1.71)	0.06	(1.71)
Industry	included		included		included		included		included		included		included		included		included		included	
R^2	0.07		0.13		0.14		0.07		0.07		0.07		0.07		0.14		0.15		0.18	
Adjusted R^2	0.05		0.12		0.12		0.05		0.05		0.05		0.05		0.12		0.13		0.15	
F	4.01***		7.86***		7.67***		3.64***		3.46***		3.69***		3.36***		6.77***		6.31***		5.68***	
F change			39.80***		5.10*		0.41		1.60		0.89		0.11		14.12***		3.18*		6.78***	

[a] Standardized coefficients are reported. Standard errors are in parentheses. The F change scores for model 2, 4, 6, 8 and 10 are relative to the base model (model 1), the change scored for model 3 is relative to model 2, model 5 to model 4, model 7 to model 6, and model 9 to model 8.
[b] Significant: *p < .05, ** p< .01, *** p< .001.

TABLE 5 Multiple regression analysis with return on equity long term as dependent variable (N = 591; standardized regression coefficients (bèta))

DV: ROE-Long term																		
Variables	**M1**		**M2**		**M3**		**M4**		**M5**		**M6**		**M7**		**M8**		**M9**		**M10**	
Constant	-2.79	(6.53)	-4.08	(6.52)	-7.55	(6.43)	-10.36	(7.06)	-12.24	(6.92)	-6.12	(6.56)	-5.88	(6.6)	-10.92	(7.06)	-9.98	(7.51)	-11.65	(7.12)
Test of hypotheses																				
Entry time			-0.11*	(1.96)	-0.10*	(1.92)									-0.11**	(1.95)	-0.11*	(1.98)	-0.12**	(1.89)
Entry time squared					0.20***	(6.54)													0.19***	(6.83)
Pace							-0.21**	(3.04)	-0.30***	(3.04)					-0.12	(3.68)	-0.09	(5.41)	0.16	(7.62)
Pace squared									0.27***	(5.99)									0.67***	(17.95)
Rhythm											0.15**	(1.86)	0.16**	(3.24)	0.11	(2.25)	0.14	(4.71)	0.40	(5.92)
Rhythm squared													-0.02	(3.24)					0.39*	(7.33)
Entry time x rhythm																	-0.03	(6.95)	0.00**	(6.65)
Entry time squared x rhythm																			-.04	(26.08)
Pace x rhythm																	0.03	(14.51)	0.91***	(40.27)
Pace squared x rhythm																			0.27	(80.98)
Control variables																				
Firm size	0.15**	(0.63)	0.17**	(0.63)	0.16**	(0.62)	0.15**	(0.63)	0.15**	(0.61)	0.16**	(0.62)	0.15**	(0.63)	0.17	(0.62)	0.16**	(0.63)	0.16**	(0.6)
Prior performance	0.27***	(0.1)	0.28***	(0.1)	0.29***	(0.1)	0.25***	(0.1)	0.27***	(0.1)	0.26***	(0.1)	0.26***	(0.1)	0.26	(0.10)	0.26***	(0.1)	0.30***	(0.09)
Number of acquisitions	-0.05	(1.73)	-0.05	(1.73)	-0.03	(1.7)	0.13	(2.94)	0.07	(2.9)	0.04	(1.98)	0.03	(2.01)	0.11	(2.95)	0.10	(3.24)	-0.02	(3.2)
Relatedness	-0.02	(0.94)	-0.01	(0.94)	0.00	(0.92)	-0.01	(0.94)	0.03	(0.93)	0.00	(0.94)	0.00	(0.94)	0.00	(0.93)	0.00	(0.94)	0.05	(0.91)
Attitude – Friendly	-0.02	(5.95)	-0.01	(5.93)	0.00	(5.81)	-0.01	(5.92)	0.00	(5.8)	-0.02	(5.9)	-0.02	(5.91)	-0.01	(5.88)	-0.01	(5.89)	0.04	(5.59)
Attitude – Neutral	0.08	(7.5)	0.09	(7.47)	0.10	(7.32)	0.08	(7.46)	0.10	(7.31)	0.08	(7.44)	0.08	(7.44)	0.09	(7.40)	0.09	(7.42)	0.13*	(7.05)
Geography	-0.07	(1.09)	-0.08	(1.08)	-0.08	(1.06)	-0.07	(1.08)	-0.06	(1.06)	-0.06	(1.08)	-0.06	(1.08)	-0.07	(1.08)	-0.07	(1.08)	-0.05	(1.03)
Industry	included		included		included		included		included		included		included							
R^2	0.10		0.11		0.15		0.11		0.15		0.11		0.11		0.13		0.13		0.23	
Adjusted R^2	0.08		0.09		0.13		0.09		0.13		0.10		0.10		0.11		0.11		0.21	
F	6.11***		6.18***		7.91***		6.31***		8.24***		6.58***		5.98***		6.25***		5.39***		8.06***	
F change			6.23*		22.57***		7.40*		24.63***		9.87**		0.13		6.11***		0.34		8.95***	

[a] Standardized coefficients are reported. Standard errors are in parentheses. The F change scores for model 2, 4, 6, 8 and 10 are relative to the base model (model 1), the change scored for model 3 is relative to model 2, model 5 to model 4, model 7 to model 6, and model 9 to model 8.
[b] Significant: *p < .05, ** p< .01, *** p< .001.

TABLE 6 Multiple regression analysis with return on asset short term as dependent variable (N = 591; standardized regression coefficients (bèta))

DV: ROA-Short term																		
Variables	**M1**		**M2**		**M3**		**M4**		**M5**		**M6**		**M7**		**M8**		**M9**		**M10**	
Constant	-3.1	(3.92)	-5.09	(3.77)	-6.73	(3.74)	-4.19	(4.26)	-4.22	(4.27)	-3.47	(3.97)	-2.91	(3.99)	-6.74	(4.13)	-3.66	(4.36)	-3.63	(4.31)
Test of hypotheses																				
Entry time			-0.28***	(1.13)	-0.28***	(1.12)									-0.28***	(1.14)	-0.29***	(1.15)	-0.29***	(1.15)
Entry time squared					0.16***	(3.81)													0.19***	(4.14)
Pace							-0.05	(0.69)	-0.05	(1.88)					-0.07	(2.15)	0.15	(3.14)	0.48*	(4.61)
Pace squared									0.01	(3.7)									0.33*	(10.86)
Rhythm											0.03	(1.12)	0.06	(1.24)	0.01	(1.31)	0.25*	(2.74)	0.44**	(3.58)
Rhythm squared													-0.07	(1.96)					0.14	(4.43)
Entry time x rhythm																	0.06	(4.04)	0.08	(4.02)
Entry time squared x rhythm																			-0.09	(15.78)
Pace x rhythm																	0.2*	(8.43)	0.69**	(24.37)
Pace squared x rhythm																			0.34	(49.01)
Control variables																				
Firm size	0.00	(0.38)	0.03	(0.36)	0.03	(0.36)	0.00	(0.38)	0.00	(0.38)	0.00	(0.38)	-0.01	(0.38)	0.03	(0.37)	0.03	(0.37)	0.03	(0.36)
Prior performance	0.23***	(0.06)	0.27***	(0.06)	0.28***	(0.06)	0.23***	(0.06)	0.23***	(0.06)	0.23***	(0.06)	0.23***	(0.06)	0.26***	(0.06)	0.27***	(0.06)	0.29***	(0.06)
Number of acquisitions	0.04	(1.04)	0.03	(1)	0.05	(0.99)	0.08	(1.77)	0.08	(1.79)	0.05	(1.2)	0.04	(1.21)	0.10	(1.72)	0.02	(1.88)	-0.06	(1.94)
Relatedness	-0.05	(0.56)	-0.05	(0.54)	-0.04	(0.54)	-0.05	(0.57)	-0.05	(0.58)	-0.05	(0.57)	-0.05	(0.57)	-0.04	(0.55)	-0.05	(0.55)	-0.02	(0.55)
Attitude – Friendly	0.05	(3.57)	0.06	(3.43)	0.07	(3.38)	0.05	(3.57)	0.05	(3.58)	0.05	(3.57)	0.05	(3.57)	0.07	(3.44)	0.06	(3.42)	0.09	(3.38)
Attitude – Neutral	0.13	(4.5)	0.15*	(4.32)	0.16*	(4.27)	0.13	(4.5)	0.13	(4.52)	0.13	(4.5)	0.13	(4.5)	0.15*	(4.33)	0.14*	(4.32)	0.16*	(4.26)
Geography	0.11*	(0.65)	0.1*	(0.63)	0.1*	(0.62)	0.11*	(0.65)	0.11*	(0.65)	0.11*	(0.65)	0.11*	(0.65)	0.11*	(0.63)	0.1*	(0.63)	0.11*	(0.62)
Industry	included		included		included		included		included		included		Included		Included		Included		Included	
R^2	0.08		0.16		0.18		0.09		0.09		0.09		0.09		0.16		0.17		0.21	
Adjusted R^2	0.07		0.14		0.16		0.07		0.07		0.07		0.07		0.14		0.15		0.18	
F	5.23***		9.58***		10.28***		4.74***		4.30***		4.73***		4.48***		8.06***		7.38***		6.94***	
F change			44.69***		14.73***		0.42		0.02		0.34		1.90		15.25***		2.92		7.84***	

[a] Standardized coefficients are reported. Standard errors are in parentheses. The F change scores for model 2, 4, 6, 8 and 10 are relative to the base model (model 1), the change scored for model 3 is relative to model 2, model 5 to model 4, model 7 to model 6, and model 9 to model 8.
[b] Significant: **p* < .05, ** *p*< .01, *** *p*< .001.

TABLE 7 Multiple regression analysis with return on asset long term as dependent variable (N = 591; standardized regression coefficients (bèta))

DV: ROA-Long term																		
Variables	**M1**		**M2**		**M3**		**M4**		**M5**		**M6**		**M7**		**M8**		**M9**		**M10**	
Constant	1.06	(2.28)	0.65	(2.27)	-0.86	(2.21)	-3.33	(2.43)	-3.88	(2.39)	-0.26	(2.28)	0.06	(2.29)	-3.67	(2.43)	-3.23	(2.58)	-3.87	(2.45)
Test of hypotheses																				
Entry time			-0.10*	(0.68)	-0.09*	(0.66)									-0.11**	(0.67)	-0.10*	(0.68)	-0.12**	(0.65)
Entry time squared					0.25***	(2.25)													0.23***	(2.35)
Pace							-0.36***	(1.05)	-0.43***	(1.05)					-0.31**	(1.27)	-0.27	(1.86)	-0.04	(2.62)
Pace squared									0.23***	(2.07)									0.59***	(6.17)
Rhythm											0.18***	(0.65)	0.21***	(0.71)	0.07	(0.78)	0.11	(1.62)	0.36*	(2.04)
Rhythm squared													-0.07	(1.12)					0.32**	(2.52)
Entry time x rhythm																	-0.05	(2.39)	-0.02	(2.29)
Entry time squared x rhythm																			-0.09	(8.97)
Pace x rhythm																	0.03	(2.39)	0.78**	(13.85)
Pace squared x rhythm																			0.20	(27.85)
Control variables																				
Firm size	0.04	(0.22)	0.05	(0.22)	0.05	(0.21)	0.04	(0.22)	0.04	(0.21)	0.04	(0.22)	0.04	(0.22)	0.05	(0,22)	0.04	(0.22)	0.04	(0.21)
Prior performance	0.27***	(0.03)	0.28***	(0.03)	0.30***	(0.03)	0.24***	(0.03)	0.25***	(0.03)	0.26***	(0.03)	0.26***	(0.03)	0.25***	(0,03)	0.25***	(0.03)	0.29***	(0.03)
Number of acquisitions	-0.01	(0.6)	-0.01	(0.6)	0.02	(0.59)	0.29***	(1.01)	0.24**	(1)	0.09	(0.69)	0.08	(0.7)	0.28***	(1,02)	0.27**	(1.11)	0.14	(1.1)
Relatedness	-0.01	(0.33)	-0.01	(0.33)	0.01	(0.32)	0.00	(0.32)	0.04	(0.32)	0.01	(0.33)	0.01	(0.33)	0.01	(0,32)	0.01	(0.32)	0.06	(0.31)
Attitude – Friendly	-0.05	(2.07)	-0.05	(2.07)	-0.03	(2)	-0.04	(2.04)	-0.03	(2.01)	-0.05	(2.05)	-0.05	(2.05)	-0.04	(2,03)	-0.04	(2.03)	0.01	(1.92)
Attitude – Neutral	0.04	(2.61)	0.05	(2.6)	0.06	(2.52)	0.05	(2.56)	0.07	(2.53)	0.04	(2.58)	0.04	(2.58)	0.05	(2,55)	0.05	(2.56)	0.1	(2.42)
Geography	0.00	(0.38)	0.00	(0.38)	-0.01	(0.37)	0	(0.37)	0.01	(0.37)	0.01	(0.38)	0.01	(0.38)	0.00	(0,37)	0.01	(0.37)	0.02	(0.35)
Industry	included		included		included		included		included		included		Included		Included		Included		Included	
R^2	0.08		0.09		0.15		0.12		0.15		0.10		0.11		0.13		0.14		0.24	
Adjusted R^2	0.07		0.07		0.13		0.10		0.13		0.09		0.09		0.11		0.11		0.21	
F	5.01***		5.07***		8.18***		6.80***		8.00***		5.89***		5.53***		6.41***		5.60***		8.31***	
F change			5.24*		35.81***		21.07***		17.72***		12.77***		1.83		9.82***		0.78		10.44***	

[a] Standardized coefficients are reported. Standard errors are in parentheses. The F change scores for model 2, 4, 6, 8 and 10 are relative to the base model (model 1), the change scored for model 3 is relative to model 2, model 5 to model 4, model 7 to model 6, and model 9 to model 8.
[b] Significant: **p* < .05, ** *p*< .01, *** *p*< .001.

TABLE 8
Summary of the main outcomes

Sub-questions:	Hypotheses	Accepted/ Rejected	Main outcomes
1. Does entry time in an industry merger wave affects post-acquisition performance in the Energy and Power Sector?	***H1:*** *There is a negative relationship between entry time in an industry wave and post-acquisition performance in the Energy and Power Sector.* ***H2:*** *The relationship between entry time in an industry merger wave and post-acquisition performance in the Energy and Power Sector is characterized by a U-shaped pattern, with early movers gaining the highest returns.*	√ √	• Entry time is negative related to post-acquisition performance in both short and long term. • Post-acquisition performance exhibit in a curvilinear relation over a wave period, with early mover gaining the highest post-acquisition performance.
2. Does the pace of M&A activities affects post-acquisition performance in the Energy and Power Sector?	***H3:*** *The relationship between the pace of M&As and post-acquisition performance in the Energy and Power sector is characterized by an inverted U-shaped pattern.*	X	• Firms following a high pace of M&As are more likely to experience superior short-term post-acquisition performance. • On the other hand, firms following a low pace of M&As are more likely to experience superior long-term post-acquisition performance. • Contradictory to the expectations, pace and long-term post-acquisition are curvilinear related, in a way that firms that follow an average pace are having the lowest post-acquisition performance (U-shape).
3. Does the rhythm of M&A activities affects post-acquisition performance in the Energy and Power Sector?	***H4:*** *An even-paced rhythm is positively related to post-acquisition performance in the Energy and Power sector.* ***H5:*** *The relationship between the rhythm of M&As and post-acquisition performance in the Energy and Power sector exhibit an inverted U-shaped pattern, with event-paced rhythm gaining the lowest returns*	X X	• No significant relation is found between rhythm and post-acquisition performance. • The full model (M10) shows however a significant curvilinear relation between rhythm and ROA long term.
4. Does rhythm affects the relationships between entry time and pace and post-acquisition performance in the Energy and Power Sector	***H5:*** *The relationship between the rhythm of M&As and post-acquisition performance in the Energy and Power sector exhibit an inverted U-shaped pattern, with event-paced rhythm gaining the lowest returns.* ***H6:*** *The rhythm of M&As moderates the effect of pace on post-acquisition performance in the Energy and Power sector. For an even-paced rhythm, the relation is weaker.*	X X	• Rhythm positively moderates the relation between entry time and ROE short term. This moderation effect is however in the opposite direction as expected. • Contradictory to the expectations, rhythm positively moderates the pace-ROA short term relation. • No significant moderation effect is found for the other post-acquisition performance measures. • No support is found that rhythm moderates the curvilinear relation between entry time and post-acquisition performance. • No support is found that rhythm moderates the curvilinear relation between pace and post-acquisition performance.

5. Discussion and Conclusion

5.1. Contribution to Theory and Practice

The Energy industry has faced a dramatically change since the 1990s due to various developments in the environment, such as deregulation of the market and the increasing interest in renewable energy sources. As a result, firms in the industry were forced to change their business models (Kishimoto et al., 2017; Markard & Truffer, 2006; Verde, 2008), resulting in an enormous growth of the number of M&As in the industry. Because of these developments and the industry-specific characteristics, the Energy industry is an interesting industry to look into. Prior research on M&As has shown that acquiring firms generally do not benefit from making acquisitions (Faulkner et al., 1993; Haleblian et al., 2009), and research on M&As in the Energy industry have shown similar results (Becker-Blease et al., 2008; Bartunek et al., 1993; Berry, 2000; Brahma et al., 2018; Datta, Kodwani & Viney, 2013; Leggio & Lien, 2000). While prior scholars in the general M&A literature have researched various moderators in the acquisition-performance relationship, only limited attention is given to the effect of timing on post-acquisition performance. By this thesis, I respond to the call of scholars to conduct more research on the temporal dimensions of strategic actions, and in particular M&As (Kunisch et al., 2018; Shi et al., 2012; Shi & Prescott, 2012). Moreover, to my knowledge, this is the first research which focuses on the effect of timing in the Energy and Power industry. In sum, this thesis has expanded and revised the extant theoretical perspective on Mergers and Acquisitions in the Energy industry.

The findings of this study can be summarized into the following four points. First, this study has examined the applicability of first-mover advantage, late-mover advantages and bandwagon effect to the practice of M&As in the Energy and Power industry. Consistent with prior research, this study showed a clear clustering of waves within sub-industries in the Energy and Power industry (Andrade et al., 2001; Carow et al., 2004; Haleblian et al., 2012; Harford, 2005; McNamara et al., 2008; Mitchell & Mulherin, 1996; Mulherin & Boone, 2000). By drawing on and combining the notions of first-mover advantage, late-mover advantages and bandwagon, I have theoretical argued that entry time in an industry merger wave affects post-acquisition performance. In more detail, I have argued that post-acquisition performance exhibit in a curvilinear relation over a wave period with early movers gaining the highest post-acquisition performance. Consistent with prior research, the results show strong support for this relation. Early movers within a merger wave outperform later ones, however post-acquisition performance will show some improvement as the wave completes itself. This study advances therefore the view that entry time in an industry wave has a significant direct effect on a firm's post-acquisition performance. From a practical utility standpoint, this study offers managerial insights for managers about the question when to enter an industry merger wave. As the results show a clear early-mover advantage, it is recommended to engage as early as possible in an industry merger wave. However, these first-mover advantages only apply up to a certain point. Due to the bandwagon effect, managers may be forced to acquire other companies in the peak of the wave, because of to the social pressure caused by

the growing number of other M&As (Fiol & O'Connor, 2003). The results of this study however suggest that firms acting in the peak of the wave shows the worst post-acquisition performance. Therefore, it must be taken into account that the first-mover advantages will vanish in the remained of wave, especially in the peak of the wave. Thus, it is recommended for managers to avoid acquiring other firms in the peak of a wave.

Second, interestingly the results also suggest that the benefits of moving early are more pronounced when a firm follows an unregularly rhythm (on the short term). Firms following an even-paced rhythm are less likely to gain early-mover benefits on the short term. This relation can be explained by the notion of organizational routines. Firms following an even-paced rhythm are likely to stick to their international routines regarding its acquisition behaviour (Betsch, Haberstroh, Glockner, Haar & Fiedler, 2001; McNamara et al., 2008). As McNamara et al. (2008, p. 118) states, these "acquisition routines lead to the development of procedural memory that influences the information search the acquiring firm undertakes, causing it to focus on specific information items consistent with the routines and to avoid other information". In other words, these firms are less likely to identify opportunities in the environment because they stick to their own routines, making them less likely to benefit from first-mover advantages. Moreover, contrary to the expectations, the visual representation of this relationship in Figure 9 shows that firms following an even-paced rhythm suffer more from the disadvantages of bandwagon and acting late in a wave than firms following an event-paced rhythm. However, this positive moderation effect is only found for the dependent variable 'ROE-short term' and therefore we cannot attach to much value to this moderation effect. When focusing on the moderation effect of rhythm on the relation between entry time and post-acquisition performance on the long term, a positive moderation effect is noticed. However, this effect is not significant. Thus, the results suggest that rhythm may enhance the effects of these factors, and therefore extend our knowledge of first-mover advantages and bandwagon effect.

Third, this thesis has attempt to enrich the M&A literature by exploring the role of pace and rhythm on post-acquisition performance in the Energy and Power industry. The amount of research in these two-time phenomena is still limited and previous research has shown contradictory results. Building on the research of Vermeulen and Barkema (2002), it is argued that the rhythm and pace of firm's M&A activities influences post-acquisition performance. I explained this relation by arguing that firms experience a limited absorptive capacity (Cohen & Levinthal, 1990) during the process of M&As, which subsequently enhances time compression diseconomies (Dierickx & Cool, 1989). A too high pace of M&As and/or an event-paced rhythm, involving large peaks of rapid expansion followed by long periods of inactivity, enhances the likelihood that a firm overstrains their absorptive capacity. As a result, firms are less likely to benefit from e.g. learning effects, the creation of acquisition capabilities (Laamanen & Keil, 2008), and synergies (Hashai et al., 2008). Especially in the Energy industry a (too) high pace or an event-paced of M&As may negatively affects post-acquisition performance, as most companies have already a low absorptive capacity, as they have little experiences with M&As due to

the protectionism of the industry till the 1990s. However, the results did not provide clear answers on the role of pace and rhythm on post-acquisition performance. Firstly, the results suggest that firms following a low pace of M&As experience superior post-acquisition performance. This negative relation is in line with prior research (Klarner & Raisch, 2013; Laamanen & Keil, 2008; Vermeulen & Barkema, 2002). However, contrary to the expectations, firms following an average pace showed the lowest post-acquisition performance. Firms following a high pace of M&As showed some improvements compared with an average pace, however these are still very limited (see figure 11). In other words, the relation between pace and post-acquisition performance is characterized by a U-shaped pattern, with firms that follow an average pace having the lowest post-acquisition performance and some improvement if a firm follows a high pace. This is contrary to the finding of Hayward (2002) and Kusewitt (1985), who found an inverted U-shape relationship between acquisition pace and post-acquisition performance. The results in this research suggest that the advantages of a high pace of M&As do not outweigh the costs associated with a high pace. An explanation for this relation may be the limited experiences of electric utilities firms, due to the protectionism of the sector in the 20th century. Based on these results, it is advisable to managers to not engage in multiple acquisitions in a short amount of time. Companies need time to realize the full potential of M&As. Secondly, only limited support is found that rhythm affects post-acquisition performance. Moreover, also contradictory to the expectations, the results show that firms following an event-paced rhythm are more likely to experience superior post-acquisition performance on the long term (see figure 12). This opposite effect could be explained by the fact that a regular and predictable rhythm may lead to inflexible organizations (Lin, 2012).

Fourth, this thesis has advanced the literature on pace, by explaining how the relation between pace and post-acquisition performance is influenced by the moderating effect of rhythm. The majority of previous literature has treated these concepts separately, however this research has argued that rhythm should be considered alongside entry time and pace when firms engage in new M&As. By combining prior research on pace and rhythm, I have argued that firms that combine a rapid and regular (even-paced) M&A strategy are likely to reduce some of the negative effects related to a high pace of M&As. A key insight of the theoretical framework is that firms following an even-paced rhythm are likely to have a greater absorptive capacity (Cohen & Levinthal, 1990; Eisenhardt & Martin, 2000; Vermeulen & Barkema, 2002) and are better able to utilize their absorptive capacity (Vermeulen & Barkema, 2002), reducing the negative effects of time compression diseconomies due to a high pace of M&As. However, the results do not give clear answers to the moderation effect of rhythm on the relation between pace and post-acquisition performance. Only a significant moderation effect is found for the dependent variable 'Return of Assets Short Term'. Contrary to the expectations and findings from prior research (Hashai et al., 2018), the visual representation of this relationship in Figure 10 shows that firms following an even-paced rhythm suffer more from the disadvantages of a high pace. From a theoretical point of view, it is hard to explain this positive interaction effect. It could mean that absorptive capacity and time compression diseconomies do not influence post-acquisition performance, however that is not

very plausible. Moreover, as only a significant moderation effect is found for one of the dependent variables, we cannot attach too much value to this moderation effect. In sum, this thesis suggests to a very limited extent that rhythm affects the relation between pace and post-acquisition performance. Due to the fact that the effect between rhythm and post-acquisition is limited and only very limited support is found that rhythm moderates the studied relations, it is not advisable for managers in the Energy and Power industry to spend money and time to make any adjustments in their M&A strategy.

FIGURE 11
Relation between pace and post-acquisition performance

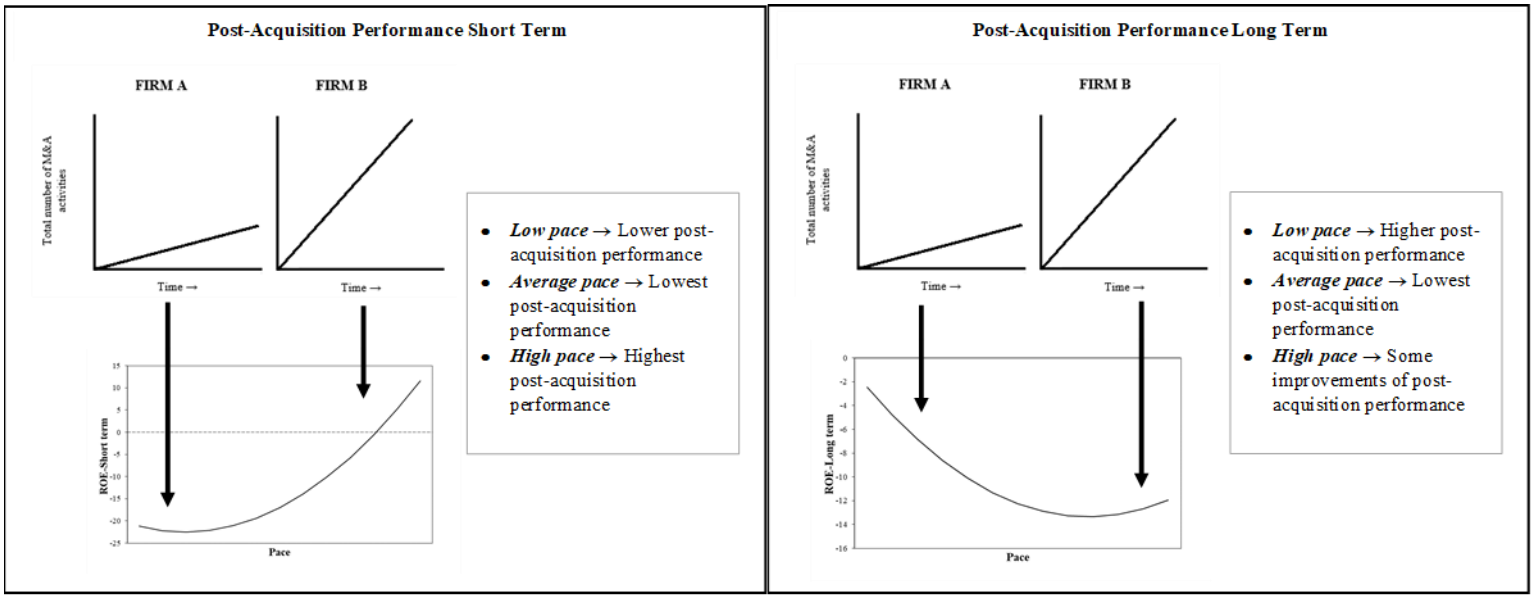
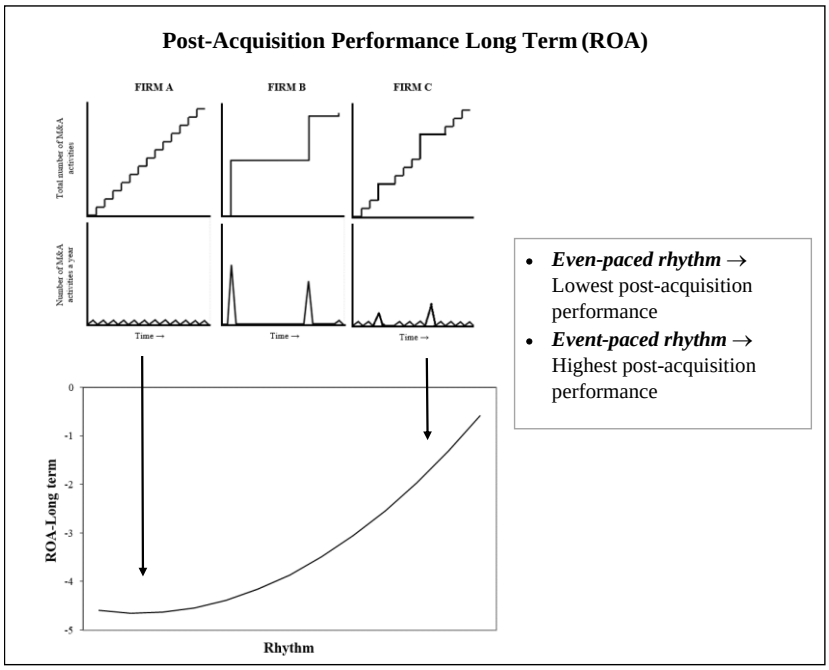


FIGURE 12
Relation between rhythm and post-acquisition performance



5.2. Limitations and future Research Directions

The study conducted in this thesis has a number of limitations, some of which may lead to opportunities for future research. First, all firms in the data set are active in one macro industry: The Energy and Power industry. Industry-specific characteristics may affect the results. Acquisitions by electric utilities firms are subject to a unique set of circumstances, such as straight regulations, which may influence the relation between M&As and post-acquisition performance, and therefore also the effect of entry time, pace and rhythm on this relation. Because of this, there is an issue of generalizability. The results in the study are based on firms in one specific macro industry. Therefore, the results cannot be generalized to other industries. Further research can expand this thesis by exploring the relations between entry time, pace and rhythm and post-acquisition performance in other industries. Moreover, this study does not look to the differences between the specific macro industry. The Energy and Power industry consist of several sub-industries, such as the renewable energy industry. Further research can examine the differences between these sub-industries. Moreover, different industries are characterized by different characteristics, such as different degrees of competition, regulations and capital requirements (Dykes & Kolev, 2018). These circumstances can moderate the influence of entry time, pace and rhythm on post-acquisition performance. Future research can examine how these circumstances affects the relation analysed in this research.

Second, due to the limited availability of the performance measure of the firms, the final data sample does not include all M&A activities in the time spam. It is therefore conceivable that only performance data was available for firms which were performing better and therefore more inclined to make data about their performance publicly available. This may affect the results found in this research. Collecting data of a large sample or using another performance measure can alleviate this limitation in future research.

Third, I limited the sample to firms that are active acquirers, as I focus on variables that start to play a role only when firms acquire multiple firms in the time period. For companies performing fewer acquisitions I could not calculate variables on rhythm and pace. Moreover, the analysis performed in this research includes only cases with values on all variables. However, as only a limited number of M&As occurred in one of the eleven identified merger waves, the data sample is limited to these deals. Further research can therefore examine the effect of pace and rhythm on post-acquisition performance in the Energy and Power industry, without the notion of entry-time.

Fourth, another limitation of this analysis is that I do not test why the relation between entry time, pace and rhythm and post-acquisition performance exhibits in a curvilinear relationship. Although giving some theoretical explanations, I have not tested these in the analysis. Further research can therefore expand the results findings by analysing these theoretical explanations.

Fifth, future research could build on this study by investigating additional temporal dimensions of M&A programs, such as duration and sequence, and how these interacts with each other. Moreover, it may be interesting to explore the role between pace and rhythm on entry time. It can be argued that

firms following a predictable rhythm are less likely to identify opportunities in the environment, because they stick to their own routines (Betsch et al., 2001), making companies less likely to be a first-mover. Further, this study does not include non-participants of a merger wave. Future research may explore the differences between the effect of entering a merger wave or not.

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Appendices

Appendix A Identification of merger waves

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
131	135	84	109	130	166	149	130	144	168	131	121	177	199	210	236	202	152	170	162	175	3150
138	25	24	16	47	72	48	20	20	37	28	16	35	47	86	61	52	27	49	35	29	774
162	1	1	5	3	4	8	2	4	2	3	2	0	2	4	6	9	9	6	9	6	86
291	2	7	6	14	9	9	11	13	14	6	18	9	13	13	15	15	13	13	19	6	225
353	7	10	6	12	24	20	13	8	14	13	6	8	8	7	12	15	15	6	11	9	224
361	1	11	3	5	4	8	10	14	5	1	3	4	7	12	6	12	6	15	17	18	162
362	4	3	4	1	6	10	11	11	5	4	9	5	10	11	17	3	4	5	15	10	148
369	0	3	3	4	3	3	3	3	1	5	3	9	6	3	5	5	7	4	8	4	82
461	1	2	2	2	1	1	2	1	6	6	11	11	8	10	2	6	8	7	10	7	104
491	8	11	21	28	48	47	74	88	71	64	37	48	46	53	58	56	37	43	56	50	944
492	13	12	10	12	12	21	22	24	28	18	23	21	26	16	30	22	25	33	23	30	421
493	2	2	8	2	12	11	16	23	16	21	11	11	7	12	4	7	3	2	5	8	183
494	10	3	6	10	11	15	24	22	4	13	4	8	7	3	6	15	7	3	5	6	182
495	23	21	27	43	83	56	22	16	14	15	9	10	7	24	16	20	17	9	11	11	454
499	0	1	2	0	3	1	2	4	5	4	3	4	9	12	17	19	16	15	7	7	131
517	3	2	5	4	3	6	3	2	6	5	3	7	14	5	17	12	11	15	16	15	154
951	0	2	0	0	0	0	2	1	4	2	4	5	11	11	12	6	0	2	3	4	69

Appendix B Missing value analysis

		ROE_short	ROE_long	ROA_short	ROA_long	Entry_time	Pace	Rhythm	Prior_Per	Size	# of acq.
N	**Valid**	3191	3191	3191	3191	692	3191	3027	3191	2814	3191
	Missing	0	0	0	0	2499	0	164	0	377	0
	Percent missing	0%	0%	0%	0%	78.31%	0%	5.14%	0%	11.81%	0%

Comparison between missing values and value in the analysis

	Entry time		Rhythm		Size		Attitude	
	Missing data	**Sample**	**Missing data**	**Sample**	**Missing data**	**Sample**	**Missing data**	**Sample**
N	2499	692	164	3027	377	2814	17	3174
ROE short	8.62	8.60	5.60	8.78	6.84	8.86	12.45	8.60
ROE long	5.02	4.42	2.99	4.99	4.31	4.97	12.28	4.85
ROA short	5.15	5.39	4.23	5.26	5.20	5.21	6.13	5.20
ROA long	4.06	3.89	2.78	4.09	3.75	4.06	6.01	4.01
Entry time		0.50	0.56	0.49	0.54	0.50	0.59	0.50
Pace	1.28	2.10	1.33	1.47	1.30	1.48	1.28	1.46
Rhythm	5.19	2.22		4.64	4.90	4.61	6.86	4.63
Size	16,439.28	29,789.71	15,085.13	19,620.24		19,413.95	57,486.09	19,264.54
Prior performance	5.87	5.74	3.61	5.96	5.75	5.85	7.49	5.83
# of acquisitions	11.23	12.49	2.59	11.98	7.68	12.01	11.71	11.50
Relatedness	0.66	0.53	0.49	0.64	0.60	0.64	0.76	0.63
Attitude - Friendly	0.96	0.98	0.94	0.97	0.97	0.97		0.97
Attitude - Neutral	0.03	0.01	0.05	0.03	0.03	0.03		0.03
Geography	0.25	0.28	0.32	0.25	0.18	0.27	0.18	0.26
Industry – Mining	0.44	0.40	0.39	0.44	0.51	0.42	0.35	0.43
Industry – Manufacturing	0.12	0.29	0.20	0.15	0.11	0.16	0.18	0.16
Industry – Transportation & Public Utilities	0.39	0.26	0.29	0.36	0.31	0.36	0.47	0.36

Appendix C Industry adjusted Return on Equity and Return on Assets (winsorized data)

Industry		n	Average ROE		Average ROA		
			ROE-short term	ROE-long term	ROA-short term	ROA-long term	Prior performance
1.	Mining	202	11.77	4.57	6.79	4.44	6.15
2.	Manufacturing	160	10.64	9.61	5.82	5.56	9.12
3.	Transportation & Public Utilities	143	8.15	3.93	4.17	3.24	4.59
4.	Public Administration	14	6.29	1.68	5.52	3.95	8.49

Appendix D Continuous variables before winsorization, industry-adjustment and transformation

		ROE_short	ROE_long	ROA_short	ROA_long	Entry_time	Pace	Rhythm	Prior_Per	Size	# of acq.
N	Valid	519	519	519	519	519	519	519	519	519	519
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		9.87	5.42	5.69	4.39	0.49	2.38	2.58	6.51	33380.82	15.17
Std. Dev.		20.09	15.38	7.74	4.62	0.24	2.40	12.55	6.02	75680.98	11.64
Skewness		-1.56	-3.81	-0.53	-0.78	-0.06	1.87	4.84	-1.76	3.15	1.58
Std. Error of Skewness		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Kurtosis		8.60	32.08	9.85	6.26	-0.48	2.79	30.30	10.10	9.18	1.63
Std. Error of Kurtosis		0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Min		-113.34	-136.10	-42.53	-19.72	0.00	0.33	-7.38	-38.10	48.00	4.00
Max		96.02	52.97	59.60	25.93	1.00	9.20	109.72	22.12	364528.00	46.00

Appendix E Dependent variables and prior performance after winsorization and industry adjustment

		AWROE_short	AWROE_long	AWROA_short	AWROA_long	AWPrior_Per
N	Valid	519	519	519	519	519
	Missing	0	0	0	0	0
Mean		.00	.00	.00	.00	.00
Std. Dev.		17.01	10.67	6.35	3.68	4.78
Skewness		-.75	-.72	-.79	-.26	-0.64
Std. Error of Skewness		.11	.11	.11	.11	0.11
Kurtosis		2.05	1.62	1.9	.40	2.89
Std. Error of Kurtosis		.21	.21	.214	.214	0.21
Min		-52.22	-37.80	-20.15	-10.63	-19.42
Max		45.10	26.06	15.56	8.52	13.18

Appendix F Transformation of variables

Figure 1 Descriptive statistics after Log transformation

		Log_Pace	Log_rhythm	Log_Size	Log_#ofacq
N	Valid	519	519	519	519
	Missing	0	0	0	0
Mean		0.39	0.92	3.78	1.08
Std. Dev.		0.27	0.28	0.82	0.29
Skewness		0.75	1.12	0.25	0.44
Std. Error of Skewness		0.11	0.11	0.11	0.11
Kurtosis		-0.32	2.47	-0.36	-0.53
Std. Error of Kurtosis		0.21	0.21	0.21	0.21
Min		0.00	0.00	1.68	0.60
Max		0.99	2.07	5.56	1.66

Figure 2 Descriptive statistics after Squared-Root transformation

		Sqrt_Pace	Sqrt_rhythm	Sqrt _Size	Sqrt _#ofacq
N	Valid	519	519	519	519
	Missing	0	0	0	0
Mean		1.64	3.06	122.84	3.66
Std. Dev.		0.58	1.26	135.37	1.32
Skewness		1.31	2.73	2.14	1.05
Std. Error of Skewness		0.11	0.11	0.11	0.11
Kurtosis		1.04	10.25	4.08	0.33
Std. Error of Kurtosis		0.21	0.21	0.21	0.21
Min		1.00	1.00	6.93	2.00
Max		3.14	10.87	603.76	6.78

Figure 3 Descriptive statistics after Reciprocal transformation

		Rec_Pace	**Rec _rhythm**	**Rec _Size**	**Rec _#ofacq**
N	Valid	519	519	519	519
	Missing	0	0	0	0
Mean		0.49	0.14	0.00	0.10
Std. Dev.		0.25	0.09	0.00	0.06
Skewness		0.11	4.88	6.70	0.79
Std. Error of Skewness		0.11	0.11	0.11	0.11
Kurtosis		-1.19	41.55	59.92	-0.01
Std. Error of Kurtosis		0.21	0.21	0.21	0.21
Min		0.10	0.01	0.00	0.02
Max		1.00	1.00	0.02	0.25

Appendix G Descriptive statistics after winsorization and transformation

		AWROE – short term	AWROE – long term	AWROA – short term	AWROA – long term	Entry-time	Log_Pace	Log_Rhythm	Log_Firm size	Sqrt_AW_Prior performance	Log_#ofacq	Entry timing*rhythm	Pace*Rhythm
N	Valid	519	519	519	519	519	519	519	519	519	519	519	519
	Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean		0.00	0.00	0.00	0.00	0.49	0.39	0.92	3.78	0.00	1.08	0.00	-0.05
Std. Dev.		17.10	10.67	6.35	3.68	0.24	0.27	0.28	0.82	4.78	0.29	0.07	0.07
Skewness		-0.75	-0.72	-0.79	-0.26	-0.06	0.75	1.12	0.25	-0.64	0.44	-0,06	-2,40
Std. Error of Skewness		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0,11	0,11
Kurtosis		2.05	1.62	1.90	0.40	-0.48	-0.32	2.47	-0.36	2.89	-0.53	7,92	8,30
Std. Error of Kurtosis		0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0,21	0,21
Min		-52.22	-37.80	-20.15	-10.63	0.00	0.00	0.00	1.68	-19.42	0.60	-0.37	-0.43
Max		45.10	26.06	15.56	8.52	1.00	0.99	2.07	5.56	13.18	1.66	.33	.06

Appendix H Correlation matrix (n = 519)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. ROE – short term	1																		
2. ROE – long term	.605**	1																	
3. ROA – short term	.914**	.603**	1																
4. ROA – long term	.556**	.930**	.639**	1															
5. Entry timing	-.213**	-0.048	-.224**	-0.051	1														
6. Pace	0.067	-0.053	0.018	-0.085	0.035	1													
7. Rhythm	-0.001	.107*	-0.004	.115**	-0.004	-.676**	1												
8. Entry timing*rhythm	0.010	-0.065	-0.012	-0.070	.148**	-0.041	0.036	1											
9. Pace*rhythm	0.002	-0.036	0.059	-0.007	-0.048	0.019	-.642**	-.137**	1										
10. Size	.118**	.132**	0.052	0.057	.161**	.207**	-.112*	-.112*	-.130**	1									
11. Prior performance	.179**	.262**	.247**	.268**	.145**	0.082	-0.051	-0.051	0.009	0.074	1								
12. Number of acquisitions	.087*	0.041	0.069	0.053	0.083	.827**	-.484**	-.484**	-0.037	.258**	.205**	1							
13. Relatedness	-.090*	-0.070	-0.071	-0.049	-0.050	-0.020	0.003	0.076	.144**	-.198**	0.015	-.126**	1.000						
14. Attitude - Friendly	-0.027	-0.083	-0.036	-.090*	0.006	0.038	-0.033	0.035	-0.080	0.010	0.015	0.030	-0.022	1.000					
15. Attitude - Neutral	.090*	.105*	0.084	.094*	0.031	-0.022	0.038	-0.040	0.061	0.004	0.018	-0.032	0.012	-.788**	1.000				
16. Geography	0.043	0.008	0.078	0.040	0.008	-.130**	0.054	0.025	0.020	.254**	-0.031	-.131**	0.008	-0.060	0.069	1.000			
17. Industry – Mining	0.063	-0.045	0.065	-0.039	-.178**	-.157**	.132**	.122**	.208**	-.300**	.097*	-.197**	.273**	-0.061	0.002	-.098*	1.000		
18. Industry – Manufacturing	-0.077	-0.048	-0.007	0.006	0.019	-.118**	.094*	0.051	-0.051	.152**	-.086*	-0.001	-.176**	0.050	-0.023	.238**	-.533**	1.000	
19. Industry – Transportation & Public Utilities	-0.009	0.079	-0.084	0.025	.168**	.282**	-.190**	-.169**	-.185**	.244**	-0.033	.243**	-0.077	0.007	0.027	-.110*	-.492**	-.412**	1.000

*Significant: *p <.05, ** p <.01*

Appendix I Check for assumptions

Assumption 1: Normally distributed errors

Figure 1 Histogram and normal probability plot of the standardized residuals (DV: ROE-Short term)

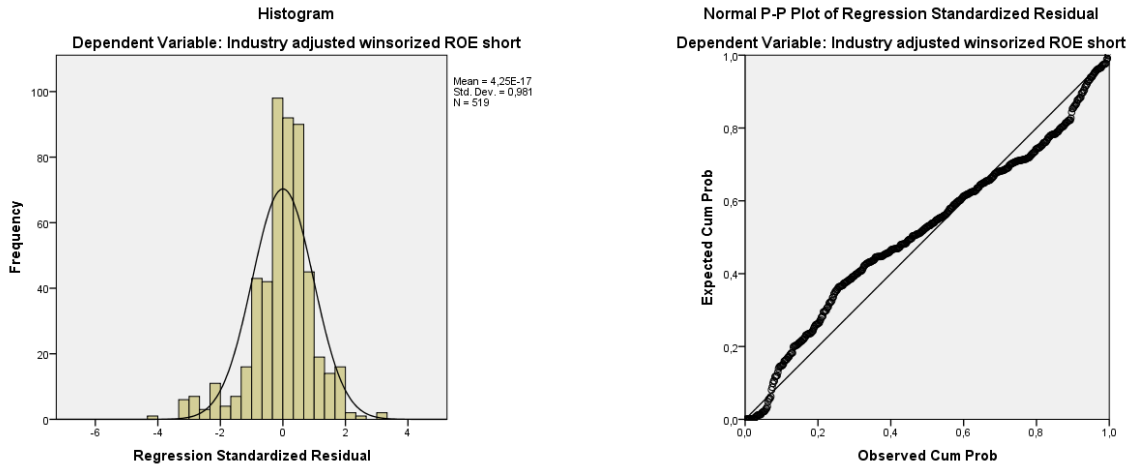


Figure 2 Histogram and normal probability plot of the standardized residuals (DV: ROE-Long term)

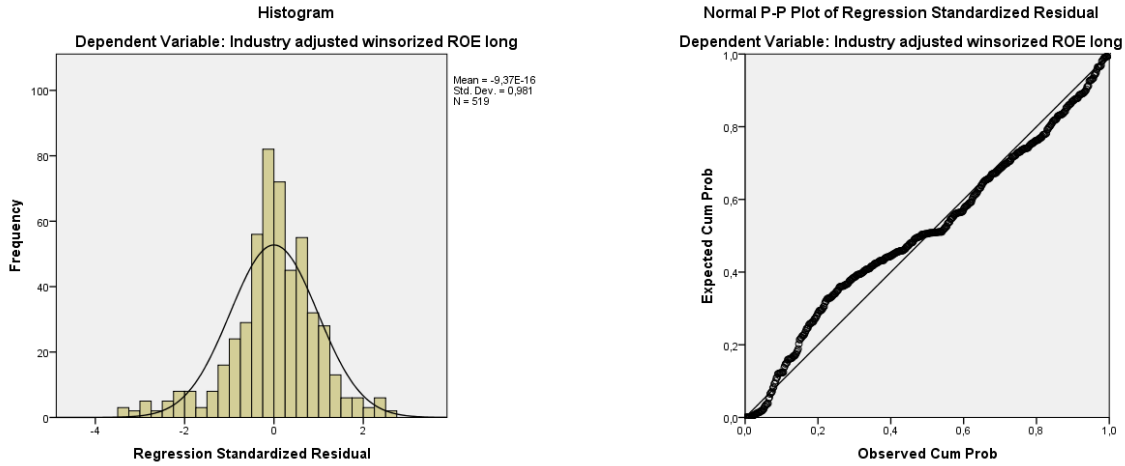


Figure 3 Histogram and normal probability plot of the standardized residuals (DV: ROA-Short term)

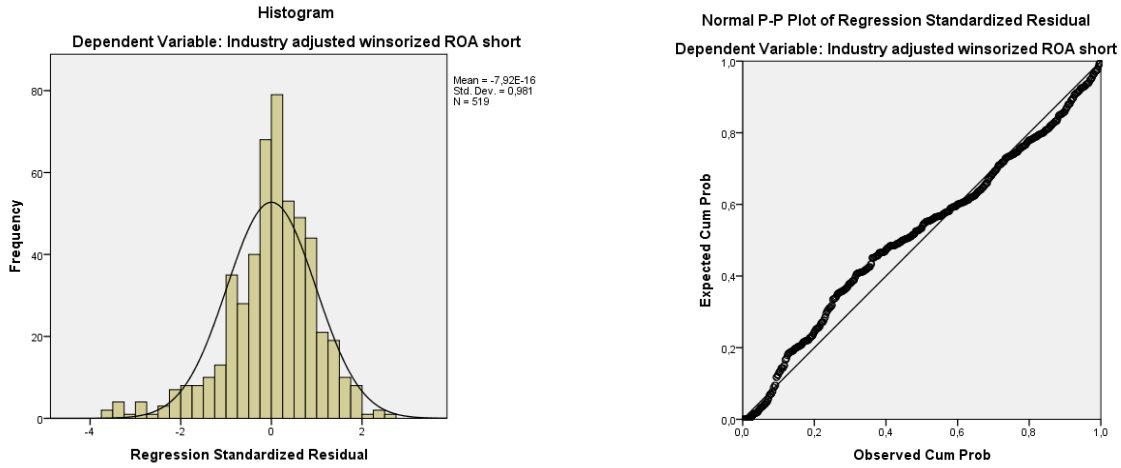
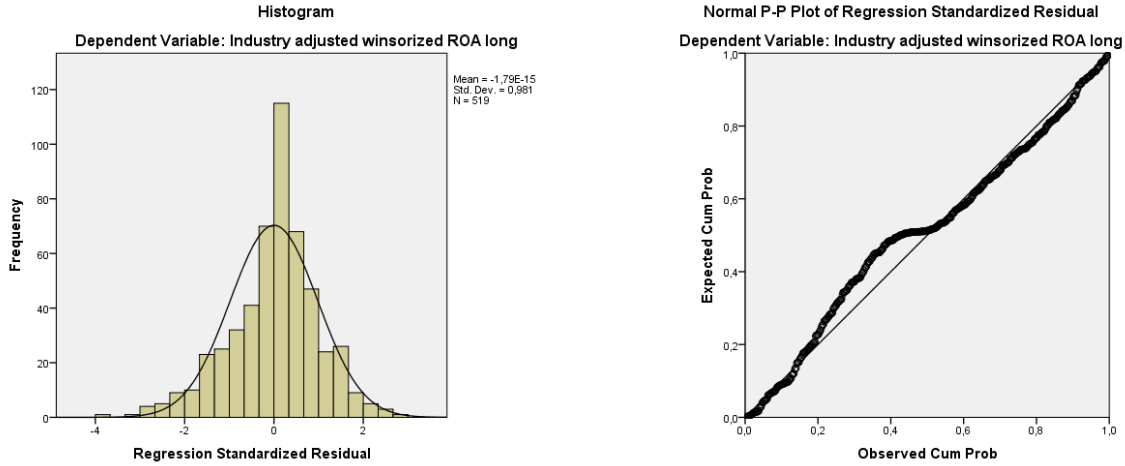
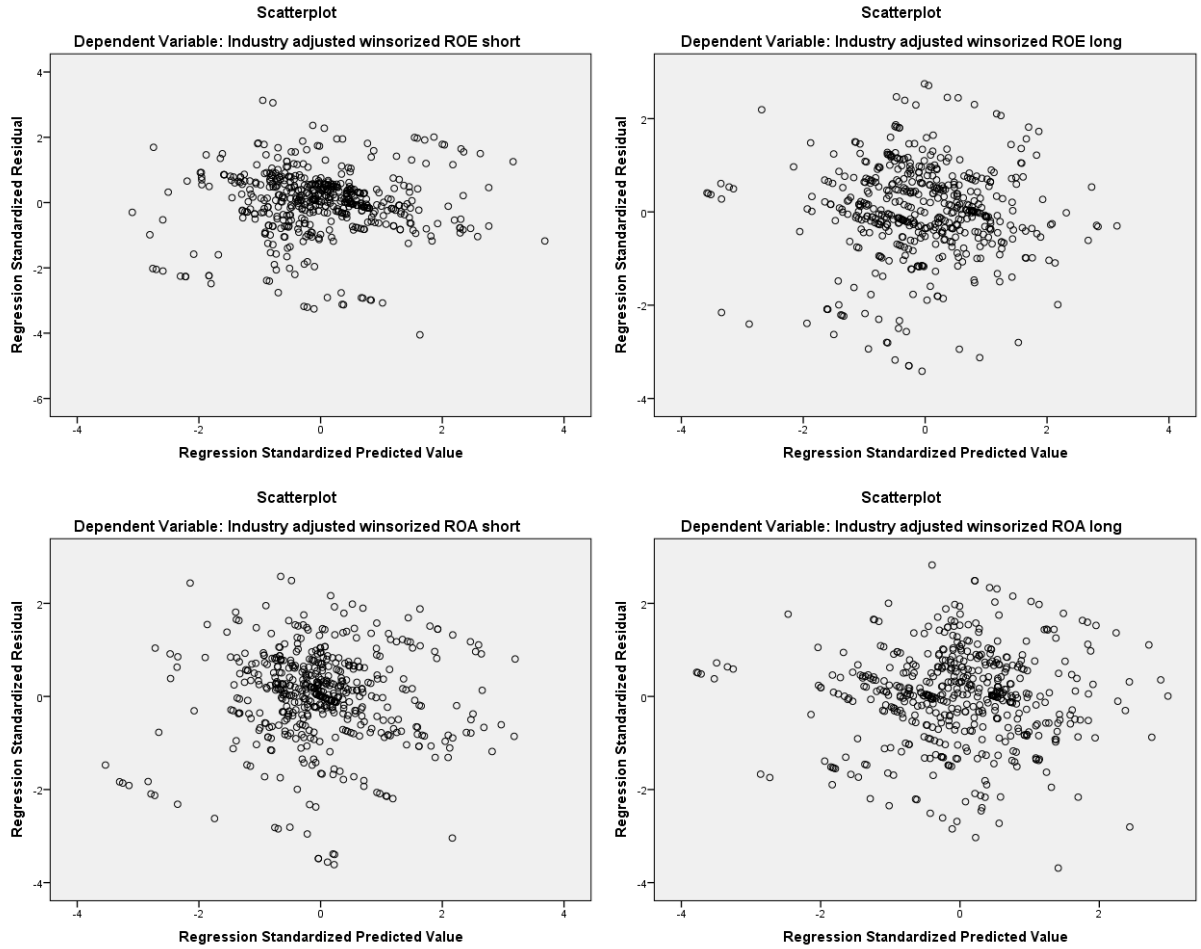


Figure 4 Histogram and normal probability plot of the standardized residuals (DV: ROA-Long term)



Assumption 2: Linearity and Homoscedasticity

Figure 5 Scatterplots



Assumption 4: Independent erros

Table 1 Durbin-Watson test

Dependent variable	Durbin-Watson test
ROE-short term	1.519
ROE-long term	1.760
ROA-short term	1.437
ROA-long term	1.874

Assumption 5: Multicollinearity (after deletion of Industry-Mining)

Table 2 VIF values

M9	Tolerance	VIF
Log_size	0.74	1.36
Industry adjusted winsorized prior performance	0.90	1.11
Log_Total_acq	0.22	4.48
Relatedness (SIC2)	0.90	1.11
Attitude_friendly	0.37	2.68
Attitude_neutral	0.37	2.68
Geography_nation	0.83	1.20
Industry - Manufacturing	0.68	1.47
Industry - Transportation & Public Utilities	0.61	1.63
MC_Entry_time	0.90	1.11
MC_Log_Pace	0.09	11.23
Mean centered log_rhythm	0.11	8.96
Entry time*rhythm	0.89	1.13
Pace*rhythm	0.21	4.86

M10	Tolerance	VIF
Log_size	0.73	1.37
Industry adjusted winsorized prior performance	0.86	1.17
Log_Total_acq	0.20	4.95
Relatedness (SIC2)	0.85	1.17
Attitude_friendly	0.37	2.72
Attitude_neutral	0.37	2.72
Geography_nation	0.81	1.24
Industry - Manufacturing	0.64	1.56
Industry - Transportation & Public Utilities	0.59	1.69
MC_Entry_time	0.88	1.13
MC Entry time squared	0.81	1.24
MC_Log_Pace	0.04	25.09
MC Log Pace squared	0.06	17.50
Mean centered log_rhythm	0.06	15.91
Rhythm squared	0.12	8.53
Entry time*rhythm	0.86	1.16
Pace*rhythm	0.02	42.16
Entry time_squared*rhythm	0.44	2.28
Pace_squared*rhythm	0.02	40.60