Post-acquisition performance of acquiring firms in the short-term, during industrial merger waves: A first-mover approach

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Dissertation

Master in Finance

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September 15th, 2017

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Acknowledgements

First I want to exalt all my gratitude to the Professors who have closely followed my work, namely Miguel Sousa, PhD and Jorge Farinha, PhD, for all their support, dedication and readiness to helping me taking this dissertation to a successful conclusion.

I also want to thank the help and support of all my colleagues, friends and family.

Abstract

With no doubt the number of Mergers and Acquisitions (hereafter M&A) operations has been increasing through the last years. These deals often occur in global waves identified usually as an aggregate of specific industrial merger waves. The theoretical explanations and empirical studies for these events are vast, from stock market misevaluation to economic, technological or regulatory shocks. This study, supported by the neoclassical theory, leaves aside the explanation and focuses on the short-term returns inside the different industrial merger waves, comparing the gap between waves' participants and non-participants returns, and comparing the first and latter movers' returns within those waves. The theory suggests a timing advantage for the first movers inside an industrial merger wave, which somehow proves the possible existence of a bandwagon effect. Our results were positive regarding participants and non-participants returns, however, they showed a significant advantage for the latter movers contradicting previous works and also failing to support the bandwagon effect verification.

Keywords: Bandwagon; mergers and acquisitions; short-term returns; post-acquisition performance; waves.

JEL-Codes: G34.

Abstract (Portuguese)

Sem dúvida alguma que o número de Fusões e Aquisições tem vindo a aumentar durante os últimos anos. Estas operações ocorrem frequentemente através de "ondas" globais normalmente identificadas como um conjunto de "ondas" de aquisições dentro de indústrias específicas. São inúmeras as teorias explicativas e os estudos de casos práticos para este tipo de eventos, variando desde avaliações incorrectas dentro do mercado bolsista a choques económicos, tecnológicos ou regulatórios. Este estudo é maioritariamente suportado pela teoria neoclássica e, deixando de lado todas as explicações teóricas, foca-se antes nos retornos de curto prazo dentro das diferentes "ondas" industriais. Comparando não só as diferenças nos retornos dos compradores que participam nessas "ondas" com aqueles que ficam de fora, mas assim como os retornos dos primeiros participantes com os dos últimos. A teoria sugere que existe uma vantagem para os primeiros participantes numa onda de aquisições dentro de uma indústria específica, o que de certa forma comprova a existência de um efeito *bandwagon* (efeito imitação). Por um lado, os nossos resultados foram claros no que toca à comparação entre os retornos dos participantes com aqueles dos não-participantes, mostrando uma patente vantagem para os primeiros. Contudo, e por outro lado, os resultados referentes à comparação dos retornos dos primeiros participantes com os retornos dos restantes mostraram uma vantagem estatisticamente significativa dos últimos, o que contradiz trabalhos anteriores.

Palavras-chave: *Bandwagon*; fusões e aquisições; retornos de curto prazo; desempenho pós-aquisição; "ondas".

JEL-Code: G34.

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1. Introduction

The theme of merger waves, per se, is a topic that through several theoretical or empirical studies was already much scrutinized in the finance history. The results seem to point out that most of the time mergers occur in waves (Brealey and Myers, 2003) defined as a set of specific industrial merger waves (Andrade and Stafford, 1999).

After the proven existence of these events it seemed logical that questions about possible explanations would arise and the possible answers would consequently appear. From works such as Gort (1969), and more recently Mitchell and Mulherin (1996) and Harford (2005), neoclassical explanations were developed arguing that industry's economic, technological, or regulatory shocks associated with high liquidity were in the foundations of industrial merger waves.

Conversely, Shleifer and Vishny (2003), and Rhodes-Kropf and Viswanathan (2004), argue that merger waves result mainly from a managerial advantage due to stock market overvaluation of their firms.

Considering the existence and the developing explanations for industrial merger waves some space is still open to evaluate the performance of companies participating in these waves, and furthermore comparing it with the performance of companies that chose to stay out of these events.

Even with the considerable extant research analyzing the impact of M&A on value creation for both acquirer and target companies, we still consider that the M&A literature should be constantly updated with relevant and original improvements, in order to better understand and improve companies' decisions.

Despite the fact we present both the neoclassical and behavioral theory as explanations for merger waves, this event study takes its support mostly from the industry's economic, technological (Mulherin and Boone, 200), financing innovations and regulatory shocks (Mitchell and Mulherin, 1996), associated with sufficient capital liquidity to accommodate the assets reallocation (Harford, 2005), as preeminent explanations for the abovementioned phenomena.

Starting from the *post-acquisition performance of acquiring firms in the short-term* and then narrowing it to a more specific subject, as it is the case of industrial merger waves

the expectations are that it would be possible to measure and somehow explain how the market "inefficiencies" (whatever they are neoclassical or behavioural theory) are exploited by managers according their different timing in entering the market.

When in an industrial merger wave some managers feel the pressure for entering the market as a response to their rivals. However, what should be a rational and conscious decision at times may be affected by copycat behavior characterized by following the industry tendency signaled by managers with different information and opportunities. This study purpose is to deepen into the *bandwagon theory*, (Pangarkar, 2000) a theory suggesting that firms will tend to imitate their close rivals regardless of whether such imitation is value-enhancing or not.

Regarding the first-mover advantage theory, other research has shown that the timing of participation in the wave is a matter of relevant importance, since early movers outperform later ones (Carow, et al., 2004; McNamara, et al., 2008).

The natural intuition seems to provide first movers with competitive advantages and the later entrants with considerable disadvantages, however a specific firm must have certain competences and skills to do so, because depending on their unique traits, some firms might benefit from early entrance and others might benefit from following (Kerin, et al., 1992).

Not exactly in the same position as a firm developing a new product or entering a new market, a first mover in an industrial merger wave is also endowed with the natural assumptions of higher abnormal returns however, is along with a series of tests, that it is expected to discover if that first mover advantage is real.

As the industrial merger waves, and consequently aggregate merger waves are defined, another simple question automatically emerges. Independently of first or later movers, is it advantageous to "surf" within a wave? It is hard to find empirical studies in this field, nevertheless analysing returns between financial operations within and without waves might be enlightening in which regards the managers' concern about waves.

This last question will be briefly addressed as we try to reach some conclusions by globally comparing short-term returns of companies caught within M&A waves with market returns. Additionally, this work intends to answer to the following questions: 1) is timing relevant in M&A? 2) Could the first companies reacting to market inefficiencies take

advantage over the subsequent ones? 3) Is it possible that some managers feel the pressure of entering the market through M&A in response to their rivals regardless the operation creates value or not? 4) Is it advantageous for a company to participate in a wave? 5) Could the market inefficiencies exploited by firms "surfing" within a wave be observable in their short-term returns? 6) What are the deal/firm characteristics that impact when a firm enters an industry merger wave?

This study proceeds by using a sample of mergers and acquisitions from all the globe between 2005 and 2014, and across a range of industries to test the timing of entry in industrial merger waves within different geographies, economic development, means of payment, among others. Fundamentally, our first major contribution is to investigate if the early mover advantage (advantage from an acquisition that occurs in the beginning of an industrial merger wave) is somehow reflected in the shareholder's returns. And if it is, in our second major contribution, we intend to test if those abnormal returns are still observable after controlling for the transaction characteristics namely, the mean of payment used (cash vs stock), economic growth (developed countries vs developing countries), size (large-cap firms vs small-cap firms), geographical scope (cross-border vs domestic), and industry relatedness (industry specialization vs industry diversification).

We are trying to prove that part of the later entrants only run for this kind of financial operation as a response to their rivals, regardless of such reply creates value or not.

The following section briefly reviews the most relevant literature related to our study. Chapter 3 presents the data and the methodology used to measure and compare the short-term abnormal returns. Section 4 and 5 will respectively present the results and conclusions.

2. Literature review

In the first section, 2.1, we explain the definition and the differences between the different types of M&As. In section 2.2 we present the theory behind merger waves and the specific case of industrial merger waves. And we also discuss the results obtained by previous studies. Sections 2.3 and 2.4 leave aside the global perspective of M&A and focus on two main points of this study: the bandwagon effect, and the identification of industrial merger waves. In section 2.5 we consider the different methodologies and results of value creation studies in M&A, leaving for the section 2.6 the main conclusions regarding the more relevant factors determining acquirers' returns.

2.1. Mergers and Acquisitions (M&A)

According to Ross et al. (2013), an acquisition follows one of three different forms: merger or consolidation, acquisition of stock or acquisition of assets.

In a merger, one firm absorbs the other, acquiring all its assets and liabilities. The acquiring firm retains its name and identity while the acquired, from that moment, ceases to exist. A consolidation is very similar to a merger; however, an entirely new firm is created with the termination of both the acquiring and acquired firm.

2.2. Theory behind merger waves

The existence of merger waves is clearly documented (see, e.g., Brealey and Myers, 2003 and DePamphilis, 2010). The first wave began in the 19th century, in the 1890s to be more precise, and ended in 1903. The second wave occurred from the 1910s through 1929, closely following the end of the first wave, while the third took place between the 1950s and 1973. The fourth and fifth waves materialized in the periods from 1981 to 1989, and from 1993 to 2001, respectively.

Also well-known is the proven existence of clustering waves within industries (see, e.g., Andrade, et al. (2001), and Mulherin and Boone (2000)) where they both play a 'contractionary' and 'expansionary' role in industry restructuring (Andrade and Stafford, 1999), invariably tied to two different explanatory concepts.

From the behavioural angle, Rhodes-Kropft and Viswanathan (2004) suggest that potential market value deviations from fundamental value on both positive and negative sides can rationally lead to a correlation between stock merger activity and market valuation; thus, valuation fundamentally impacts mergers. In the same line of thought, the model of stock-market-driven acquisitions plotted by Shleifer and Visnhy (2003) seems to be consistent with the available empirical findings supporting the conclusion that firms with overvalued equity might be able to make acquisitions, survive and grow while firms with undervalued, or relatively less overvalued, equity become takeover target themselves.

As in the work of Gort (1969), the neoclassical explanations for merger waves are based on economic disruptions that lead to industry reorganization. The results shown by Mitchell and Mulherin (1996) support the argument that much of the takeover activity during the 1980s was driven by broad fundamental factors such as technological, economic or regulatory shocks. More recently Harford (2005), through several tests, reinforced that industry shocks are the drivers for merger waves; however, whether the shocks lead to a wave of mergers will depend on whether there is sufficient overall capital liquidity in the market.

2.3. Bandwagon effect

The first-mover advantages seemed, somehow, a belief that would automatically lead to countless competitive gains but, as noted by Lieberman and Montgomery (1988, p. 52):

> [F]or any given firm, the question of whether early or late entry is more advantageous depends on the firm's particular characteristics. If one firm has unique R&D capabilities while the other has strong marketing skills, it is in the interest of the first firm to pioneer and the second firm to enter at a later date. Both may earn significant profits entering in this sequence, but neither would gain if the (attempted) order of entry were reversed.

The first-mover problem would never exist if it were not due to imitators. As Keyfies (1973) explains, people know that, in times of pressure or uncertainty as in the case of a merger wave, their individual judgment is not trustworthy, and they tend to fall back on the judgment of others whom they consider, perhaps, better informed. Thus, people tend to come

into compliance with the majority or the average.

Several models have been advanced for capturing the essence of such behaviour. One of the terms that could better explain the manager's attitude toward merger waves is *mimetic isomorphism*, as suggested by DiMaggio and Powell (1983), which according to them results from standard responses to uncertainty.

The probability model for mimetic isomorphism presented by Tseng and Chou (2010) seems to point to an impact of institutional pressures on mimetic isomorphism in merger and acquisitions activity. Isomorphism refers to the tendency for firms within the same population, facing the same set of institutional pressures, to display the same behaviour mainly because the social pressures common to all managers in the same industry cause firms to exhibit similar structures and activities.

As in many other economic situations, mimetic behaviour is present in mergers. Pangarkar (2000) identifies it as *bandwagon effect* and argues that firms will tend to imitate their close rivals regardless of whether such imitation is value-enhancing or not.

It is assumed from the beginning that first movers would probably have advantages over the ones. To develop this argument, some event studies will be realized so we can compare the short-term returns between first and later movers.

In the results given by the theoretical model developed by McNamara, et al. (2008), evidence was found that acquisition performance is higher for early movers but lower for acquirers that participate at the height of an acquisition wave. However, findings also suggest that both industry and acquirer characteristics affect the degree to which firms seize early-mover advantages or fall prey to bandwagon pressures.

2.4. Value creation in M&A

Whether mergers add value or not is a question that has been raised for a long time. In an M&A operation, value may be created, preserved or destroyed and, if we want to know whether in practice mergers actually create value or not, we should be ready to examine empirical evidence, as it is impossible to answer an empirical question in any other way. Though there exist several different ways of measuring value creation, the great majority of academics in the field tend to use event studies. These studies estimate abnormal returns on,

and around, the merger announcement date, comparing the actual returns with a market index or control group of stocks.

2.4.1. Short-term and long-term returns

There are many perspectives we could use to determine takeover success. They could vary from the perspectives of the target's shareholders to those of any other stakeholders, e.g. bondholders, managers, employees and consumers. In this specific case, though, we are focusing on the bidder's position, considering bidders as a company's residual owners.

Several studies have already proved that abnormal returns are a good indicator of acquisitions success (e.g., Healy, et al. (1992)) and, assuming the semi-strong form of information efficiency by Fama (1970) where the current price reflects all the past and present public information, short-term returns seem a plausible method to measure acquisition performance.

To reach some conclusions about takeover profitability across the decade, it is necessary to find a suitable measurement model. In a careful review of the vast academic literature on the market for corporate control, Martynova and Renneboog (2008) presented a list of the major studies of returns across the last five merger waves. Diverse preferences regarding the benchmark return model and the event window from a number of different authors can be observed; thereby, the most apt method to compare the post-acquisition performance of acquiring firms is expected to be found.

The studies focusing on the bidding firm's stockholder returns are immense but, on average, abnormal returns realized by bidder shareholders at time of announcement are statistically indistinguishable from zero; in other words, they are not statistically significant (Andrade, et al. (2001)). In the first merger wave, Asquith (1983) and Eckbo (1983) report, there were positive abnormal returns close to zero (0.2% and 0.1%, respectively). For the second wave, Morck et al. (1990), Byrd and Hickman (1992), and Chang (1998) report negative abnormal returns also close to zero (ranging from -1.2% to -0.7%). And for the third wave, the findings of 17 different event studies are split almost evenly between positive and negative abnormal returns (Martynova and Renneboog, 2008).

One explanation for such inconsistent results could be the different methodologies used by the researchers. Noteworthy pioneering studies have included those of Fama et al. (1969), using a methodology based on the Market Model (MM); Kummer and Hoffmeister (1978), who used the Capital Asset Pricing Model (CAPM) as benchmark return model; Asquish (1983), who introduced the Beta-Matched Control Portfolio (BMCP); and Dennis and McConnell (1986), who used the Market-Adjusted Model (MAM) as a reference point, in the short-term return of M&A. The abnormal return is the positive or negative difference between the actual returns and the benchmark.

A benchmark should be used to rule out the impact of extraneous factors not related to the operation or the share price. Considerably more methodological problems emerge when long-term performance is evaluated, mainly because the company's gains or losses could be affected by several different factors in the long term and it is almost impossible to completely isolate them.

Following the work of McWilliams and Siegel (1997), who argue that it is more effective to use event studies than accounting studies, as stock prices are much less manipulable by managers than accounting returns, we have established as our goal to develop an event study about the short-term returns of acquiring firms. It is expected to compare the timing of the financial operation, not the general returns. Our ambition is to conclude whether there are significant return differences between the first movers and the later ones, and between the industrial merger wave participants and the non–industrial merger wave participants.

2.4.2. Post-operating performance

Apart from the abnormal returns measured by the short-term returns, other studies examine the post-operating performance of acquiring firms, usually based on a comparison between the accounting items or ratios preceding and following a takeover process. After the deal, a positive variation on the company's cash flows is expected, which usually implies an increase in the firm's value (Andrade et al., 2001). Such assessments include: return on equity (ROE), return on assets (ROA), return on sales (ROS), sales growth, total assets growth,

leverage growth, employment growth, market share, cash flows, and others (Martynova et al., 2008).

The main goal of this kind of study is to identify the sources of gains from M&A and to determine whether the expected gains/losses seen in the share price movements at the announcement are ever actually realized. Other studies compare the acquirer's performance with other companies in the same industry. If the creation of value of an acquisition, through synergies or cost reduction, truly exists, the gains should eventually show up in the firm's financial statements, specifically in the cash flow and income statement.

A problem materializes in this specific approach. Sometimes operating performance is affected, not merely by the takeover, but also by an array of other factors. Moreover, as pointed by Martynova and Renneboog (2008), it seems that an industry adjustment trend is necessary. Alternatively, one could compare the performance of merging companies with their non-merging peers, grouped by similar size and market-to-book ratio, prior and after the bid.

Martynova and Renneboog, 2008 accounted the combined operating gains of takeovers and found out that, from 26 different studies, 14 reported a post-merger decline in the operating returns of merged firms, 7 papers showed insignificant changes, and 5 provided evidence of a significant increase. Hereafter, we could conclude that the findings in this matter are not conclusive (Martynova et al., 2006). The inconclusive results can be partially explained by the different choices within a group of peer companies, i.e. benchmarking.

2.5. Determinants of acquirers' returns in the short term

Whether we focus on theoretical or empirical M&A literature, both bodies have shown the existence of a variety of factors affecting the takeover announcement returns apart from synergies. Some empirical authors have found evidence that changes in bidder and target share prices in the short term, at the announcement date, could depend on the attributes of the M&A deal and the characteristics of the acquiring and acquired firms (Martynova and Renneboog, 2011).

In the same work, the authors defend the hypothesis that takeover returns could also depend on the origin and the ownership structure of the bidding and target firm. The

following transaction attributes are likely to affect the acquirers' and targets' takeover returns: 1) the geographical scope of the bid—*cross-border M&As* are likely to benefit from imperfections in international capital, as compared with *domestic M&As*; 2) the form of the bid and the attitude towards it—unlike *friendly takeovers, tender offers* are frequently associated with lower takeover wealth effects for the bidder's shareholders; 3) the legal status of the target firm—takeover bids on *privately held companies* may lead to bidders' returns exceeding those obtained in the bids on *public firms*; 4) the industry relatedness of the bidding and target firms—although *diversifying acquisitions* are expected to create operational and financial synergies not seen in *focus bids,* the number of hitches created, such as rent-seeking behaviour by divisional managers, bargaining problems within the firm or bureaucratic rigidity, may outweigh the alleged synergies; 5) the type of acquisition—a *partial acquisition* (of less than 100% of equity) is likely to lead to lower takeover returns to the target's shareholders than an acquisition in which a bidder obtains *full control;* 6) the means of payments—all-cash takeovers are expected to generate higher returns to the bidder's and target's shareholders than all-equity and mixed-offer; 7) deal transparency—whereas most bidding companies *fully disclose* the means of payment and transaction value, some companies *conceal* this information, and it is expected that the first type of deal will result in higher returns to the bidder's and target's shareholders than the second kind, as they may suspect that a non-transparent deal may lead to the expropriation of their rights either by the bidder's management or by a controlling shareholder; and 8) the timing of the takeover—reports show that takeover returns to the bidder's shareholders decline *during and after takeover wave peaks* (Martynova and Renneboog, 2011).

3. Sample and Methodology

To reach some relevant conclusions at the end of this event study, it is a matter of great importance to develop a complete and understandable database and methodology that would allow all the tests to be accomplished (MacKinlay, 1997). Taking a period of 10 years, from January 1, 2005 until December 31, 2014, different databases, such as Zephyr by Bureau Van Dijk and Datastream Professional by Thomson Reuters, all the information required to identify an industrial merger wave and to test our hypotheses has been gathered.

3.1. Hypotheses

This section introduces our research hypotheses and points out the impact of M&A industrial waves on the market, as well as includes the comparison between first and latter entrants.

3.1.1. Hypothesis I

The firms' returns within an industrial merger wave are superior to those presented by the market.

It seems natural that a rational CEO or Board of Directors would only perform an acquisition when the possibility of value creation presents itself as likely.

However, as presented in the Section 2.4.1, despite countless event studies in this matter there are no definitive answer regarding the positive or negative relation between M&A activity and abnormal returns.

Regardless of our sample outcome, we cannot be sure that the results will only reflect the synergies created by the specific deal, as other variables may impact such results. Therefore, we have incorporated variables presented as relevant in previous works through the following regression:

$$CAR_{i(-t;+t)} = \alpha + \beta_1 PAY + \beta_2 IND + \beta_3 EGROW + \beta_4 SIZE + \varepsilon_i$$

Where,

(-t;+t) – Correspond to the days around the announcement day, which define an event window. It may take the following values: (-10;+10); (-5;+5); (-3;+3); and (-1;+1).

In the presented model, the dependant variable regards the Cumulative Abnormal Returns (CAR) of the acquirer companies, while the independent/explanatory variables are defined in the Table 1:

Table 1. Variables definitions

Variable	Description
CAR	Cumulative Average Returns of Acquirers within the event window announced.
PAY	Zero-one dummy variable taking the value 1 if the bid is all cash and 0 otherwise (shares or mixed).
IND	Zero-one dummy variable taking the value 1 if the bid is for a same industry company and 0 otherwise.
EGROW	Zero-one dummy variable taking the value 1 if the bid is made by a company in a developed country and 0 otherwise.
SIZE	Zero-one dummy variable taking the value 1 if the bid is made by a large company (Market Capitalization over $5 Billion) and 0 otherwise.

We use the variable PAY to test the means of payment hypothesis, or in other words if the acquirer tends to have better results (higher returns) in all-cash transaction or in other type of offers. In the case of all-cash offers have better performance than different types of acquisitions, this variable should show a positive sign. The variable IND is used to better understand the effects of specializations versus diversification so, if same industry acquisitions present better returns than the targeting of different industry firms the sign of the variable shall be positive. EGROW variable pretends to differentiate the transactions made by companies located in economies economically advanced (developed countries) from acquisitions made by companies in other geographies (non-developed and developing countries. If firms in developed economies take advantage over other firms the coefficient associated with this variable should be positive. Finally, the SIZE variable compares the returns of large acquirers with the returns of smaller ones. As some of the literature indicates,

for better results regarding small cap companies, the coefficient associated to this variable should present a negative value.

3.1.2 Hypothesis II

The returns presented by firms first entering an industrial merger wave are superior to those presented by the remaining companies.

The entrance timing may affect acquirer returns. McNamara, et al. (2008) found evidence that first movers present better performance than the remaining ones.

Taking into account the multiple linear regressiondeveloped in the previous section, a dummy variable was added to test the relevance of entering sooner in an industrial merger wave. The following equation summarize our test statistic:

$$CAR_{i(-t;+t)} = \alpha + \beta_1 PAY + \beta_2 IND + \beta_3 EGROW + \beta_4 SIZE + \beta_5 ENTRY_y + \varepsilon_i$$

where,

ENTRYy – is zero-one dummy variable taking he value 1 if the deal takes place earlier (y^{th} percentile on entrance order) on a M&A industrial wave and 0 otherwise;

y – may take the value of 50, 25, or 10 corresponding to Scenario I, Scenario II, and Scenario III, respectively.

3.2. Industrial wave identification

The identification of a possible existing industrial mergers followed a complex process: First, it was collected 1) all the acquisitions, mergers, institutional buy-outs, MBIs/MBOs, management buy-ins, and management buy-outs label as completed by Bureau Van Dijk's Zephyr between January 1st, 2005 and December 31st 2014. Second, this data was categorized by sector based on the different Standard Industrial Classification (SIC) codes, and sector/industrial merger was only considered in the case a minimum of 1,000 deals, over the 10-year period, in which the bidders have the same first two SIC algorithms.

For the identification of the industrial merger wave we have followed Mitchell and Mulherin (1996), which established a merger wave as a period of 2 years or 24 months, and Harford (2005), which simulated 1,000 different distributions of all the bids occurring over a 120-month period by randomly assigning each occurrence to a month where the probability of assignment is 1/120 for each month. Then, the highest 24-month concentration of activity was calculated from each of the 1,000 draws. Finally, Harford compared the actual concentration of activity from the potential wave to the empirical distribution of 1,000 peak 24-month concentrations: if the actual peak concentration exceeded the 95th percentile from that empirical distribution, that period was coded a wave.

The level of maximum concentration for a 95th percentile reached by Harford (2005) was 27%, so, every time different industries from 2005 to 2014 had an M&A bid concentration of over 27% within any 24-month period, the interval was considered an industrial merger wave.

3.3. Short-term returns

A huge range of stakeholders are usually affected by an operation of this importance, from the target's shareholder to bondholders, as well as managers, employees and consumers of both target and bidder companies, but the primary goal here is to understand and measure the effects linked to the bidder's shareholders, being as they are the residual owners of the 'new' company.

Many types of event studies analysing short-term shareholders' wealth effects have been developed since 1970 (Martynova and Renneboog, 2008), and taking into consideration the assumption of a semi-strong form of information efficiency by Fama (1970) where the current price reflects all the past and present public information, the short-term returns seem a plausible measure of the post-acquisition performance of the acquirer.

Every time an M&A deal happens, new information is brought to the market that changes the investor's expectations about the future performance of the company, expectations consequently reflected in the share prices. For our purposes, only the impact caused by the operation needs to be accounted for; thus, an expected return (benchmark) is

needed. Though the Fama-French three-factor model is the most common benchmark, the CAPM, market model (MM) or market-adjusted model (MAM) can also be used.

Two commonly used event windows for these event studies are the three days immediately preceding and following the merger announcement and the day itself (the seven-day event window) and a longer one, beginning several days before the announcement and ending at the close of the operation (Andrade, et al., 2001).

3.3.1. Measure of abnormal returns

As in any other event study, using financial market data allows for measuring the impact of a specific event on the value of the firm (MacKinlay, 1997). Starting from this assumption, and taking into consideration the acquiring shareholder's cumulative abnormal returns around the M&A's announcement day, it is expected that the effects of that specific event would be immediately reflected in the security prices (Fama, et al., 1969).

Acknowledged as abnormal returns (AR) for each company (i) is the difference between the observed returns (R) and the expected returns (E(R)) at day *t*:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \qquad (1)$$

A security's price performance can only be considered 'abnormal' in comparison to a specific benchmark (Brown and Warner, 1980). Thus, it is necessary to define a model or models that generate 'normal' returns. For each different model considered, the excess return for a given security (i) in any period (t) is defined as the difference between its *ex post* return and that which is predicted under the assumed return-generating process.

Mackinlay (1997) presents the *constant mean return model* and the *market model* as the two most common choices for modelling the normal returns. The first model, as the name implies, assumes that the mean return of a given security is constant through time, while in the second model, it assumes a stable linear relation between the market return and the security return.

In addition to these methodologies, Brown and Warner (1980 and 1985) suggested another two different models to be used as benchmark, the *market-adjusted return model* and

the *OLS market return model.* Still following the work of Brown and Warner (1980), they conclude that a simple methodology based on the market model is both well-specified and relatively powerful under a wide variety of conditions, stating that in some cases even simpler methods also perform well.

Using this information while complementing it with Martynova and Renneboog's (2008) summary of short-term return effects around M&A announcements, we have decided to use both the market model (MM) and the market-adjusted model (MAM) as benchmarks, these being the most used regarding the measure of abnormal returns during merger waves.

As explained before, the MM is a statistical model which relates the return of any given security to the return of the market portfolio. For any security *i* the market model is

$$\mathbf{E(R}_{i,t}\mathbf{) = \alpha}_i + \mathbf{\beta}_i * \mathbf{R}_{m,t} + \mathbf{\varepsilon}_{i,t} \qquad (2)$$

assuming that:

$E(R_{i,t})$ = expected return of the share of acquiring firm *i* on day *t;*

α_i = measure of average return of shares of acquiring firm *i* that it is not explained by the market;

β_i = measure of sensibility of the shares of acquiring firm *i* to market movements;

$R_{m,t}$ = return of market index on day *t*; and

$\varepsilon_{i,t}$ = stochastic error, $\Sigma\varepsilon_{i,t} = 0$.

Our assumption, in this case, is the following: if the M&A operation was not announced, the difference between actual return and expected return on day *t* would be zero. However, in the situation of an M&A announcement deal, these returns should be different, and the abnormal returns (AR) of company *i* on day *t* is obtained as follows:

$$\mathbf{\varepsilon}_{i,t} = \mathbf{AR}_{i,t} = \mathbf{R}_{i,t} - (\mathbf{\alpha}_i + \mathbf{\beta}_i * \mathbf{R}_{m,t}) \qquad (3)$$

$R_{i,t}$ = actual return of the share of acquiring firm *i* on day *t*.

The abnormal return observations must be aggregated to draw an overall inference for the event study (MacKinlay, 1997). The aggregation is made along two dimensions: through time and across securities. In the first case we consider an aggregation of an individual security through time. Here enters the concept of cumulative abnormal returns (CAR); thus, the CAR of the acquiring firm *i* for a certain event window is the sum of all abnormal performance from day one until the last day of the window:

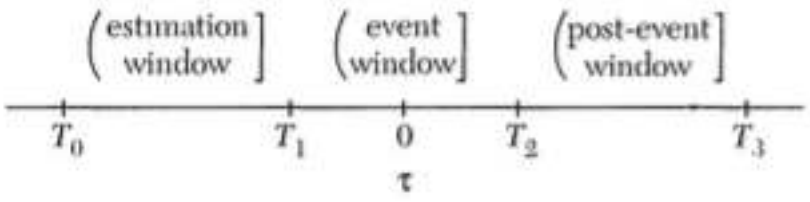
$$\mathbf{CAR} = \sum_{t=1}^{T} \boldsymbol{AR}_{i,t} \qquad (4)$$

Notwithstanding, tests with only one event observation are not likely to be useful, so it is necessary to aggregate across the different securities. For this aggregation, and since the securities and event dates were randomly selected, it is assumed that the abnormal returns and the cumulative average abnormal returns will be independent. Considering *N* as the number of companies, the cumulative average abnormal returns (CAAR) for acquiring firms are calculated as:

$$\mathbf{CAAR} = \frac{\sum_{i=1}^{N} \boldsymbol{CARi}}{\boldsymbol{N}} \qquad (5)$$

To develop the framework where we are going to work, it is important to mark out some notations to facilitate the measurements and analysis of abnormal returns. We define day '0' as the announcement day for a hypothetical M&A operation for a given company. The announcement day will happen within the event window (period between T_1 and T_2), which precedes the estimation window (the period from T_0 to T_1) and precedes the post-event window (the period between T_2 and T_3).

Figure 1. Timeline for an event study (Mackinlay,1997)



Event windows change across different researchers, and consequently across the different studies on post-acquisition performance in the short term. For example, the post-event window will not be considered due to the lack of statistical relevance of long-term abnormal returns as reported by Campa and Hernando (2004).

Brown and Warner (1985) set for each security the use of a maximum of 250 daily return observations for the period around its respective event; however, as it is typical for the estimation window and the event window not to overlap so that the parameters of the normal return model are not affected by the returns around the event, it was decided to established a period of 250 days (civil year) for the estimation window, from day -280 to day -30, and a period of 60 days to the event window, between the day -30 and the day +30.

Despite the 60 days-period established as the event window, mainly due to the problematic situation that could arise if both the normal returns and the abnormal returns were to capture the event impact, we are expecting to test the abnormal returns only for shorter periods. The 7-day event window (-3, +3) is the most commonly used but, in addition to that, it is our intention to test the 3-, 11- and possibly the 21-day event window ([-1, +1]; [-5, +5]; [-10, +10] respectively), in order to diminish biases and better assess the impact of M&A operations. This is shaky ground to trample as a too-small event window may exclude information released before the announcement, while an extended window may mistakenly include previous or future movements in the acquiring company's stock price (Goergen and Renneboog, 2004).

The use of an extended estimation window (250 days) is due to the assumption that the MM parameters are constant over the window. Each of the MM parameters will be estimated using the ordinary least squares (OLS) method obtained through a logarithm transformation to approximate the returns to normality (Henderson, 1990):

$$\widehat{R}_{i,t} = ln\left(\frac{P_t}{P_{t-1}}\right) \qquad (6)$$

$$\widehat{R_{m,t}} = ln\left(\frac{I_t}{I_{t-1}}\right) \qquad (7)$$

where

P_t = market price of the share of acquiring firm *i* on day *t*;

P_{t-1} = market price of the share of acquiring firm *i* on the day before day *t*;

I_t = index price on day *t*; and

I_{t-1} = index price on the day before day *t*.

For the event study we are going to use the MSCI World Index as a proxy of the market return as our sample includes acquiring firms listed in different markets worldwide. As noted before, the event window will not coincide with the estimation window; therefore, the estimated MM parameters will not be affected by event returns. It is assumed that the abnormal returns capture, totally, the announcement impact. The equation below represents the expected return:

$$\boldsymbol{E(R_{i,t}) = \widehat{\alpha_i} + \widehat{\beta_i} * R_{m,t}} \qquad (8)$$

Besides the market model (MM), we will also estimate returns using the market-adjusted model (MAM). MAM is a market model with restrictions, where the company risk is not accounted – the expected return is equal to the market return ($\alpha = 0$ and $\beta = 1$). This specific model does not require estimation of any parameters, so there is no need for the designation of an estimation window.

$$\boldsymbol{E(R_{i,t}) = R_{m,t}} \qquad (9)$$

Given the logarithm transformation assumed, we have considered that the individual firms' abnormal returns are normally distributed. Therefore, if the null hypothesis is rejected, we may conclude that 'surfing' within an industrial merger wave has a direct impact on shareholders' wealth. To do so, the standard statistic test is presented as follows:

$$\boldsymbol{t = \widehat{CAR_0} \,/\, S(\widehat{AR_0})} \qquad (10)$$

where,

$\widehat{CAR_0}$ = (1/N) $\sum_{i=1}^{N} AR_{i0}$; and

$S(\widehat{AR_0})$ is an estimate of standard deviation of the average abnormal returns $\sigma(\widehat{AR_0})$.

However, considering the different event window lengths of our sample, we have sought support from the work of Serra (2004) to test whether CAAR equals zero or not, through the multi-week T-student test statistic presented below, subsequently adapted to a sample comprising daily returns:

$$\boldsymbol{t = \widehat{CAR_l} \,/\, \sqrt{S^2(\sum_{l=1}^{L} \widehat{AR_l})}} \qquad (11)$$

where,

l denotes the weeks (days in the present event study) in the event window.

Assuming independence over time, we have:

$$\boldsymbol{S^2(\sum_{l=1}^{L} \widehat{AR_l}) = \sum_{l=1}^{L} S^2(\widehat{AR_l})} \qquad (12)$$

where,

$$\boldsymbol{S^2(\widehat{AR_l}) = \sqrt{\frac{\sum_{t=1}^{T}(AR_{it} - \frac{\sum_t AR_{it}}{T})^2}{T-d}}} \qquad (13)$$

And the statistic is distributed as Student-*t* with T-*d* degrees of freedom. However, the standard deviation presented (13) fails to account for autocorrelation in average abnormal returns over the event window, usually leading to an underestimation of the multi-week variance (Serra, 2004).

3.4. Sample

A total of 252,621 deals was obtained in the first sample extracted. When distributing the data by industry and through the 120 months, we did not find enough concentration in any of the 24-month periods across most of the 85 possible industries. Therefore, a change

in the methodology was required so it would be possible to identify industrial merger waves.

As a major methodology change, we dropped counting the number of deals for a concentration measure, using instead the value of each transaction. We considered as an industrial merger wave the 24-month period between January 1, 2005 and December 31, 2014, with maximum value concentration, provided that the period in question has a value of deals larger than 27% of the total value of deals during the 10-year timeframe. For the sample we had to restrict the number of deals, counting only transactions with known values, reaching a total of 90,397 deals. A final total of 19 industrial merger waves was identified.

Then, the Datastream database was used to gather all deals included in the criteria initially presented. The data are based on the sample adopted to identify the industrial M&A waves plus some different criteria. Apart from the four conditions presented before, we will consider only deals: (i) in which the value is disclosed; (ii) where the acquirer company is listed on the announcement day; (iii) with value of at least 5% of the acquirer's value, so as to be considered relevant; (iv) where the acquirer becomes a majority shareholder of the target company; and (v) that involve the acquisitions of at least 20% of total target's shares. Considering all the criteria mentioned, we were left with a total of 388 different deals.

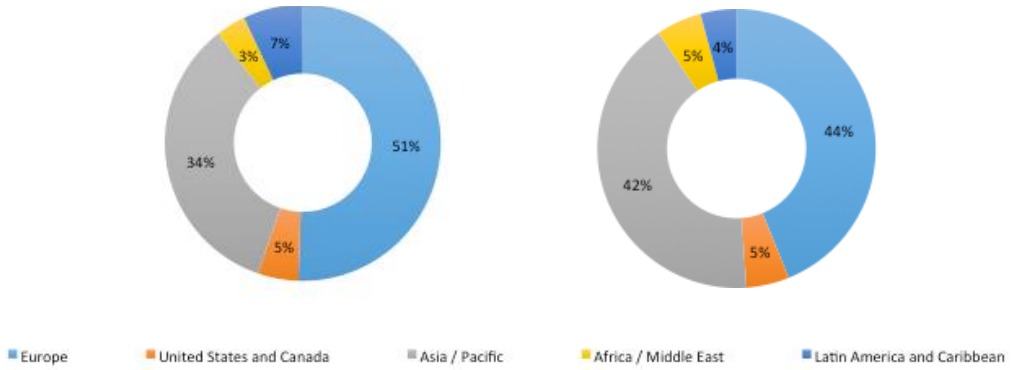
Next, to every deal was attributed an entrance timing within the wave where it belongs. For that we have used the first sample (gathered in Zephyr database) that includes all deals occurred in one of the identified waves. In the end, the time of entrance in a wave (according to the announcement date) was defined for the 388 deals.

From here, and with the help of Datastream database, we obtained the share price for each of the 388 acquiring companies for the 10-year period along with the movements of MSCI Index World over the same period.

Only acquiring companies with known share prices for the 280 days before the announcement date were considered. At this stage 28 deals were dropped from the study.

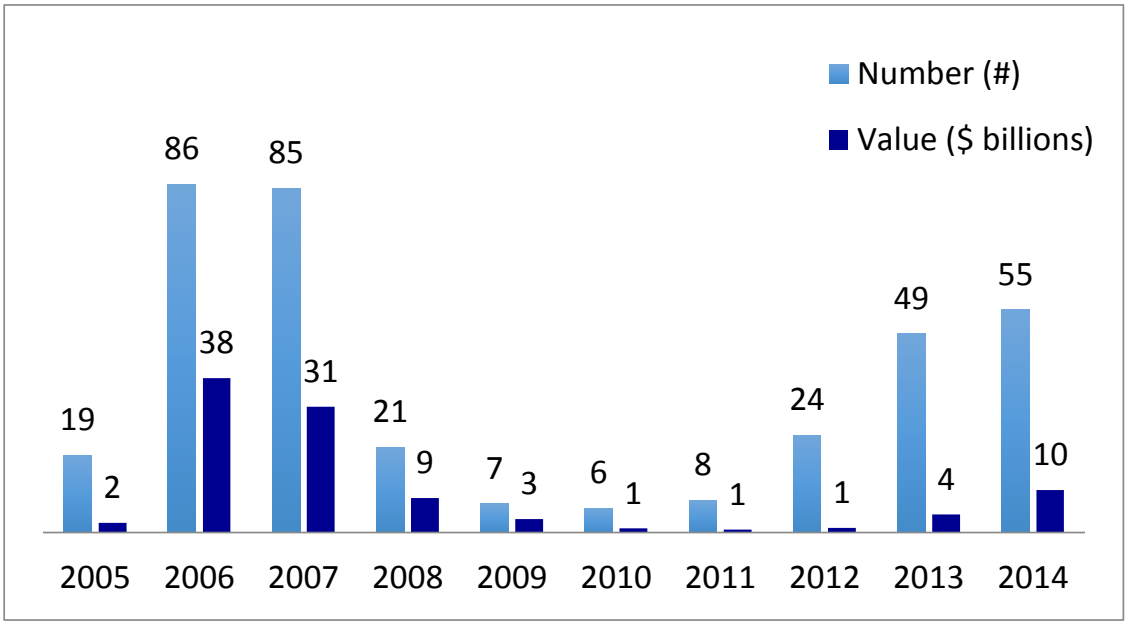
Despite all these constraints, the sample still comprises acquirers from the most diverse areas around the globe with a particularly strong representation in Europe and Asia/Pacific. The geographical area distribution was considered in both value and number of deals, as represented in Figure 2, respectively.

Figure 2. Geographic deal distribution by value and number



The sample obtained is concentrated mostly during the years 2006 and 2007, exceeding 170 transactions and reaching almost 70 billion euros, 48% and 69% of the total number and value of the deals, respectively. As expected, following the 2008 crisis there was a decrease in M&A activity in both number and value, which seems to have been recovering in the last years (Figure 3).

Figure 3. Time horizon deal distribution by number and value



The Table 2 shows the deal distribution by *means of payment*, *industry relatedness*, *geographical scope*, *acquirer's economic growth* and *acquirer's size*. The sample is represented by 42% of all-cash and same-industry deals, while being completely dominated by 100% cross-border deals. The developed countries present the larger part of the acquirer companies (71%), signalling a specific financial availability from the strongest economies. In terms of size, 272 deals (approximately 76% of the total sample) are comprised by companies with a market capitalization below $1 billion.

Table 2. Main deal characteristics distributed by geographical area

	Acquirer's Region					
	Africa / Middle East	Asia / Pacific	Europe	Latin America and Caribbean	United States and Canada	**Total**
Panel A: Means of Payment						
All-Cash	6	70	63	4	7	**150**
All-Equity, Mixed, and others	13	80	95	11	11	**210**
Panel B: Industry Relatedness						
Specialization (same industry)	6	61	65	9	11	**152**
Diversification (other industry)	13	89	93	6	7	**208**
Panel C: Geographical Scope						
Cross-Border	19	150	158	15	18	**360**
Domestic	0	0	0	0	0	**0**
Panel D: Acquirer's Economic Growth						
Developed Countries	7	72	157	0	18	**254**
Developing Countries	12	78	1	15	0	**106**
Panel E: Acquirer's Size						
Large-Cap	1	33	47	5	2	**88**
Mid-Cap and Small-Cap	18	117	111	10	16	**272**

Source: Own calculations based on Zephyr, United Nations

4. Results

This section, under Hypothesis I, presents the effects of M&A operation in acquirer companies during industrial merger waves, comparing as abovementioned, the combined firm share prices over the following event windows: [-10;10], [-5;5], [-3;3]; and [-1;1], using both the MM and MAM. Apart from that, control variables such as: i) mean of payment, ii) economic growth, iii) size; iv) industrial relatedness will be introduce in our analysis with the purpose of strengthen the assumption that the participation in industrial merger waves is the main explanation for the abnormal returns.

In the Hypothesis II we pretend to test, for the same event windows, if within industrial merger waves there are advantages for the first movers. Using both the MM and MAM approaches it will be compared the abnormal returns of the first i) half, ii) quarter, and iii) tenth firms to "surf" within the wave against those of the remain companies.

Considering that the final sample of our work comprises 360 complete deals, which have taken place during different 280-days periods (*estimation window* + *event window* + *post-event window*) across the 10-year period under analysis. We had to develop an Ordinary Least Square (OLS) regression for each of the cases in order to calculate the abnormal returns for all the transactions.

4.1. Hypothesis I

The results presented in this section intend to explain the behaviour of our sample when compared to the market performance.

4.1.1. Descriptive and test statistics

In the Table 3, the results shown by our sample confirm a positive relation between participants in industrial merger waves and better short-term performance. Conversely to the literature presented in the "*Short-term and long-term returns"* section, bidders' returns are statistically significant.

However, the differences between the means and the medians presented may indicate the presence of relevant outliers amongst our sample.

Table 3. Summary of descriptive statistics

Event window (days)	MM				MAM			
	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
CAAR	0.0484***	0.025***	0.0168***	0.0109***	0.0653***	0.0511***	0.046***	0.0305***
Median (CAR)	0.0066***	0.0046***	0.0029***	0.0028***	0.0315***	0.0299***	0.0246***	0.0146***
Std. Deviation (CAR)	0.153	0.089	0.057	0.043	0.193	0.148	0.115	0.092
Positive CAR (#)	217	218	232	218	215	219	238	236
Observations	360	360	360	360	360	360	360	360

Source: Own calculations

t-statistic follows a t-student distribution. ***, **, * denotes for 1%, 5%, and 10% significance level for a two-tailed test.

However, to control for the possibility of considerable outliers we performed the non-parametric Wilcoxon Signed Rank test, in order to understand if the samples' median was statistically distinguishable from zero. Therefore, considering our medians, the sample presented positive abnormal returns for every event window with a 99% of confidence level.

These results appear to be more conclusive than the ones related in the previous works. In previous waves Asquith (1983) and Eckbo (1983) reported positive returns close to zero for the shareholders of acquiring firms, while Morck et al. (1990), Byrd and Hickman (1992) and Chang (1998) reported negative abnormal returns also close to zero.

4.1.2. Model and independent variables

Besides the expected synergies, we have gathered some of the factors affecting mergers' returns, such as method of payment, industry relatedness, bidder size, and economical environment. In this section we are trying to test the strength of the main characteristics, and in which level they may affect acquirers' performance.

4.1.2.1. Univariate analysis

In this section of our work we have developed a set of univariate analyses where we have separated our sample in different sub-groups. Despite the statistically significance of our results, the standard deviations presented and the differences between the means and medians show us that there must be a relevant dispersion amongst the data gathered.

Therefore, in order to test the median statistical significance for every situation, a one sample Wilcoxon Signed Rank test was performed.

4.1.2.1.1. All cash and other method of payment

Table 4 shows us that for larger event windows the acquisitions using other methods of payment besides all-cash present better results. However, in the event windows closer to the announcement date this effect disappears. In future works, it could be interesting to test if it is due to the expectations created before the announcement or after, computing the results for the [-5;+1] and [-1;+5] event windows, respectively.

When testing for the assumption of a non-parametric sample (Wilcoxon Ranked Test), the acquirers' returns continue to favour the merger wave's participant. Regarding the returns' differences between all-cash and non-all-cash operations, across the different event windows, the results show a behaviour similar to the one presented by the means.

Table 4. Descriptive statistics for all cash and other methods of payment bids

Event window (days)	MM				MAM			
	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
All-cash								
CAAR	0.0515***	0.0506***	0.0503***	0.0384***	0.0507***	0.0489***	0.0483***	0.0369***
Median (CAR)	0.0214***	0.0217***	0.0235***	0.0135***	0.0319***	0.0288***	0.0307***	0.0181***
Std. Deviation (CAR)	0.171	0.129	0.105	0.096	0.162	0.120	0.100	0.087
Observations (#)	150							
Other method of payment								
CAAR	0.0811***	0.0582***	0.0509***	0.0305***	0.0757***	0.0527***	0.0443***	0.0259***
Median (CAR)	0.0278***	0.0205***	0.0173***	0.0093***	0.0306***	0.0302***	0.0213***	0.0103***
Std. Deviation (CAR)	0.249	0.176	0.145	0.108	0.213	0.165	0.124	0.096
Observations (#)	210							

Source: Own calculations

t-statistic follows a t-student distribution. ***, **, * denotes for 1%, 5%, and 10% significance level for a two-tailed test.

4.1.2.1.2. Industry relatedness and industry diversification

In the table 5 we can observe that, in both benchmark models, the industry diversification strategy outperforms the industry specialization for the larger event window. Nevertheless, this effect is completely reversed for shorter event windows. Thus, we think that the suggestion for testing different event windows presented in the previous section would also be pertinent in this case.

Table 5. Descriptive statistics for industry related and industry diversified bids

Event window (days)	MM				MAM			
	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
Industry relatedness								
CAAR	0.0616***	0.0596***	0.0526***	0.0338***	0.0536***	0.0523***	0.0456***	0.0309***
Median (CAR)	0.0202***	0.0207***	0.0162***	0.0098***	0.0177***	0.0274***	0.0221***	0.0183***
Std. Deviation (CAR)	0.205	0.173	0.134	0.111	0.195	0.162	0.127	0.099
Observations (#)	152							
Industry diversification								
CAAR	0.0741***	0.0517***	0.0492***	0.0338***	0.0738***	0.0502***	0.0462***	0.0302***
Median (CAR)	0.0276***	0.0214***	0.0189***	0.107***	0.0346***	0.0329***	0.0275***	0.0128***
Std. Deviation (CAR)	0.231	0.146	0.126	0.097	0.192	0.138	0.105	0.087
Observations (#)	208							

Source: Own calculations

t-statistic follows a t-student distribution. ***, **, * denotes for 1%, 5%, and 10% significance level for a two-tailed test.

4.1.2.1.3. Large bidder and small bidder

In this section, we have tested the effect of the bidders' market capitalization on the returns around the announcement date. Considering the Table 6, it can be observed that smaller bidders present better results than larger ones, for each one of the event windows analysed.

Nonetheless, these consideration are more evident in larger event windows, as both the CAAR and the median (CAR), of the larger bidders are losing statistical significance as the time period increases

The results are consistent with Banz (1981) where he finds a negative correlation between average returns and the market capitalization of the stocks.

Table 6. Descriptive statistics for larger bidders and small bidders

Event window (days)	MM				MAM			
	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
Large bidder								
CAAR	0.043**	0.0404**	0.0396***	0.0228**	0.0568***	0.0458***	0.0419***	0.0251**
Median (CAR)	0.0195*	0.0093*	0.0114***	0.0059**	0.0316***	0.0226***	0.0159***	0.0132***
Std. Deviation (CAR)	0.165	0.143	0.116	0.095	0.164	0.138	0.111	0.090
Observations (#)	88							
Small bidder								
CAAR	0.0771***	0.0597***	0.0542***	0.0374***	0.068***	0.0528***	0.0473***	0.0322***
Median (CAR)	0.0278***	0.0232***	0.0232***	0.0112***	0.0315***	0.0318***	0.025***	0.0149***
Std. Deviation (CAR)	0.235	0.163	0.134	0.105	0.202	0.151	0.116	0.093
Observations (#)	272							

Source: Own calculations

t-statistic follows a t-student distribution. ***, **, * denotes for 1%, 5%, and 10% significance level for a two-tailed test.

4.1.2.1.4. Developed country and developing country

It is expected that the greater risk inherent to more volatile economies such as developing countries should be compensated through a bigger premium. This rational is strengthened by the results introduced by Table 7 where, acquirers' returns from developing countries exceed the returns presented by bidders headquartered in developed countries.

Table 7. Descriptive statistics for bidders from developed and developing countries

Event window (days)	MM				MAM			
	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
Developed country								
CAAR	0.0596***	0.0464***	0.0409***	0.0294***	0.0514***	0.04***	0.0353***	0.0252***
Median (CAR)	0.0279***	0.0199***	0.0145***	0.009***	0.0309***	0.0261***	0.0191***	0.0128***
Std. Deviation (CAR)	0.197	0.150	0.122	0.106	0.170	0.144	0.107	0.092
Observations (#)	254							
Developing country								
CAAR	0.0907***	0.0757***	0.074***	0.0444***	0.0986***	0.0778***	0.0715***	0.043***
Median (CAR)	0.0136**	0.0237***	0.0253***	0.0162***	0.0319***	0.037***	0.0387***	0.0198***
Std. Deviation (CAR)	0.268	0.017	0.175	0.096	0.237	0.156	0.127	0.092
Observations (#)	166							

Source: Own calculations

t-statistic follows a t-student distribution. ***, **, * denotes for 1%, 5%, and 10% significance level for a two-tailed test.

4.1.2.2. Model summary

The effect of all the explanatory variables was tested by running the multiple regression developed under the Hypothesis I, for the event window [-3;+3][1] and using the MM as benchmark.

The results presented in the Table 8 show that only the economic environment has significant power to explain the acquirers' CAR.

With a statistical significance level of 5%, it suggests that the level of development of the acquirer's country has a negative "statistically significant" effect on shareholders' value. Saying that and considering our sample, bidders located in developing economies perform better than the ones based on developed countries.

[1] The regression has also been conducted for the other event windows. However, given the length of the larger window (21 days), in which the results may be affected by other variables, and considering the similarity of results or absence of statistical significance of the other windows, such results were not presented.

Nonetheless, the explanatory strength of the independent variables in the model is low. As we may observe in the regression (7) only 1.6% of the acquirer's CAR can be explained by them.

The positive and statistical significant value of the constant reinforce our previous results, therefore highlighting the advantages of "surfing" within an industrial merger wave.

There are no evidence regarding collinearity[2] within our independent variables (see Annex 4), nor even the variables' coefficients changed the signal or significance level as new variables were added to the single regressions.

Despite most of the coefficients presented were not statistical significant, the results may, at some level, be compared with the literature reviewed. In our sample all-cash deals negatively affect the acquirers' CAR, conversely with the presented by Franks et al. (1991), Leeth et al. (2000), and Martynova et al. (2011) where all-cash deals outperform the other methods of payment.

Regarding industry relatedness, our results point out in the direction of previous works. As in Morck et al. (1990), Leeth et al. (2000), and Martynova el al. (2011), when compared to industry diversification, focused bids seem to positively affect acquirers' returns.

[2] The correlation matrix between explanatory variables is presented in Annex 4.

Table 8. MM multiple regression of acquirers' CAR

MM The table presents the effect of a set of variables on the acquirers' returns							
Variable	**Coefficient**						
Event window	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PAY	-0.001				-0.001	-0.002	-0.003
	(0.014)				(0.014)	(0.014)	(0.014)
IND		0.003			0.003	0.005	0.003
		(0.014)			(0.014)	(0.014)	(0.14)
SIZE			-0.015			-0.015	-0.013
			(0.016)			(0.014)	(0.16)
EGROW				-0.033**			-0.032**
				(0.015)			(0.15)
(Constant)	0.051***	0.049***	0.054***	0.074***	0.0490***	0.053***	0.076***
	(0.009)	(0.009)	(0.008)	(0.013)	(0.011)	(0.011)	(0.016)
Observations	360	360	360	360	360	360	360
R-Squared	0.000	0.000	0.002	0.014	0.000	0.003	0.016
Adjusted R-Squared	-0.003	-0.003	0.000	0.011	-0.005	-0.006	0.005
F-statistic	0.002	0.06	0.839	4.932	0.031	0.322	1.408
Prob(F-statistic)	0.969	0.806	0.36	0.027	0.97	0.809	0.231

Source: Own calculations.

Notes: Standard deviation presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level. Regression (1) presents the effect of payment method in the bidders' $CAR_{[-3;+3]}$. Regression (2) presents the effect of industry relatedness in the bidders' CAR[-3;+3]. Regression (3) presents the effect of the firm's size in the bidders' CAR[-3;+3]. Regression (4) presents the effect of acquirers' country of origin in the bidders' CAR[-3;+3]. Regression (5), (6) and (7) present other combinations of the previous variables.

4.2. Hypothesis II

Taking into account the multiple linear regression[3] developed in the Section 3.1.2, the following sections 4.2.1., 4.2.2., and 4.2.3. present the results of the comparison between the first entrants returns and the returns of the remaining companies, for 3 different scenarios (below detailed), and in 4 different event windows [-10;+10], [-5;+5], [-3;+3] and [-1;+1].

After adding the *timing* variables, and in line with the model presented in the previous section, the constant presents a positive and statistical significant value, thus supporting the advantages of participating in industrial merger wave.

4.2.1. Scenario I

The returns presented by firms entering in the first half of an industrial merger wave are superior to those presented by the remaining companies.

The results for the first scenario are presented in the Table 9:

[3] In this section, we are only presenting the results of the multiple regression using the MM as benchmark. The results for the regression using the MAM are presented in the annexes.

Table 9. MM Multiple regression for Scenario I

MM				
The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.034**	-0.015	-0.010*	-0.002
	(0.016)	(0.010)	(0.006)	(0.005)
IND	-0.012	0.008	0.002	0.003
	(0.016)	(0.010)	(0.006)	(0.005)
SIZE	-0.027	-0.008	-0.005	-0.002
	(0.019)	(0.011)	(0.007)	(0.005)
EGROW	-0.03*	-0.006	-0.005	0.003
	(0.018)	(0.010)	(0.007)	(0.005)
TIMING_50	-0.036**	-0.021**	-0.010*	-0.009*
	(0.016)	(0.009)	(0.006)	(0.005)
(Constant)	0.111***	0.043***	0.03***	0.013**
	(0.019)	(0.011)	(0.007)	(0.005)
Observations	360	360	360	360
R-Squared	0.042	0.026	0.020	0.013
Adjusted R-Squared	0.029	0.012	0.007	-0.001
F-statistic	3.120	1.900	1.473	0.926
Prob(F-statistic)	0.009	0.094	0.198	0.464

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

The results show that, for all the event windows, the coefficient associated to the dependent variable related to the entry time is negative and statistically significant. These results suggest that the value created by first 50% of firms "surfing" within an industrial merger wave are different of the returns presented by the remaining companies. However, surprisingly, the value created by the first movers is lower than the ones presented by the latter movers.

We believe that the absence of a *bandwagon effect*, on one hand may be due to the current semi-strong form of market efficiency. In this form of efficiency, the market reflects all the publicly information (Fama, (1970)), however the first movers shall possess private information regarding the industry's specificities, which will only be reflected in the market prices after the first deals are completed. Thus, at this moment, we cannot be sure that the returns of latter entrants are entirely due to the merger synergies.

On the other hand, we presented a sample "divided" in two groups across the different scenarios, (i) first entrants and (ii) all the remaining companies. Considering that the division between first movers and latter movers is not completely clear, this method may implicate that some of the first mover advantages are being reflected in the group of remaining firms.

To partially removed this effect, in future works we may only compare the industrial merger tails, e.g. first 10% entering the market vs. last 10% entering the market.

4.2.2. Scenario II

The returns presented by firms entering in the first quarter of an industrial merger wave are superior to those presented by the remaining companies.

The results for the second scenario are presented in the Table 10:

Table 10. MM Multiple regression for scenario II

MM The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.036**	-0.015	-0.01*	-0.003
	(0.016)	(0.010)	(0.006)	(0.005)
IND	-0.010	0.009	0.002	0.003
	(0.016)	(0.010)	(0.006)	(0.005)
SIZE	-0.028	-0.008	-0.005	-0.002
	(0.019)	(0.011)	(0.007)	(0.005)
EGROW	-0.032*	-0.007	-0.006	0.003
	(0.018)	(0.010)	(0.007)	(0.005)
TIMING_25	-0.015	-0.014	-0.006	-0.004
	(0.020)	(0.012)	(0.007)	(0.006)
(Constant)	0.100***	0.037***	0.027***	0.010*
	(0.019)	(0.011)	(0.007)	(0.005)
Observations	360	360	360	360
R-Squared	0.017	0.016	0.014	0.005
Adjusted R-Squared	0.152	0.002	0.000	-0.009
F-statistic	2.239	1.141	0.974	0.342
Prob(F-statistic)	0.050	0.338	0.433	0.887

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

Our sample did not present the statistical power to assure that a difference between the returns of the first 25% of firms "surfing" within an industrial merger wave and the returns of the remaining firms exists. In this scenario we could not prove that the existence of an advantageous or disadvantageous position for the first movers.

4.2.3. Scenario III

The returns presented by firms entering in the first tenth of an industrial merger wave are superior to those presented by the remaining companies.

The results for the third scenario are presented in the Table 11:

Table 11. MM Multiple regression for Scenario III

MM				
The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.036**	-0.016	-0.011*	-0.003
	(0.016)	(0.010)	(0.006)	(0.005)
IND	-0.010	0.009	0.002	0.003
	(0.016)	(0.010)	(0.006)	(0.005)
SIZE	-0.029	-0.008	-0.005	-0.002
	(0.019)	(0.011)	(0.007)	(0.005)
EGROW	-0.032*	-0.008	-0.006	0.003
	(0.018)	(0.010)	(0.007)	(0.005)
TIMING_10	-0.016	-0.006	-0.006	-0.006
	(0.028)	(0.016)	(0.010)	(0.008)
(Constant)	0.099***	0.035***	0.026***	0.010*
	(0.018)	(0.011)	(0.007)	(0.005)
Observations	360	360	360	360
R-Squared	0.030	0.012	0.013	0.005
Adjusted R-Squared	0.016	-0.002	-0.001	-0.009
F-statistic	2.198	0.891	0.928	0.346
Prob(F-statistic)	0.054	0.487	0.463	0.885

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

There is no statistical significance between the difference of the returns presented by the very first firms engaging in M&A deals and the remaining companies. Despite the small

differences are not statistically significant, for all the event windows the β of the ENTRY variable has a negative value, in accordance with both Scenario I and Scenario II.

5. Conclusion

The present study investigates and seeks to offer a further understanding of the dynamics in the M&A sector, namely within industrial merger waves. Considering that those merger waves occur due to economic disruption that leads to industry reorganization (neoclassical approach) we have follow the work of several other authors to conclude if such increase in M&A activity would have befallen in recent years.

From 2005 to 2014 we have concluded that there was not, in almost any period, such a concentration in the number of mergers by industry[4] that we could comprehend as a wave. However, we found that there were intense peaks of M&A concentration, during some periods, when measured by the value of each deal. Despite not all the deals' values were available, the approach used allowed us to identify 19 industrial merger waves during the 10-year period, result in line with the existence of industrial merger waves.

Regarding the acquirers' returns of the participants in industrial merger waves, the results present positive and strong statistically significance across the different event windows and different benchmark models. Fundamentally converging to the statistical significance of the positive acquirer firm performance associated with prior works (Morck *et al.* (1990), among others).

In what concerns the model tested, we have found that the control variables affect the acquirer's returns at a very low level. However, the results present statistical significance related with economic environment of the acquirer's country. Firms based on developing countries positively affect the cumulative abnormal returns, when compared to firms headquartered in developed economies. As there was no reliability behind the companies' results (entry time vs control variables) some of the cases first selected for the comparison during the wave progression were removed.

Finally, and surprisingly, the only statistically significant results revealed in the hypothesis II of this study presented an increase in the returns as an acquisition's wave progress, contradicting the historical evidence presented by other authors, such as McNamara *et al.* (2008).

[4] Methodology used by Harford (2005)

Concerning future research recommendations, we believe that focusing in the most important M&A markets such as USA, UK, or EU, instead of using a worldwide sample, would be easier and more accurate to manage the control variables and better understand the real impact of industrial merger waves in the acquirers' returns.

Additionally, we believe that the economic, technological or regulatory shocks that, according to the neoclassical theory, are the reason for the occurrence of industrial merger waves, would probably impact the industry's returns. These shocks, besides allowing for the merger wave to happen, would probably signal a sector's undervaluation.

Moreover, as the increase in value is not immediately reflected in the market prices, the positive returns showed by latter acquirers may be due to the expected industry gains and not from the acquisitions per se. This correlation between acquirer's returns within industrial merger should be accounted for.

6. References

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Annexes

Annex 1

MAM Multiple regression for Scenario I.

MAM The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.025	-0.004	0.003	0.011
	(0.021)	(0.016)	(0.012)	(0.010)
IND	-0.023	0.000	-0.003	0.000
	(0.021)	(0.016)	(0.012)	(0.010)
SIZE	-0.008	-0.005	-0.002	-0.005
	(0.024)	(0.016)	(0.014)	(0.011)
EGROW	-0.045**	-0.035**	-0.034*	-0.016
	(0.022)	(0.017)	(0.013)	(0.011)
TIMING_50	-0.043**	-0.037**	-0.02*	-0.019*
	(0.020)	(0.016)	(0.012)	(0.010)
(Constant)	0.138***	0.095***	0.079***	0.046***
	(0.024)	(0.019)	(0.014)	(0.012)
Observations	360	360	360	360
R-Squared	0.033	0.030	0.015	0.021
Adjusted R-Squared	0.019	0.016	0.114	0.007
F-statistic	2.379	2.157	2.097	1.542
Prob(F-statistic)	0.038	0.580	0.650	0.176

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

Annex 2

MAM Multiple regression for Scenario II.

MAM The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.027	-0.005	0.003	0.010
	(0.021)	(0.016)	(0.012)	(0.010)
IND	-0.021	0.001	-0.002	0.000
	(0.021)	(0.016)	(0.012)	(0.010)
SIZE	-0.008	-0.005	-0.003	-0.005
	(0.024)	(0.018)	(0.014)	(0.011)
EGROW	-0.048**	-0.037**	-0.036***	-0.017
	(0.022)	(0.017)	(0.013)	(0.011)
TIMING_25	-0.013*	-0.012	0.004	-0.006
	(0.025)	(0.020)	(0.015)	(0.012)
(Constant)	0.124***	0.082***	0.071***	0.040***
	(0.024)	(0.018)	(0.014)	(0.011)
Observations	360	360	360	360
R-Squared	0.021	0.015	0.021	0.012
Adjusted R-Squared	0.007	0.001	0.007	-0.002
F-statistic	1.534	1.091	1.537	0.871
Prob(F-statistic)	0.178	0.365	0.178	0.501

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

Annex 3

MAM Multiple regression for Scenario III.

MAM				
The table presents the effect of the entry timing on the acquirers' returns				
Variable	**Coefficient**			
Event window	[-10;+10]	[-5;+5]	[-3;+3]	[-1;+1]
PAY	-0.027	-0.006	0.003	0.010
	(0.021)	(0.016)	(0.012)	(0.010)
IND	-0.021	0.001	-0.002	0.001
	(0.021)	(0.016)	(0.012)	(0.010)
SIZE	-0.009	-0.006	-0.003	-0.006
	(0.024)	(0.018)	(0.014)	(0.011)
EGROW	-0.048**	-0.038**	-0.036*	-0.016
	(0.022)	(0.017)	(0.013)	(0.011)
TIMING_10	-0.02	-0.003	0.001	-0.02
	(0.035)	(0.027)	(0.021)	(0.017)
(Constant)	0.123***	0.081***	0.072***	0.041***
	(0.023)	(0.018)	(0.014)	(0.011)
Observations	360	360	360	360
R-Squared	0.021	0.014	0.021	0.015
Adjusted R-Squared	0.007	0.000	0.007	0.002
F-statistic	1.540	1.020	1.525	1.113
Prob(F-statistic)	0.176	0.405	0.181	0.353

Source: Own calculations.

Notes: Standard deviations presented under parenthisis. ***, **, * denotes for 1%, 5%, and 10% significance level.

Annex 4

Correlation matrix between explanatory variables.

	PAY	IND	SIZE	EGROW
PAY	1.000	0.008	-0.087	-0.035
IND	0.008	1.000	0.103	-0.040
SIZE	-0.087	0.103	1.000	0.055
EGROW	-0.035	-0.040	0.055	1.000

Annex 5

Summary of the data gathered.

SIC II	Description	No	Value	max concentration period	value of max con. Per.	%
10	Coal mining	2.035	441.374.476	jul-06 a jun-08	154.905.233	35%
13	Oil and gas extraction	2.969	1.130.087.183	mai-05 a abr-07	343.828.704	30%
15	Building construction-general contractors and operative builders	1.313	164.515.894	jul-05 a jun-07	84.894.966	52%
16	Heavy construction other than builing construction-contractors	1.187	137.152.680	jul-05 a jun-07	73.718.075	54%
20	Food and kindred products	2.647	602.898.869	mar-08 a fev-10	184.289.426	31%
27	Printing, publishing and allied industries	1.369	171.541.670	jan-05 a dez-06	78.933.900	46%
33	Primary metal industries	1.139	204.239.508	jun-05 a mai-07	126.326.227	62%
34	Fabricated metal products, except machinery and transportation equipment	1.140	128.566.638	set-10 a ago-12	45.235.442	35%
36	Electronic and other electrical equipment and components, except computer equipment	2.965	345.436.493	out-12 a set-14	141.780.523	41%
38	Measuring, analysing and controlling instruments, photographic, medical and optical goods, w atches and clocks	1.364	161.387.983	ago-05 a jul-07	59.425.666	37%
48	Communications	2.889	1.008.011.404	jan-05 a dez-06	380.943.170	38%
49	Electric, gas and sanitary services	2.014	568.584.371	jan-06 a dez-07	226.300.800	40%
50	Wholesale trade, durable goods	2.281	107.243.825	out-06 a set-08	33.225.109	31%
60	Depositary institutions	3.262	1.310.609.643	jun-05 a mai-07	622.167.315	47%
62	Security and commodity brokers, dealers, exchanges and services	2.633	518.272.790	set-06 a ago-08	147.556.044	28%
65	Real estate	3.290	393.601.557	dez-05 a nov-07	159.493.615	41%
67	Holding and other investment offices	17.870	2.302.651.945	set-05 a ago-07	928.117.597	40%
73	Business services	6.991	401.732.257	out-12 a set-14	120.631.291	30%
87	Engineering, accounting, research, management, and related services	1.383	75.310.770	nov-06 a out-08	29.556.025	39%