Market Reaction to Horizontal & Vertical M&As

Evidence from Automotive Industry

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We hereby declare that the work submitted is ours and that where we have made use of another's work, we have attributed the source(s) according to the Regulations set in the Student's Handbook.

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Abstract

This dissertation was written as part of the MSc in International Accounting, Auditing and Financial Management at the International Hellenic University. The purpose of this study was to examine the abnormal returns to shareholders of the companies engaged in the M&As around the day of the first public announcement. Our analysis was focused on M&As in the automotive sector for the period 2008-2018 and we explored whether the market reacted differently on horizontal M&As than on vertical ones, conducting the event study methodology on abnormal returns. We found that investors highly reacted to the announcement of a deal either positively or negatively depending on their expectations regarding the deal and information leakages may be the reason for the existence of abnormal returns before the announcement date. In the case of vertical M&As, positive statistically significant CAARs found in several windows for both the bidder and target company while in horizontal M&As negative statistically significant windows estimated based on market model. Finally, accounting-based analysis was employed to examine the post-M&A profitability performance of the acquiring firms based on specific financial ratios. Analysis showed that there was no statistically significant improvement of ROE and Profit Margin Ratio in a period of two years following the M&A.

Before the presentation of our dissertation, we would like to express our deep gratitude to our supervisor, Dr. Grose, for his guidance and helpful comments which was vital for the completion of our thesis. We would also like to thank our families for their support during the entire process.

KEY WORDS: *automotive industry, horizontal M&As, vertical M&As, abnormal returns, M&A profitability performance*

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1 Introduction

For decades now, companies from every sector, especially in the automotive, conduct mergers and acquisitions not only to gain competitive advantage, but also to dominate in the market and expand their business globally. Before we begin, although "mergers" and "acquisitions" refer to different types of transactions, the terms are used interchangeably since they both serve the same corporate purpose.

In an M&A transaction two parties participate, the acquirer or bidder and the seller or target. Acquisition is the form of transaction where a firm acquires another and becomes the new owner of the target company. From a legal point of view, the target company ceases to exist, and its stock is no longer traded, while the acquirer absorbs the target business and its stock continues to be traded. On the other hand, a merger describes two firms who join forces to move forward as a single new entity, rather than remain separately owned and operated. Both companies' stocks are surrendered, and new company stock is issued in its place. A popular merger case is the merger of Daimler-Benz and Chrysler, where both ceased to exist after the completion of the deal, and a new company, Daimler Chrysler, was created.

There are also cases where target companies do not wish to be purchased. These deals are called “unfriendly deals” and are always considered as acquisitions. Therefore, a purchasing deal is classified as a merger or an acquisition, based on whether the purchase is friendly or hostile and how it is announced (Berk & Peter, 2017). In other words, the difference lies on how the deal is communicated to the target company's board of directors, employees and shareholders.

There are three main categories of M&A deals, horizontal, vertical and conglomerate. Horizontal M&As are deals between companies that directly compete in the same industry. Corporate management make horizontal deals to increase market power, that is their market share, further utilize economies of scale, and exploit merger synergies. Vertical M&As are conducted between companies that operate along the same supply chain. A vertical M&A is the combination of companies along the production and distribution process of a business. The rationale behind a vertical deal includes higher quality control, better flow of information along the supply chain, and merger synergies.

In contrast to the horizontal and vertical M&As, conglomerate M&As are deals between companies that are totally unrelated. The biggest risk in a conglomerate merger is the immediate shift in business operations resulting from the merger, as the two companies operate in completely different markets and offer unrelated products/services. This attribute of conglomerate mergers usually raise concern to the investors because it complicates the integration procedure, thus classifying them into the least preferable type of merger (Berk & Peter, 2017).

The purpose of our study is to measure the effect of M&As in shareholder's returns of both the bidder and the target company in the automotive industry and understand the impact on the enterprise value. We also examine horizontal and vertical deals separately and elaborate on their comparison, in order to comprehend further the motives and rational behind the managerial decision regarding the M&A type. For this reason, the third type, conglomerate M&As, won't be covered, due to the complications discussed above, so as to mainly focus to the industry components, which are better depicted in horizontal and vertical types.

This research aims to examine the financial effects of M&A announcements of both bidder and target firms in the automotive industry, which is one of the most popular sectors regarding consolidation. More indicatively, our study:

- Investigates the shareholder's reaction to the announcement of an M&A in the automotive industry, during the period 2008-2018, based on the M&A type.
- Compares the horizontal and vertical M&A deals with regards to the wealth effect of the shareholders of both bidder and target firms
- Examines some profitability indicators of the acquiring companies after the completion of an M&A

Based on previous studies on M&As in which target companies usually undergo higher abnormal returns in comparison to the acquiring companies (Capron & Pistre, 2002), we hypothesize that our research for automotive sector will conclude to similar results.

The importance of our study relies on the reasons why M&A is a very popular strategic tool worldwide, generally in the academic, governmental, corporate and investor

audience. Automotive corporations tend to determine the indicators behind M&A success which is depicted on their shareholders' wealth effect. M&A type consists one of the major indicators of integration success. The results of our study want to shed light on the effective choice between the different transaction types regarding the consequences upon both corporations' market performance and the share price reaction. The latter is of outmost importance for the interest of the investors, as their decision determines the actual abnormal return of the companies, as well as their reaction on any future M&A announcement in automotive sector. Finally, governments and academics are concerned for the overall efficiency of the market. Excess abnormal returns after M&As, for instance, would raise governmental awareness concerning monopoly or oligopoly issues.

For the fulfillment of the research objectives, we conducted the event study methodology using both market model and the market adjusted model. We therefore calculated the abnormal and the cumulative abnormal returns around the M&A announcement for both acquiring and target firms. Finally, we used the paired t-test analysis to examine profitability ratios of the acquiring firms comparing the figures two years before and two years after the M&A completion.

Furthermore, our current study is structured as follows. To begin with, the first chapter includes general information on M&As, where there is also a brief presentation of our main research questions. Consecutively, in the second chapter we report the literature review regarding M&As, where a detailed analysis of horizontal and vertical deals is provided, as well as a deeper insight in the automotive industry transactions. In chapters three and four, data selection and research methodology are described. The fifth section includes the empirical results of the study. Finally, in chapter six, we provide the conclusions of the study.

2 International literature on M&As

Prior research concluded that while some consolidations are characterized as successful, other M&As show the opposite results (Warter & Warter, 2016). However, it remains vague whether companies' negative abnormal returns and reduction of shareholder's value resulted from the integration or other operating factors. Special factors that contribute to the controversy of automotive M&As are the role of prior experience to M&As, the methodology of evaluating performance and cultural issues. Similar to Warter & Warter's study (2016), Andrade, Mitchell, & Stafford also mention little accurate evidence that shows the long-term effects of M&As and what makes them successful (Andrade, Mitchell, & Stafford, 2001). M&A is a multilevel, multidisciplinary, and multistage process which results in total or partially integration of the original organizations' functions, processes and activities (Warter & Warter, 2016).

Mergers present cyclical patterns because high volatility of merger activity usually in periods of economic prosperity is followed by lower volatility and fewer deals, especially in periods of economic contraction. This characteristic is called merger wave and it is influenced by multiple factors like regulation, advances in technology and economic environment.

From the payment perspective, a company can be acquired with several means like cash, stock or a combination of these two methods. Cash payment can be used in a broader definition encompassing except for cash, "noncontingent liabilities, and newly issued notes" while stock is defined as shares with superior or inferior voting rights (Martin, 1996) (Faccio & W. Masulis, 2005). In general, the means of payment could be very complicating when including additional debt instruments or options (Berk & Peter, 2017).

2.1 Market reaction to M&A announcement

The market reaction on the announcement of M&As between corporations has drawn much attention to academics, as it provides the indicator for the value creation or destruction of the shareholders concerned. Most previous studies and researches show different effects for acquirors and targets (Ma, Chu, & Pagán, 2009), while others

examine other factors like M&A type, payment method (Wansley, Lane, & Yang, 2019). The researchers Ma, Chu and Pagan have noted in their study that the most reliable evidence on whether M&A creates value for shareholders is the studies of Andrade, Mitchell, & Stafford (2001), Hackbarth & Morellec (2008).

Gains from an M&A are distributed asymmetrically between bidder and target and this may depend on the characteristics of the sector in which they run their business. Although some studies confirm synergetic efficiencies for the bidder (synergy hypothesis assumes reduction of costs and increase of revenues after M&A), other studies confute this statement and cite that no significant gains could be observed due to the "overinvestment problem" (shareholders are worried about extreme investment in low investment opportunities) (Gross & Lindstädt, 2005-2006). Due to the implementation of technological advantages resulting from the M&A and the reduction of agency and production costs, it is believed that bidder's performance could be improved.

What is more, previous studies (Markides & Oyon, 1998) proved that "international acquisition" is perceived as a profitable investment by the market through which the company can build a competitive advantage and can lead to the increase of bidder's value in the contrast of "domestic acquisitions that are perceived as "liability" by investors" (Gross & Lindstädt, 2005-2006, p. 24).

However, in general, the average return due to a successful acquisition is null for the acquiring company's shareholders while the target company usually earns approximately 30% as return (Capron & Pistre, 2002). Similarly, Berg and De Marzo (Brealey, Myers, & Allen, 2011) state that target's stock price usually presents an increase of 15% due to the merger announcement in comparison to the acquirer's price that usually falls. According to Fresard, Hoberg, & Phillips, both bidder and target companies, but mostly target ones, perform positive excess stock returns (Fresard, Hoberg, & Phillips, 2013).

Another study, (Kedia, Ravid, & Pons, 2008), found that horizontal mergers resulted to significantly higher returns and that these returns were time varying, while on the other hand, vertical M&As were associated with positive abnormal returns until 1996 and they

fall significantly afterwards. They also point out the capture of the gains by the target firms rather than by the bidder ones. Moreover, according to the study of (Ellis, 2014), who investigated the abnormal returns of combined firms, it was found that horizontal mergers reported significant returns of 6.9% and vertical mergers 5.3% as well. We therefore expect to find positive abnormal returns mainly in the case of horizontal M&A types and less positive in the vertical ones.

Gross's and Lindstandt's study (2005-2006) which refers in the existence of abnormal returns in mergers and disintegrations in several industries, proved that cumulative abnormal returns (CAAR) exist in both horizontal and vertical mergers in automotive sector. The study shows that cumulative abnormal returns in horizontal mergers - especially in international level- are positive (+2%) for the bidding firms, while in vertical integration cumulative abnormal returns perform negative figures (-3.1%). According to the authors possible reason why this happens is the audience belief that such transactions satisfy companies' orientation to economies of scale and increase of sales. It is also impressive in the same study that the targets in automotive sector present the highest cumulative abnormal returns (27.5%) among the other sectors as well as a substantial (6.3%) increase in abnormal returns due to disintegrations of non-major sectors of the company (vertical disintegrations).

Furthermore, the existence and degree of distribution of abnormal returns between the bidder and target is associated by with whom resources the value is created. Laurence Capron and Natalie Pistre's study (2002) proved that in a horizontal acquisition, acquirer is appeared to have abnormal returns when value creation comes from its own resources while when the resources are offered by the target the benefits of returns is accrued by the target (Capron & Pistre, 2002). This is explained in Laurence Capron and Natalie Pistre's academic paper because of the fact that high competition is developed between the possible bidders which in turn increases the deal's premium until the "Net Present Value (NPV) for the successful bidder is close to zero" (Capron & Pistre, 2002).

The achievement of operating efficiency through a takeover is very crucial aspect for the companies merged. As presented in Andrade, Mitchell, & Stafford's paper (2001), the analysis of Healy, Palepu, & Ruback (1992) proves that the merged companies gain a

competitive advantage in operating performance in comparison with their competitors in the sector, not only before but also after the transaction (James, 2005). They discovered that the merged companies present extremely "higher operating cash flows relative to their industry peers" prior to the takeover (James, 2005). The operating cash flow returns are reduced after M&As but they still remain higher than their competitors'. However, there are also other studies such as Ravenscraft and Scherer's study that found out targets' profitability loss after the merger (Ravenscraft, David, & Scherer, 1989).

In addition, it is important to note that merger activities strongly clusters by industry (Andrade, Mitchell, & Stafford, 2001), which means that it is necessary to investigate M&A performance in each industry separately, since their unique indicators and factors provide different evidence. For this reason, we chose to focus our study about M&A performance only in the automotive industry, in order to provide more targeted results. Based on the previous research, we also expect to find excess stock returns for the target companies, while for the acquiring ones, the abnormal returns are likely to be close to zero.

Moreover, as already mentioned, our study also tends to provide comparison between different M&A types, horizontal and vertical. Based on Wansley, Lane, & Yang's study, which referred only to acquiring firms, both horizontal and vertical types showed larger cumulative abnormal returns than in conglomerate type (Wansley, Lane, & Yang, 2019). We anticipate that we will find relation between the market reaction and the M&A type of the transactions conducted among automotive companies.

2.2 Horizontal M&As

It is well known that horizontal mergers and acquisitions are a strategic action for a company to enforce its presence in the market by increasing its profitability and reducing its costs. Horizontal M&A is defined as the expansion of a firm by acquiring companies which run business in the same sector which means that the acquirer has substantial knowledge and experience of the industry. The latter facilitates the integration stage and increases the possibility of a successful M&A. Based on Ziva (2017)

and Gross & Lindstädt (2005-2006) there are several reasons why horizontal M&As raise more expectations of enhancing profitability:

1) The competition is reduced in the industry as less companies operate (market power hypothesis). As a result, the firm can increase its market share and have better control over pricing (it can raise the prices -if possible- in order to increase profits). Furthermore, if it is expanded geographically, the company can also take advantage of diversification. Based on diversification hypothesis a merged firm can exploit geographical expansion and larger variety of products offering, reducing in this way total risk.

2) Because of companies' operational similarities, management can adjust quickly to the new situation, achieve integration and tackle more efficiently potential problems thus minimizing the risk factors and cash-flow variations

3) The company benefits from economies of scale and scope, take advantage of the elimination of the equipment duplication and make excess workforce redundant, thus reducing its costs.

2.2.1 Negative consequences and anti-trust regime

Possible adverse consequences of horizontal mergers in the market may be the creation of a monopolistic/ oligopolistic environment that can result in rising prices for the customers as well as lower suppliers' profits (Bhattacharyya & Amrita, 2009). Oligopolies and monopolies are two kinds of markets that are characterized by the price-fixing phenomenon which means that the market power of these companies is high, and they tend to impose prices usually higher than competitive markets do. High concentration levels and collusion can also lead to lower levels of production in order these companies to earn excess returns. Suppliers are also influenced by a horizontal merger as the companies merged can exert buying power demanding for example discounts or more beneficiary credit limits. The intensity that the suppliers are affected correlates to their dependence on the firms merged. In the case where the firm collaborates with specific suppliers, it is noticed that the input prices may rise (Lommerud, Odd Rune , & Lars , 2001).

The state, in order to prevent horizontal mergers from exerting monopoly power in the market evaluate and compare the “initial level of concentration” in the sector with the predicted one after the completion of M&A (Andrade, Mitchell, & Stafford, 2001) (Farrell & Shapiro, 1990). Both in the US and EU there is antitrust legislation that ensure that “healthy” competition exists and that there are not made practices that distort trade. For this reason, economic models are used by regulators so as to predict possible “anticompetitive effects” of an M&A (Hay & Werden, 1993). Although horizontal mergers are more likely to lead to monopoly/oligopoly -in comparison with vertical and conglomerate mergers- because they result in the reduction of the number of the independent players in the same sector- horizontal mergers can be proved efficiency boosters especially in cases when competitor’s company underperform due to management incapability.

2.2.2 Horizontal M&As substitute

An alternative way for the achievement of horizontal mergers’ benefits is through alliances which are considered as horizontal mergers substitutes. Both strategies aim to the exploitation of new resources, cost and risk reduction, expansion to new markets but a merger focus more on the control over the other entity while an alliance offers flexibility and independency thus not constituting a permanent situation. James Sawler proved that alliances are more profitable than horizontal mergers because both the costs can be restricted and the market share increase of non-merging competitors is avoided (“horizontal mergers paradox”) (James, 2005). The latter is provoked because a merger can lead to monopoly gains not only for the companies paid the costs related to the merger but also to unrelated competitive parties in the industry (Berk & Peter, 2017).

2.3 Vertical M&As

The type of vertical M&As is a combination of two or more companies included into the same industry but operate in different levels in the supply chain of a product or service. It can be classified into backward integration and forward integration. Backward integration refers to merging with suppliers and producers whereas forward integration refers to merging with distributors and retailers. According to Stuckey & White (1993),

vertical integration is simply a way of coordinating the different stages of an industry chain when bilateral trading is not beneficial. Researchers also relate vertical integration with the control of the whole industry chain of their production, from the initial input from suppliers to the distribution of the output to the final consumer (Zhang, 2013). Due to the particularity of the vertical type of M&As, we need to elaborate deeper in its perspectives and key elements.

In general, the rational and the effectiveness of vertical integration strategy depend on the industry. As it is stated, vertical integration is industry-specific (Zhang, 2013) and it is heterogeneous across sectors (Fresard, Hoberg, & Phillips, 2013). For example, Health, Drugs, and Telecommunication industry exhibit a low degree of vertical integration. These sectors perform very high R&D costs and they are more likely to avoid integration due to the need to ex-ante incentivize investment in relationship with specific investment. On the other hand, Steel, Aerospace, Automotive or Electrical Equipment Sectors appear to be essentially vertical integrated (Fresard, Hoberg, & Phillips, 2013). Matsushima & Mizuno (2009) also mention that vertical integration has become a widespread phenomenon in the industrialized world, while Fresard, Hoberg, & Phillips argue that the average firm is less vertically integrated in recent years than in the late 1990s (Fresard, Hoberg, & Phillips, 2013).

Moreover, past research shows that vertical mergers take place among firms which are more capital intensive and actually perform lower M/B ratio (Market to Book Value, higher PP&E/assets (Property, Plant & Equipment ratio) and lower product market liquidity. It is also noted that in the early phases of development firms avoid vertical mergers. However, in a later decision making process, vertical integration seems to be a useful tool for growth opportunities, always in conjunction with stable and mature markets (Fresard, Hoberg, & Phillips, 2013).

2.3.1 The rationale behind vertical M&As

Companies believe that vertical M&As create value for the merged business that is worth more than the separate businesses under individual ownership. Vertical integration provides a strategic tool for companies to grow their businesses and acquire more control over the steps supporting the supply chain.

Contrary to horizontal mergers, where rivals who operate in the same stage of the supply chain merge to lessen competition in the market, vertical mergers allow companies to grow their operations into different phases of the supply chain. They actually allow companies to use the synergies which result in efficient operation, cost reduction and business expansion.

Empirical evidence suggests that firms appreciate that companies in adjacent stages of their supply chain have more market power (Stuckey & White, 1993). However, when companies in the weak stages of the supply chain merge vertically with those of the more powerful ones, they end up paying high premiums. This case eventually turns to be injurious, as the value of the benefits achieved is lower than the premium of the whole deal.

The benefits of vertical M&As are many, as they are related with operating, financial and managerial synergies. Vertical integration provides better management of information flow between stages of production, resulting in the reduction of the transaction costs (Zhang, 2013). Zhang also mentions that factors such as competition, market structure, technological and demand uncertainty and more importantly cost-efficiency are factors that determine the management's decision between vertical integration and buying from independent suppliers (Zhang, 2013). Furthermore, vertical integration can result in a better-quality product sold at a lower price (Lin, Parlaktürk, & Swaminathan, 2014).

2.3.2 Related key indicators of vertical M&As

Previous studies consider vertical M&As to be related with essential market and product key indicators, which independently or in combination with others affect managerial decision for vertical integration.

Many argue that the decision between vertical integration and external supply is driven primarily by cost-efficiency (Zhang, 2013). Management should examine and compare the production cost versus the cost of the input from an independent party. Vertical integration level should increase when internal supply is less costly, while on the other hand, vertical integration should be avoided in the cases of lower transaction costs with

external suppliers. Market-based transactions are more beneficial when the market experiences new technologies and new transportation channels (Zhang, 2013).

Furthermore, innovation appears to be an important determinant when it comes to vertical M&As (Fresard, Hoberg, & Phillips, 2013). Fresard, Hoberg, & Phillips (2013) distinguish unrealized innovation through R&D and realized innovation through patents in order to show the possibility of vertical integration. They found that in industries with significant R&D activity, firms are more likely to avoid vertical integration and sustain arms-length customer-supplier relationships along with strong incentives for investments in high technology. Mergers can threaten relationship specific investments when firms have explicitly identified customer - supplier links.

On the contrary, realized innovation is present in markets with high patenting rates where firms are more likely to vertically integrate in order to achieve synergies and avoid ex-post holdup. Following innovation success, firms can take advantage of vertical integration in order to commercialize their patents using the property rights of already realized innovation.

Patents play an even important role when they are related with market stability. Market maturity and product stability tend to encourage vertical integration, especially when firms operate in a stable market for a long time and they are able to recover any additional fixed costs in the integration transaction (Fresard, Hoberg, & Phillips, 2013)

Another key indicator for vertical integration is the asset specificity in conjunction with the frequency of the transactions between buyers and sellers. This combination refers to the relationship between the close proximity of the assets of the two parties and the frequency of their interaction. When both asset specificity and transaction frequency is high then vertical integration is preferable for the parties engaged in order to minimize transport and inventory costs (Stuckey & White, 1993).

The most common and important feature related to vertical integration is the supply chain. The role of supply chain absolutely affects the decision to engage in vertical M&As. Based on Fresard, Hoberg, & Phillips (2013), in the presence of a stable supply chain, firms are more likely to vertically integrate as it may result in a high level of

economic benefits, while unstable supply chains may increase fixed costs due to the need of reorganization.

Other studies have also indicated that the vertical integration depends on the demand and supply uncertainty (Kouvelis & Milner, 2002). According to Kouvelis & Milner (2002), these two market factors have a reverse effect upon the decision making regarding vertical integration against outsourcing. Greater supply uncertainty encourages vertical integration, while greater demand uncertainty increases the reliance on external resources. In addition, the stage of the life cycle of the product or service also plays a significant role. For example, companies with mature products with little demand are not likely to vertically integrate, unless they enter in new markets (Kouvelis & Milner, 2002).

2.3.3 Forward and backward integration

The vertical type of M&As is categorized into backward and forward, where backward refers to the integration into the supply of resources and forward refers to the integration into the distribution and sales (Zhang, 2013). They are both major concerns when future plans are developed for an organization. With backward integration companies try to control over their supply chains and try to obtain raw materials directly, eliminating the suppliers. It can be beneficial for the company as it gets the raw materials at reduced costs. As a result, company's sales can be enhanced, and its bottom line gets healthier. Ultimately, companies can get a better control over their business operations. Reduced dependency on suppliers also ensures the availability of raw materials on time.

Businesses choose forward integration when they decide to execute distribution or retail functions within the distribution channel. In such a situation, manufacturers may eliminate the wholesalers to sell directly to retailers or eliminate the retailers to sell directly to customers. The concept behind this strategy is to reduce the cost and increase the efficiency of the firm by getting closer to the end customer.

Supporters of forward integration suggest that forward integration is based on the correlation between proximity to final consumers and corporate profitability. Some

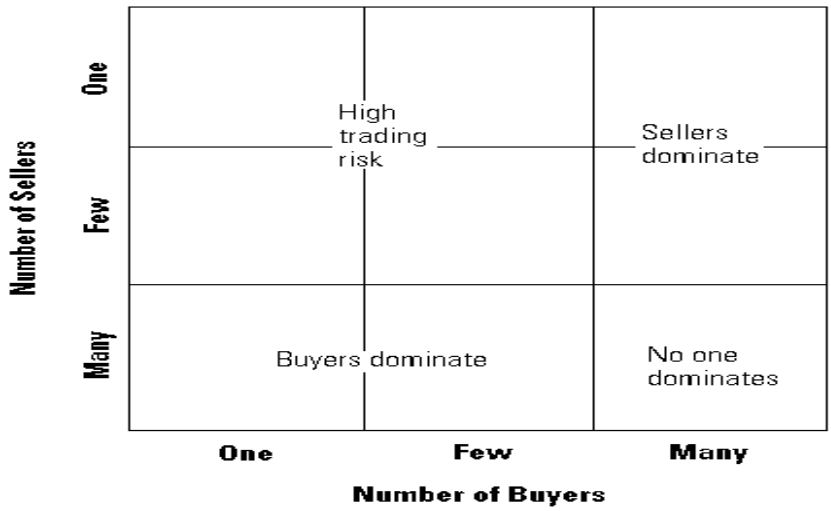
researchers believe that this correlation is rather weak and immaterial (Stuckey & White, 1993). However, Stuckey & White (1993) also state that this strategy can benefit companies achieving price discrimination. Implementing forward integration with low-price distributors, companies avoid reselling of their product from the low-price segment to the high-price segment, enjoying maximum profits (Stuckey & White, 1993). Furthermore, there is the view that forward integration is beneficial to the development of young markets (Lin, Parlaktürk, & Swaminathan, 2014).

2.3.4 Risks and drawbacks of vertical M&As

Vertical integration may be a highly efficient strategy for the company's development, but it is very difficult to implement successfully. There are many cases where a vertical merger is not only inadequate, but also inappropriate to use as strategic tool and corporate management's decisions turned to be unsuccessful and costly to fix. Vertical integration helps companies to reduce risks but it requires heavy setup costs, and its implementation is doubtfully efficient (Stuckey & White, 1993).

Furthermore, Stuckey & White determine the market structure as essential feature to vertical integrations (Stuckey & White, 1993). Based on their research, when there are few buyers and sellers in the market, each of them tries to leverage its monopoly status, which in turn can lead to haggling and exploitation. In Figure 1 you may see the different market structure in relation to the balance of the power between buyers and sellers. As all parties try to gain their slice of the pie, bilateral oligopolies have to deal with complex coordination problems.

Figure 1 Vertical market structures (Source: Stuckey & White, 1993)



Despite the benefits a vertical integration may offer, there are also issues that may arise. Following a vertical merger, firms are likely to experience negatively correlated movements in accounts payable and accounts receivables, caused by the lack of adjacency in the supply chain (Fresard, Hoberg, & Phillips, 2013). Having said that, the stability of the supply chain remains a unique and essential determinant in the M&As decision making process, in order for firms to enjoy long-term gains from operational synergies.

2.3.5 Controversy in vertical M&As

Vertical mergers, like other business transactions, come with the controversial aspect as well. To start with, anti-trust violation laws often come into play when such a merger is more likely to reduce the competition in the market. It can also be used by companies to block access to raw materials for other players in the supply chain and hence destroying the fair competition through unfair business practices. It also could be used by companies to collude to gain economic advantage in the supply chain.

Competition is healthy for consumers as it allows the companies to brainstorm and provide innovative high-quality products and services to the end user. Though using vertical integration to gain the edge over the competitors is not illegal but using it to

control the market by shady business practices like controlling the flow of raw material etc. may come under the purview of law and is subjected to scrutiny in many countries.

Having presented many aspects and perspectives of vertical M&As, we may easily understand that besides the benefits of this managerial strategy, companies can gain power by raising barriers to entry and control the market, achieving price discrimination. Especially, when the industry experiences downturn, weaker players cease to exist and the rest are left vulnerable to the exploitation by the increasingly concentrated suppliers or customers (Stuckey & White, 1993).

To sum up, vertical M&As may create several issues and the consequences can be depicted in the insufficient supply chain processes. As Raisch (2004) refers to the study of D'Aveni and Ilinitch, 1992, vertical integration may cause problems in control and coordination, as well as in the managerial activities. Furthermore, it creates market issues and may "urge companies to forgo purchasing at low prices in the open market" (D'Aveni and Ilinitch, 1992).

2.4 Automotive industry

The usefulness of mergers and acquisitions (M&As) as a corporate tool to pursue strategic growth is the reason for the increasing number of the transactions within the automotive industry. In this section, we provide an analysis of the importance, the reasons and trends of M&As in the automotive sector and we give an emphasis on the horizontal and vertical M&As in the industry examined.

2.4.1 Introduction of M&As in automotive industry

The automotive sector is one of the most well-known sectors that M&As take place. High competition levels as well as rapid technological improvements force companies to be consolidated in order to remain competitive and cope with the rising costs of raw materials. Consolidation facilitates companies to take advantage of economies of scale and open up new markets as well as restrict the high expenditures on research and development. The main motivations behind automotive M&As, according to (Warter & Warter, 2016) are economies of scale, geographic market expansion, risk reduction and diversification, leveraging of core competencies and technological changes. According

to Warter & Warter's study, Trompenaars and Asser (2010) also observe that mergers, acquisitions and strategic alliances keep being an effective way for global business expansion. Even during economic crisis, where the banking difficulties and credit restrictions become more severe, the automotive industry is not likely to shrink (Warter & Warter, 2016).

Automotive industry is a highly capital-intensive industry and in conjunction with cyclical characteristics, the larger the company becomes, the less affected from sale volatility is (Financial Times, March 2019). As a result, executives anticipate that the area of M&As in this field will continue to prosper in the upcoming years both with domestic and cross-sector deals. Based on PWC report this increasing trend of mergers in this field will continue to grow and expects to reach $44 billion in transactions in 2019 noting that remarkable trends in this field are connected cars, autonomous vehicles, ride sharing and, of course, electrification (PWC, December 2019).

As far as automobile industry in general, KPMG report anticipates that "by 2030 less than 5% of cars will be produced in Western Europe" and that "industry policies in Asia & USA seem to be far more advanced than in Europe" (KPMG, 2019). What is more, digitization will play a key role and automotive companies are expected to cooperate much with tech companies. Several types of fuels and combustion will be used but few investments in fuel cells will be made as well as the main reason preventing the consumers from buying electric cars, will be the price. Customer high demand is expected for services such as "navigation systems, adaptive cruise control & power upgrade". Finally, KPMG report states that the profitability of automobile company is unlikely to decrease.

As one of the world's largest manufacturing industries, the automotive industry has the capability to influence the labor, trade and capital markets and also governments' macroeconomic and industrial aims (Warter & Warter, 2016). However, critical issues of consolidations in automotive sector could arise. The most common is the degree of cultural integration between companies which is a common problem in M&A field. Cultural integration may never be succeeded like in Daimler-Chrysler case or can be partially achieved (Renault-Nissan alliance).

What is more, because of the fact that automotive sector is an industry highly politically affected – for example in some countries there are state shareholder– this usually influence the decisions of the companies on making a deal or not. For this reason, both cross-sectional deals become more complicated and time-consuming and the possible negative outcomes of a merger (i.e. job redundancies) may terminate the consolidation process. Another critical factor in the automotive integration may be the barriers created in the case of cross-border M&A, such as local regulations and industry standards, language and local culture etc. (Warter & Warter, 2016). Automotive companies need to overcome these barriers in order to expand internationally access new customers in new markets or acquire new production capabilities or technology.

Historically, we notice that in the automotive industry M&As have not always been successful. Two unsuccessful popular examples are the acquisition of Rover by BMW, in 2000, and the divestment of Chrysler by Daimler-Benz in 2007. On the other hand, the alliance between Renault and Nissan and the acquisition of Skoda and Seat by Volkswagen have proved to be successful. Researchers have not yet been able to determine the key factors behind an M&A success or failure, since the findings on the general performance of M&As are inconsistent and contradictory (Warter & Warter, 2016). According to the Warter & Warter's study, realization of the integration benefits and the creation of the wealth is not a straightforward procedure, and the evaluation of their effectiveness is measured through different metrics. Most surveys and metrics, until 2016, resulted to a success rate of about one third, while some have found that only 20% of mergers and acquisitions are ultimately successful (Warter & Warter, 2016).

2.4.2 Horizontal and vertical M&As in automotive industry

M&A seems to be an important way for automotive companies to boost sales not only locally but also worldwide and become competitive taking advantage of economies of scale. A usual reason for consolidation could be the exploitation of advances in technology and like the development of self-driven cars and "electric vehicle technology" (Financial Times, March 2019) which is a major trend of the century. In addition, competition among automotive companies has exacerbated during last decades which can be easily depicted on the sales slowdown and on the market share

restriction of the key market players (Bloomberg, April 2019) making the consolidation prospect luring enough especially because of the using of “pooling resources” and therefore reduction of costs. Horizontal M&As is a very popular strategic decision, in order for automotive companies to dominate in the market competition.

On the other hand, the presence of vertical M&As is also very intense in the automotive industry, as it allows companies to develop their production line and maintain their piece of pie in the international and domestic market. In automobile product development, the degree of vertical integration for a single manufacturer is the consequence of hundreds of individual procurement choices, ranging from simple supply contracts for commodity components to complex arrangements for cutting-edge technology development (Matsushima & Mizuno, 2009).

It is important to mention here that, although vertical integration can offer significant benefits to the engaged parties, different cultures provide different aspects on this matter. More indicatevely, Matsushima & Mizuno (2009) elaborate their study on the comparison of vertical M&As in the automotive sector between USA and Japan, to point out the difference of their cultures and their markets regarding vertical integration. They argue that the presence of vertical mergers was more evident in the USA rather than in Japan, due to many reasons. Firms in the USA were urged to vertically integrate in order to avoid negative interactions with their trading partners, while japanese firms tended to give much value on their partnerships, regardless of their dependency negative effects. Another reason for the little presence of vertical M&As in Japan were the limitations of its financial markets.

3 Data

To begin with, our sample was downloaded from Thomson One Database. We separated our analysis into two main parts. The first part concerned the horizontal mergers in automotive sector and the second included the vertical ones.

In order to determine whether a merger was horizontal or vertical, we first examined all the deals in automotive since 2000. Our intention was to examine every deal conducted between automotive companies and comprehend the possible targets or bidders engaged. For this reason, we downloaded the sample from Thomson One Database without setting any criteria, except our main SIC code, 3711 – motor vehicles and passenger car bodies. Any deal which included SIC code 3711 was in our first sample of 1652 results. We then categorized the parties engaged into 4 categories[1]– *horizontal*, *vertical*, *conglomerate* and *investors*. Finally, we excluded the categories of *conglomerate* and *investors* from our analysis, so as to focus our research to the two main types of M&As, *horizontal* and *vertical*, and compare the results.

The buybacks transactions, 83 in number, were removed from the population, as they are not considered as horizontal or vertical M&As. Buybacks are actually a different kind of transaction where the company buys its own outstanding shares to reduce the number of shares available and return money to the company's shareholders. This procedure usually affects the stock price upwards.

After categorizing the SIC codes, we then removed all deals which did not meet our criteria. Our criteria for the population chosen were the following:

- All deals were announced during the period 2008 - 2018. The reason for our choice not to include deals before 2008 was mainly due to the fact that before financial crisis the market reacted differently. Financial crisis of 2008 has affected all economies and consequently the shareholders' behavior. In order to capture the actual sensitivity of abnormal return we had to avoid including data which reflected different market conditions.

[1] The categories of SIC codes excluded or included in the population is presented in Table A 1 in the Appendix.

- All bidders were exclusively manufacturers of motor vehicles and passenger car bodies or truck and bus bodies. So, the SIC codes of bidders were limited to two, 3711 and 3713. All other SIC codes from automotive industry were defined as companies which products or services belonged to different stages in the supply chain[2].

Finally, additionally to these criteria we restricted our sample and focused on the companies which have a public status in order to make an event study analysis and estimate the abnormal returns.

3.1 Analysis of the population

As a result, the number of deals consisted our population for all automotive horizontal and vertical M&As during the decade 2008-2018 is showed in the Table 1.

Table 1. Population of total horizontal and vertical M&As during 2008 – 2018

M&A	TOTAL M&As	M&A TYPE %	COMPLETED	COMPLETED %
HORIZONTAL	534	42,15%	324	60,67%
VERTICAL	733	57,85%	505	68,89%
TOTAL M&As	1267	100,00%	829	65,43%

The horizontal M&As, for which we set both bidders and targets with the SIC code 3711 and 3713, included 534 deals, reaching the proportion of 42,15% of total number, against the vertical proportion of 57,85%. This distribution of the M&A types came in contrast with previous studies. More indicatively, Gross & Lindstädt (2005-2006) found that in overall market, horizontal deals outweigh the vertical ones. It seems that vertical M&As as a strategic tool in automotive industry has drawn much attention in the resent years.

On the other hand, for vertical M&As, we had to exclude SIC codes 3711 or 3713 as targets, as well as conglomerate deals or deals with investor institutions. The final population of vertical M&As consisted of 733 deals, of which 505 were actually

[2] All SIC Codes included in the vertical M&A type and defined as forward and backward are presented in Table A 2 and Table A 3 in the Appendix.

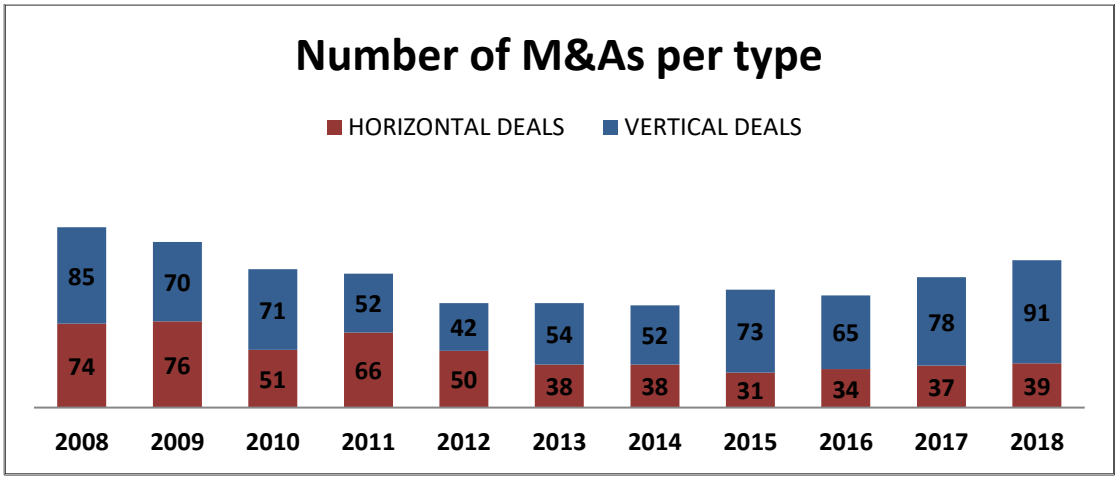
completed later, reaching the proportion of 68,89% of total vertical deals, while the horizontal M&As that achieved to complete were in total 324, that is 60,67%.

In the following part of the chapter, we make a statistical analysis of total horizontal and vertical M&As in automotive sector, that were announced during the period 2008-2018. Our intention to separate the sample into horizontal and vertical remains, so that we have clear insight of total M&As in automotive sector in general and for each type separately regarding their frequency, the nation of the corporations, the completion of the deals etc.

3.1.1 Number of M&As per type

In Figure 2 you may see the number of horizontal and vertical deals on a yearly basis, during 2008-2018[3]. What is interesting is the fact that horizontal deals were in full swing during the years 2008-2012, recording the highest number in 2009, 76 out of 534 horizontal M&As, 14,23% of total population in the decade.

Figure 2. Number of M&As per type during 2008-2018



Indicatively, only during the four-year period 2008-2012, Volkswagen AG announced 11 horizontal deals, Fiat SpA announced 6 and Navistar International Corp announced 5. All deals mentioned were actually completed later. On the contrary, the following years, fewer horizontal deals were announced with the lower number to be depicted in 2015, 31 out of 534 horizontal M&As, 5,81% of total population in the decade.

[3] Table A 4 in Appendix presents the frequency of the M&A deals in more detail for each year.

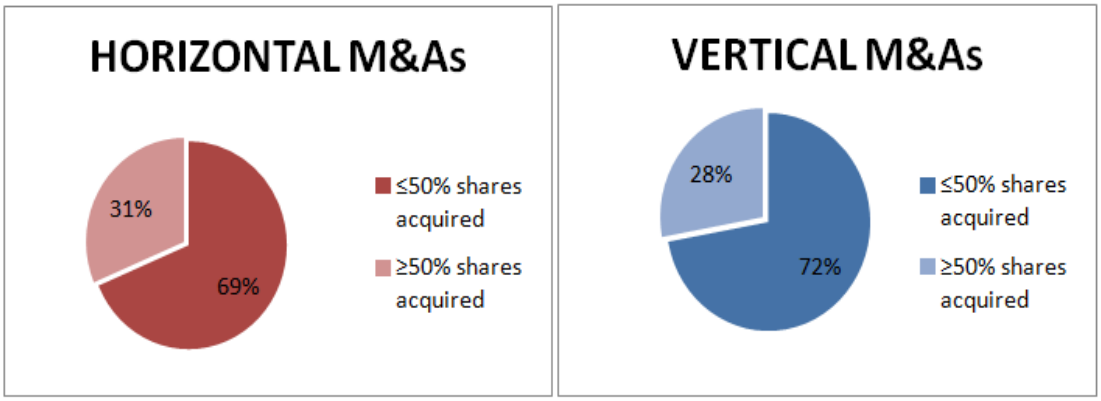
On the other hand, vertical mergers did not show the same flow. Most deals were announced last year, 2018, 91 out of 733 vertical M&As (12,41%), and also 10 years back, in 2008, 85 out of 733 vertical M&As (11,6%). Indicatively, in 2018 Lippert Components Inc, Toyota Motor Corp and Volkswagen AG announced 3 vertical deals each, all of which were completed later. The number of vertical M&As, between the period 2008-2018, were declining until the large drop in 2012, only 42 of 733 vertical M&As (5,73%), to start increasing again until the highest level in 2018. Finally, it should be noted that between 2012 and 2014, fewer deals were announced compared to previous years, both for horizontal and vertical type.

3.1.2 Proportion of shares acquired per type

When a bidder purchases most or all of another company's shares, it gains control of the entire target company. The purchase of portion of more than 50% of a target firm's stock allows the acquirer to make decisions about the newly acquired assets without the approval of the company's shareholders.

In the following pie Figure 3, you may see the proportion of total shares acquired in the transaction both for horizontal and vertical types again. Apparently, only for the completed deals we were provided with data regarding the proportion of the number of shares outstanding, so this Figure 3 refers only to the completed M&As in the automotive industry, which were announced during 2008-2018.

Figure 3. Proportion of shares acquired per M&A type



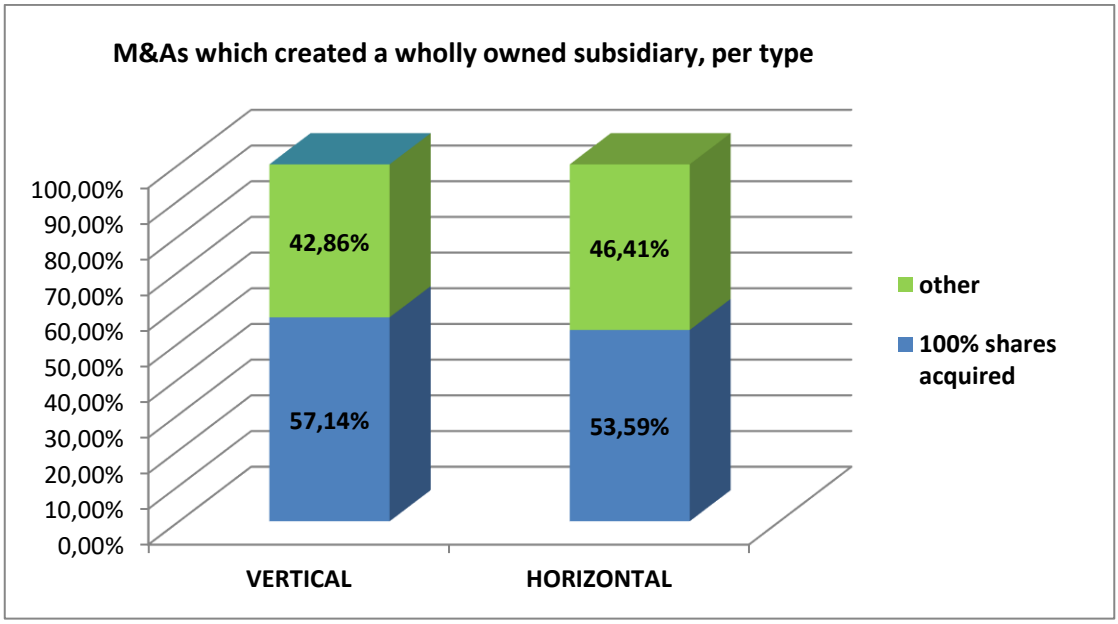
It is clear for both M&A types in automotive sector that in over than 60% of the transactions, bidders acquired more than 50% of targets' shares. Both cases had very

similar results regarding this matter, as 69% of horizontal transactions and 72% of vertical transactions were related to acquisitions of more than half of the target company. Therefore, in both horizontal and vertical mergers, around 30% of bidders purchased less than 50% of targets' shares, enjoying only a smaller non-controlling ownership interest. In case where the stake is less than 50%, the firm is considered an associate or affiliate company.

The ownership of 50% or more of voting stock creates a subsidiary. The financial statements of the parent and subsidiary are consolidated to reflect the control relationship between them, contrary to the affiliate or associate where financial reporting is presented differently. In case of 100% acquisition, the target becomes a wholly owned subsidiary.

Figure 4 presents the percentage of deals in automotive industry, where the bidder purchased the total number of shares of the target company. It is very clear from the graph that for both M&A types, more than half of all completed deals turned to the total control of the target by the bidder company. More specifically, vertical mergers where acquisition created a wholly owned subsidiary consisted the 57,14% of total population for the decade 2008-2018, and horizontal mergers recorded a very similar level of 53,59%.

Figure 4. M&As which created a wholly owned subsidiary per type

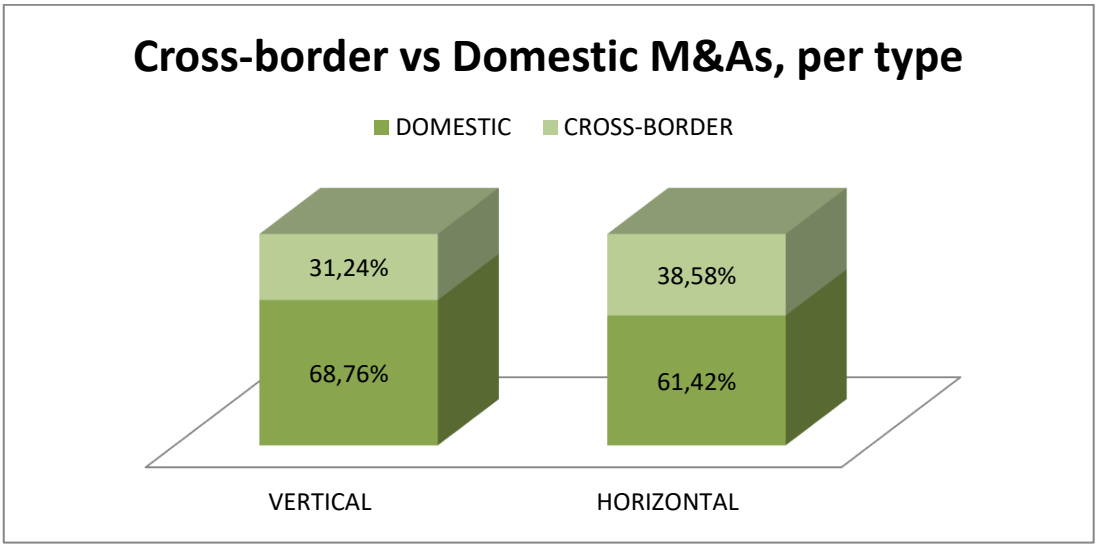


Indicatively, Volkswagen AG, during the period 2008-2018, acquired 100% shares of 7 companies, three of them competitive corporations, AFL Europe GmbH , OOO Volkswagen Rus, Wilhelm Karmann GmbH, and four of them operating on adjacent stages of the supply chain, Kroymans Auto dealers-Berlin, MAHAG Automobilhandel & Svc, Man Energy Solutions Se, Porsche Holding GmbH. Volkswagen AG is one of the largest automotive manufacturers in the world and its Group comprises of twelve brands from seven European countries. Automotive companies implement both vertical and horizontal strategies, in order to develop and improve their operations and their profits.

3.1.3 Domestic vs cross-border M&As per type

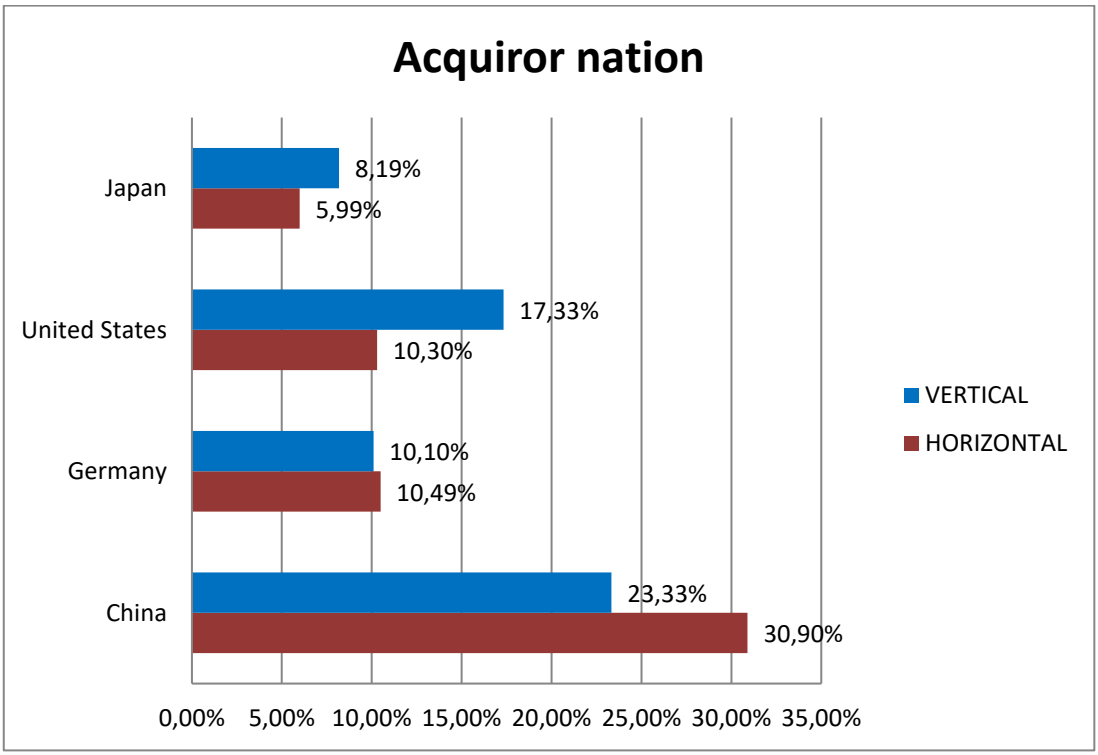
Nation distribution is important to be analyzed as it helps us comprehend the geographical area towards which the automotive companies tend to direct their development plans. First, we should distinguish the M&A transactions between bidders and targets which operated in the same geographical region. According to the below Figure 5, automotive companies, during the decade 2008-2018 tended to merge with domestic companies, in both horizontal and vertical cases. The proportion of vertical domestic M&As was almost 70%, against the cross-border vertical mergers. Likewise, the related percentage for horizontal M&A was 61,42%. We may therefore conclude that management of automotive companies directed their development and merging plans mainly towards the same geographical region, in order to gain control of the existing market they already operate.

Figure 5. Cross-border vs Domestic M&As per type



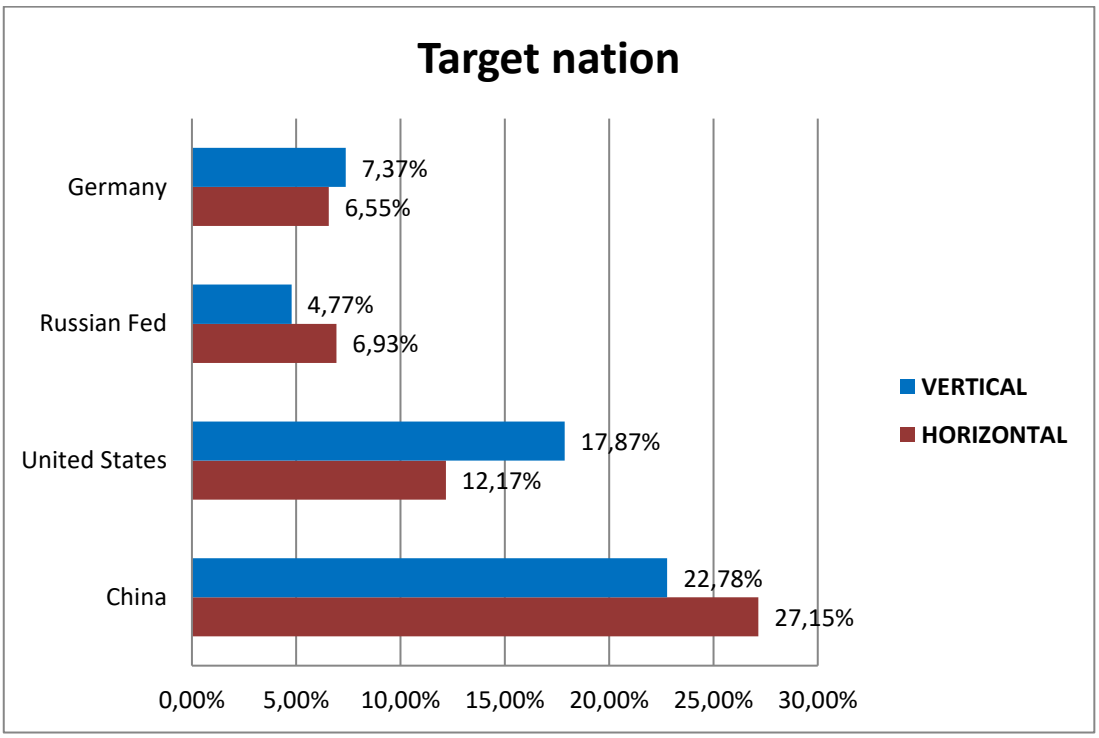
Following the second question, regarding the nation of the automotive population, we may see the Figure 6 and Figure 7, where the nations of most acquirers and targets during 2008-2018, are presented respectively. For each M&A type, we only chose the first five nations with the highest presence of acquirers and targets.

Figure 6. Acquiror nation per M&A type



As we may see, in both Figure 5 and Figure 6, for both M&A types, the companies were located approximately within the same countries. It is very clear from Figure 6, that China, with the proportion of 30,90% for horizontal population and 23,33% for vertical population, was the dominated country with regards to the geographical location of the acquiring companies engaged in M&A deals, independent of the M&A type and the transaction party. For the acquiror party, USA, German and Japan came next. USA seemed to be the location of 17,33% of total acquirers merged horizontally against 10,33% of acquirers which merged vertically. The bidders located in Germany showed similar results when we examined the M&A type, with proportion of 10%, as per both types.

Figure 7. Target nation per M&A type

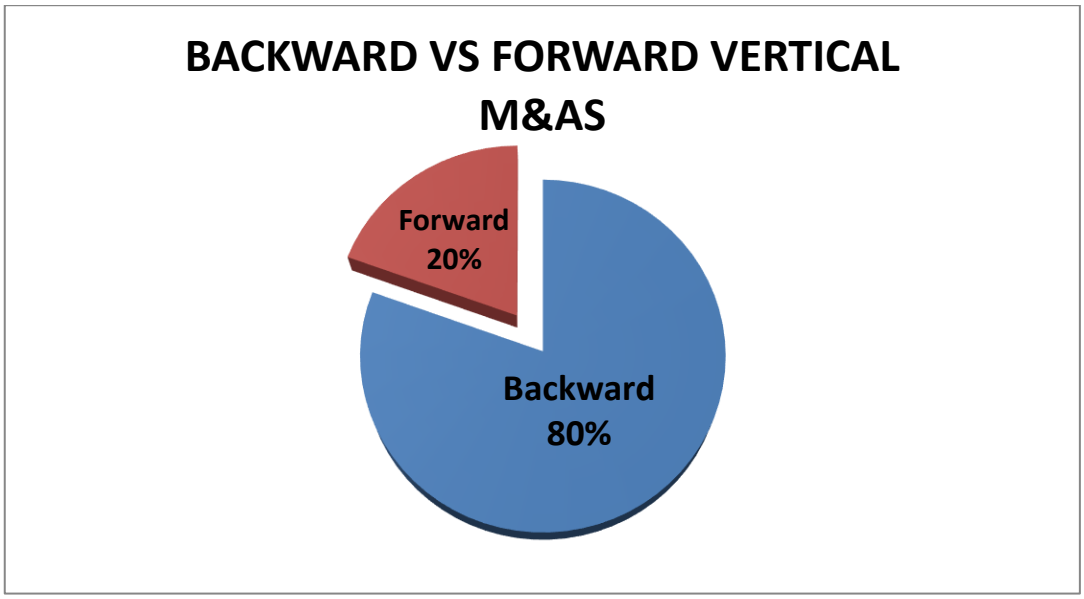


If we take into account the Figure 5 and Figure 7, we may easily conclude that the prevailed countries where target companies were located were very similar to the acquirers location, China once again reported very high percentage of 27,15% for horizontal and 22,78% for vertical. USA, Germany and Russian Federation were following. More detailed information regarding the nation of the acquirors and targets in horizontal and vertical M&As during 2008-2018, are presented in Table A 5 and Table A 6, in the Appendix.

3.1.4 Backward vs forward vertical M&As

As already discussed in previous chapter, vertical integration is distinguished between two main categories, forward and backward integration. The separation of these two types of vertical M&As is essential, as it shows the intention of management to approach suppliers or clients. In Figure 8, we present this management intention.

Figure 8. Backward vs Forward vertical M&As.



It is obvious from the Figure 8 that during the period 2008-2018, automotive companies merged vertically in order to gain control of their suppliers and develop their product's supply chain. On the other hand, only 20% of automotive acquirers targeted companies from the next stages of the industry chain, the distributors.

3.2 Abnormal returns sample

As already mentioned, our sample included deals between years 2008 and 2018. The main purpose of our study's analysis focused on the reaction of the market on the M&As announcement date. Consequently, we had to collect the companies' share prices and analyze the abnormal returns of the companies engaged in each transaction. From total population only few companies were public with available share price data trading in a stock exchange for the needs of the event period analysis. In Table 2, we show the total sample used in our event period analysis in total and per M&A type.

Table 2. Number of public companies with available stock prices.

COMPANIES ANALYZED	HORIZONTAL	VERTICAL	TOTAL
BIDDERS	54	45	99
TARGETS	56	36	92
TOTAL	110	81	191

Stock prices of bidders, targets and indices were collected from Eikon Thomson Database. Another source used for the data collection was Yahoo finance. Public companies for which stock prices were not available, were eventually excluded from the sample. In addition, the M&A deals used for our analysis are presented in Table A 7 and Table A 8 in the Appendix.

3.3 Profitability data of acquiring firms

After the abnormal returns analysis, we focused on how the profitability ratios performance of the acquiring firms were affected following the completion of M&A. Analysis of the target's performance was not included in our research due to the fact that many of the merged firms ceased to exist after the merger and post-merger group performance of the firms is not included in our study. Having said that, an accounting analysis conducted on automotive acquirors' performance around the actual merger date. Actual merger dates, or in other words, closed dates of the M&As were found on Capital IQ database as well as in other sources such as Wikipedia, Bloomberg and Financial Times.

Bidders' performance was measured by using profitability ratios. Ratios of each company were downloaded from Thomson EIKON database. Both ratios were calculated taking the average of two years before M&A and two years after the M&A. Previous researchers argue that two years pre and post M&A data is a sufficient period (Altunbas & Marqués, 2008). They also note that a period longer than two years might be biased due to some other external economic factors.

From the total number of acquirors, we excluded the bidders which conducted M&As from 2018 onwards, since their profitability ratios after 2 years would not be available.

Additionally, in the cases that a bidder made more than one deal during the same year we took the ratios only once, since we chose annual ratio data from the Thomson Eikon database. In this way, we avoided using double data that would bias the results. Eventually, our sample was reduced even more when for the remained companies, profitability ratios were not available in any database or the closing deal date was not found. As a result, our final sample was 34 acquiring companies for both vertical and horizontal M&As.

4 Methodology

Our study applied event study methodology for the investigation of Average Abnormal Returns and Cumulative Average Abnormal Returns caused by M&A announcements in the automotive industry between 2008 and 2018. Additionally, paired t-test applied for investigating any profitability improvement of acquiring firms.

4.1 Event study methodology on abnormal returns

Our study's purpose was to investigate the existence of abnormal returns due to the announcement of a M&A. In other words, we examined the impact of M&A announcement on enterprise value both for the targets and the bidders involved.

Classical event study methodology (Brown & Warner, 1985) was employed using Microsoft Excel for the calculations of Abnormal Returns and t-statistic analysis. We estimated market reaction to the announcement of an M&A using two different approaches: Market Model and Market Adjusted model.

Event study methodology is a reliable and useful method applied in economics in order to evaluate and measure the possible effect of an event on the financial markets and the company's value (MacKinlay, 1997). This approach believes that stocks reflect investors' expectations, so the occurrence of an important event (such as an M&A announcement) would change their future anticipations for the company. Short-term analysis is more scientific reliable than long-term analysis and it is a usual method used to evaluate market reaction to a takeover because based on the efficiency capital market hypothesis "stock prices quickly adjust following a merger announcement, incorporating any expected value changes" (Andrade, Mitchell, & Stafford, 2001).

According to Halpern, the first announcement date of a merger is more appropriate event date (t=0) than the actual date of the event because "information leaks" and rumors influence the audience anticipation of the deal success and creates abnormal returns (Halpern, 1983).

The steps we followed are described below:

1. Having collected the companies share prices, we then calculated the daily log returns of the firms and the corresponding daily log returns of their related indexes. We took the natural logarithm of data in order to calculate the return, as per the Equation 1.

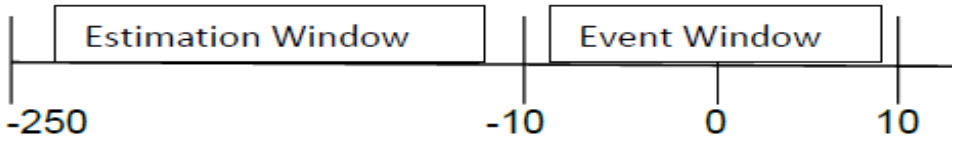
Equation 1. Returns

$$\text{Return} = \text{LN}(^{\text{Pt}}/_{\text{Pt}})$$

2. Both Market Model and Market Adjusted Model in our analysis were employed with an event window of (-10,10).

   The calculation of abnormal returns in our research spans from -10 days to +10 days around the announcement date (day 0). As the event window selected is (-10,+10), we posed an estimation window of (-250,-11) days, based on the below Figure 9.

Figure 9. Estimation and Event window



Based on the returns of the estimation period we calculated using OLS regression intercept (a) and slope (b) of *Expected Returns* which are used in the estimation of *Abnormal Returns*. Over the period examined these parameters, a and b, remain constant in order to estimate *Expected* and then eventually *Abnormal Returns*.

Expected Returns regression was based on the following Equation 2, where E_{it} stands for the expected return at time t. a_i and b_i are market model coefficients estimated during the chosen estimation window period. R_{mt} is the reference market return at time t.

Equation 2. Expected Returns

$$\text{Eit} = \text{ai} + \text{bi} * \text{Rm, t}$$

Abnormal returns estimated using both methods, based on the Equation 3. Abnormal Returns in the *Market Model* is defined as the difference between the actual and the predicted return (Krivin, Patton, Rose, & Tabak, 2003).

Equation 3. Abnormal returns in Market Model

$$\mathrm{ARi,t} = \mathrm{Ri,t} - (\mathrm{ai} + \mathrm{bi} * \mathrm{Rm,t}) = \mathrm{Ri,t} - \mathrm{Ei,t}$$

R_{it} is the actual return and $E_{i,t}$ is the calculated expected return for the firm's stock at time t.

Abnormal Returns in *Market Adjusted Model,* Equation 4*,* is defined as the subtraction of the market return ($R_{m,t}$) from the company return ($R_{i,t}$). (Scholes & Joseph, 1977).

Equation 4. Abnormal Returns in Market Adjusted Model

$$\mathrm{ARi,t} = \mathrm{Ri,t} - \mathrm{Rm,t}$$

Average Abnormal Returns ($AAR_{i,t}$) calculated for both Market model and Market-Adjusted model, based on Equation 5.

Equation 5. Average Abnormal Returns

$$AARi,t = \frac{1}{N} = \sum_{i=1}^{N} ARi,t$$

Then, *Cumulative Average Abnormal Returns (CAAR)* were estimated during the event windows, in order to have a broad picture of the consequences of the M&A announcement. CAARs were estimated in the event windows (-10, -1), (+1, +10), (-5, -1), (+1, +5), (-1, +1) and (-1, 0), based on the Equation 6, where event window is (t_1,t_2).

Equation 6. Cumulative Average Abnormal Returns ($CAAR_i$)

$$CAARi,t = \sum_{t1}^{t2} \mathrm{AARi,t}$$

3. Statistical significance was examined for both *Average Abnormal Returns ($AAR_{i,t}$)* and *Cumulative Average Abnormal Returns (CAARs),* using t-test analysis. The following Equation 7 and Equation 8 indicate the t-test formulas.

Equation 7. T-test formula for Average Abnormal Returns

$$t(AARt) = \frac{AARt}{S(AARt)}$$

Equation 8. T-test formula for Cumulative Average Abnormal Returns

$$t(CAARt) = \frac{CAAR(p,q)}{S(AARt) * \sqrt{(q-p)}}$$

4. Finally, based on the comparison of t-test figures and the related critical values, we concluded whether the *null hypothesis* is rejected or failed to be rejected. *The null hypothesis examined whether the Average Abnormal Returns and the Cumulative Abnormal Returns are equal to zero.*

Based on previous empirical research in a short-run period of time, M&A announcements influence investors' expectations creating abnormal returns for the merged company after the consolidation (Martynova & Renneboog, 2008). Target firms create abnormal return gains while the results are more ambiguous for the bidders as some bidders "reap small positive abnormal returns whereas others suffer (small) losses" (Martynova & Renneboog, 2008).

Based on Martynova & Renneboog (2008) target shareholders benefit from statistically significant abnormal returns (ARs) around the first announcement date. The same study suggests that bidders' abnormal returns are associated with the private or public status of the target and the payment method. For example, CARs are usually higher when a private company is acquired. What is more, bidders who conduct M&As in related sectors perform higher CARs than those who decide to make conglomerate mergers. All in all, bidders present insignificant CARs before the announcement.

4.2 Paired sample t-test on the post-M&A profitability of acquiring firms

Following the average abnormal return analysis of the merged companies, which examined the wealth effect of the shareholders around the announcement of the event, a second analysis of post-merger performance was conducted. Despite the immediate impact of an event upon the stakeholders' value, in the end, corporate management and investors are interested in the final benefits or drawbacks of an M&A in a short or a long term.

Therefore, it is important to further investigate the value that is created after the event period. Previous studies on various samples suggested that M&As may have positive, neutral or negative impact on the performance of organizations (Otieno & Kemunto, 2017). The research of Otieno & Kemunto (2017) refers to other studies, like Marangu (2007) and Girma, Wright, Conyon, & Thompson (2002) which found that M&As have positively affected the financial performance of the acquiring firms. On the other hand, another studies, by Akinbli and Kelilume (2013) and Abbas et al (2014) found that there was no significant effect of the M&As on the performance of the firms. Finally, as stated in Patel's research (Patel, 2018) there are also some studies such as Pawaskar (2001) and Kumar and Bansal (2008) that conclude to the fact that there is a slight insignificant improvement in the performance ratios after the merger. Previous studies (Long, 2015) also report that in some researches (R. Correa,2008 and R. V. Vennet 2002) there is not clear evidence that there is performance amelioration and especially profitability increase after the completion of an M&A.

More indicatively, this study uses the quantitative research design to measure the post-merger performance of automotive sector companies using the return on equity (ROE) and the Net Profit Margin (NPM), which are described below in detail.

- *ROE* is a measure of profitability and indicates how efficiently shareholders' financing is handled for investments. Increasing ROE demonstrates a company's ability to reinvest profits (Equation 9).

Equation 9. ROE formula

$$\text{ROE} = \frac{\text{Net Income}}{\text{Equity}} \%$$

- *Net Profit Margin* measures the percentage of profits over the total revenues a company generates. This is one of the most important indicators of a company's financial health. A company can assess whether current practices are working and forecast profits based on revenues (Equation 10)

Equation 10. Net Profit Margin formula

$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Total Revenue}}\%$$

As already mentioned, bidders' performance was measured by using profitability ratios. Ratios of each company were downloaded from Thomson EIKON database and both ratios were calculated taking the average of two years before M&A and two years after the M&A according to (Altunbas & Marqués, 2008), as depicted in Figure 3. A paired sample t-test was used to determine whether the selected financial performance indicators significantly improved following the M&A. Paired sample t-test analysis was employed in order to examine if the average mean difference between pre- and post-merger ratios were statistically different than zero. As a result, we are going to have a clear view of whether the merger became beneficiary for the acquiror. This statistical procedure is usual in pre and post analysis of an event because it is utilized to compare two population means in the case of two samples that are associated (Sujud & Boutheina , 2018).

Based on the above discussion, the following hypothesis were developed, for which a synopsis is presented below.

H_0: M&As in automotive sector <u>have not</u> significantly impacted the profitability of acquiring firms.

- $ROE_{\text{before M\&A}} = ROE_{\text{after M\&A}}$
- $NPM_{\text{before M\&A}} = NPM_{\text{after M\&A}}$

H_1: M&As in automotive sector <u>have</u> significantly impacted the profitability of acquiring firms.

- $ROE_{\text{before M\&A}} \neq ROE_{\text{after M\&A}}$
- $NPM_{\text{before M\&A}} \neq NPM_{\text{after M\&A}}$

In chapter 5.3, a paired sample t-test analysis is presented using quantitative methods, where we finally conclude whether we failed to reject the null hypothesis or not.

5 Findings - data analysis

In the following pages we report the results from the event period analysis of the 20 days surrounding the announcement date of the M&A on bidders' and targets' returns. The analysis was conducted with both models, Market model and Market Adjusted Model. To indicate the statistical significance of the results we have bolded the figures in the tables and the level of significance is characterized from the number of asterisks next to the figures. More specifically, one asterisk refers to 10% of significance level, two asterisks refer to 5% and three asterisks refer to 1%.

5.1 Average abnormal returns of bidders

In this section, the results of the event study are provided for the bidders engaged in either horizontal or vertical M&As in automotive industry for the period 2008-2018.

5.1.1 Bidders in horizontal M&As

Starting with horizontal M&As, in Table 3, we notice statistically significant values in both pre- and post- event date. More indicatively, market adjusted model shows that AAR of -0,59% in day 0 was statistically significant at level 10%. Furthermore, with market model, we consider day 1 as statistically significant with value of -1,76%.

Table 3. AARs of Bidders in horizontal M&As

DATE ANNOUNCED	MARKET MODEL		MARKET ADJUSTED MODEL	
N=45	**AAR %**	**T-TEST**	**AAR %**	**T-TEST**
-10	**-0,831*** **	**-2,682**	**-0,936** **	**-2,624**
-9	-0,055	-0,178	-0,105	-0,397
-8	-0,348	-1,122	**-0,430***	**-1,943**
-7	0,180	0,581	0,199	1,064
-6	-0,044	-0,143	0,075	0,285
-5	0,025	0,081	-0,021	-0,092
-4	-0,191	-0,617	-0,325	-1,349
-3	-0,085	-0,274	-0,129	-0,520

-2	0,504	1,627	0,323	1,029
-1	-0,015	-0,049	-0,054	-0,149
0	-0,504	-1,625	**-0,585***	**-1,689**
1	**-0,761****	**-2,455**	-0,756	-1,386
2	-0,053	-0,17	-0,051	-0,214
3	0,158	0,510	0,019	0,081
4	0,173	0,558	-0,020	-0,071
5	-0,130	-0,420	-0,020	-0,067
6	-0,115	-0,370	-0,231	-0,763
7	0,097	0,314	0,0063	0,226
8	-0,443	-1,430	**-0,657****	**-2,086**
9	0,013	0,041	0,250	-0,833
10	0,244	0,788	0,106	0,324

More importantly, 10 days prior to the announcement date the value of AAR was statistically significant with both market model and market adjusted model, at level 1% and 5% respectively. On day -8, AARs report statistical significant figure of -0.43% at a significance level 10%, in the market adjusted model. We may therefore assume that shareholders had internal information and expected the event, but their reaction was rather negative. For the days following the announcement date, the results presented a statistically significant reaction in two days, +1 in the market model analysis and +8 in the market adjusted model analysis.

Cumulative average abnormal returns represented a rather clear insight in the shareholders' internal information and wealth effect. From Table 4, it is obvious that both pre- and post- event periods showed statistically significant results using both models. Overall, CAAR (-10, +10) was statistically significant with market adjusted model, at level 5%, with value of -3,79%. Prior to the event date, CAAR (-1, 0), CAAR (-1 +1) showed statistical significance at level 1%, with both models, which definitely indicates the internal information of the upcoming news in the previous date of the announcement date.

Table 4. CAARs of bidders in horizontal M&As

INTERVAL	MARKET MODEL		MARKET ADJUSTED MODEL	
	CAAR %	T-TEST	CAAR %	T-TEST
CAAR (-10 +10)	-2,181	-1,536	**-3,785****	**-2,629**
CAAR (-10 -1)	-0,860	-0,878	-1,403	-1,412
CAAR (+1 +10)	**-2,181****	**-2,226**	**-3,785*****	**-3,809**
CAAR (-5 +5)	**-1,977***	**-1,924**	**-2,816*****	**-2,702**
CAAR (-5 -1)	-0,860	-1,242	**-1,403***	**-1,997**
CAAR (+1 +5)	**-1,977*****	**-2,854**	**-2,816*****	**-4,007**
CAAR (-1 +1)	**-2,124*****	**-3,959**	**-2,744*****	**-5,042**
CAAR (-1 0)	**-1,364*****	**-3,113**	**-1,988*****	**-4,474**

Furthermore, for the post event days of the announcement, we also notice statistically significance in the event period (+1,+10) and (+1,+5), at level 5% and 1% respectively, using the market model, compared to very similar results with market adjusted model which showed statistical significance at level 1% for the same periods. All cumulative abnormal returns in Table 4, reflected the negative reaction of the market and therefore imply the negative wealth effect in the shareholders' value. Horizontal M&As did not respond with positive signs in bidders' share price.

5.1.2 Bidders in vertical M&As

Following the vertical M&As, we observe different results as per Table 5. First of all, we need to note that the results of two methods, Market Model and Market Adjusted Model were very similar. As we observe, AAR had both positive and negative values around day 0 using both methods, but none of them were statistically significant. However, it is important to mention that on the announcement date, AARs were positive by around 0,43%, one of the highest increases of the 20-day period.

Table 5. AARs of Bidders in vertical M&As

DATE ANNOUNCED	MARKET MODEL	MARKET ADJUSTED MODEL

N=54	AAR %	T-TEST	AAR %	T-TEST
-10	-0,470	-1,540	-0,403	-1,016
-9	**0,556***	**1,824**	**0,552***	**2,009**
-8	0,303	0,995	0,325	1,192
-7	-0,010	-0,034	0,004	0,012
-6	0,239	0,785	0,146	0,532
-5	0,268	0,879	0,118	0,381
-4	0,131	0,429	0,020	0,068
-3	0,224	0,734	0,305	0,656
-2	0,431	1,414	0,271	0,801
-1	-0,408	-1,339	-0,523	-1,419
0	0,426	1,397	0,418	1,575
1	-0,296	-0,969	-0,415	-1,006
2	0,221	0,726	0,175	0,680
3	-0,191	-0,626	-0,305	-0,896
4	-0,036	-0,117	0,022	0,090
5	-0,297	-0,974	-0,419	-1,510
6	-0,326	-1,070	-0,546	-1,300
7	0,059	0,195	0,046	0,130
8	-0,023	-0,075	0,010	0,038
9	0,172	0,564	-0,028	-0,106
10	0,496	1,627	0,363	1,458

We may therefore interpret that investors' first reaction was positive in the M&A news, even though the following days we notice a rather uncertain and volatile situation, in contrast to the return values a few days before the announcement date. Furthermore, on day -9, using both methods, we observe an increase in the AAR of 0,56%, which was statistically significant at level 10%. This unexpected rise of the price can be considered as a result of information leakage through informal channels or even price manipulation.

As far as the CAARs are concerned, we notice in Table 6 that in the event period (-5,-1) there was a positive statistically significant value of the AAR, (1,26%), at level 10% in the

market model method. In the market model analysis we also observe statistically significant results in the event periods (-1,+1) and (-1,0), values of 1,4% (at level 5%) and 1,7% (at level 1%) respectively. Especially for CAAR in the event period (-1,0), the results were similar for both methods, which show statistical significance at level 1%. We may therefore conclude that in vertical M&As during the period 2008-2018, bidders enjoyed positive CAAR around the event period (+10,-10) and that there was probably an information leakage in the market prior to the announcement date, as returns changed more than expected.

Table 6. CAARs of bidders in vertical M&As

INTERVAL	MARKET MODEL		MARKET ADJUSTED MODEL	
	CAAR %	T-TEST	CAAR %	T-TEST
CAAR (-10 +10)	1,471	1,053	0,135	0,097
CAAR (-10 -1)	**1,264***	1,311	0,815	0,845
CAAR (+1 +10)	1,471	1,526	-0,227	-0,225
CAAR (-5 +5)	1,093	1,081	0,291	0,287
CAAR (-5 -1)	**1,264***	**1,854**	0,815	1,195
CAAR (+1 +5)	1,093	1,603	0,291	0,426
CAAR (-1 +1)	**1,395****	**2,641**	0,818	1,550
CAAR (-1 0)	**1,690*****	**3,920**	**1,233*****	**2,860**

Post AARs were not statistically significant, which may imply that the announcement of a vertical M&A in automotive industry probably did not increase the wealth of shareholder's value significantly, and the reaction did not constitute much consideration.

Comparing the results between horizontal and vertical M&A type for acquiring firms, we may conclude that there were some notable differences. We found statistically significance in the AAR of bidders of horizontal M&As both around the announcement date and days before the announcement, all of which with negative figures. While in the case of vertical deals there was only little significance 9 days before the event was announced. This may indicate that horizontal mergers were of most serious concern

from the shareholder's point of view. CAAR's also showed similar results as per the AARs. We may see from the Table 5 and 7, that all event windows in the horizontal cases were negative statistically significant, most of them in a high level of 1%. However, CAAR's from vertical deals seemed to show positive significance at such high level only in the event window (-1,0), using both models.

5.2 Average abnormal returns of targets

In this section, the results of our event study are provided for the targets engaged in either horizontal or vertical M&As in automotive industry for the period 2008-2018.

5.2.1 Targets in horizontal M&As

In Table 7 we examined the average abnormal returns of targets in horizontal mergers. We observed that on the announcement day the market reacted positively to the news and the AAR on day 0 were statistically significant. Prior to the announcement the AAR were usually positive except for day -10 and day -1 in the market model when they were negative and statistically significant at 1% level. As a result, the shareholders and the investors may be confused and worried about the rumors concerned the mergers and their expectations were blur.

Table 7. AARs of Targets in horizontal M&As

DATE ANNOUNCED	MARKET MODEL		MARKET ADJUSTED MODEL	
N=56	**AAR%**	**T-TEST**	**AAR%**	**T-TEST**
-10	**-0,961****	**-2,316**	**-0,979***	**-1,903**
-9	-0,087	-0,210	-0,022	-0,051
-8	-0,147	-0,354	-0,115	-0,246
-7	0,250	0,603	**0,575***	**1,933**
-6	0,426	1,027	0,507	1,215
-5	0,524	1,263	0,498	1,379
-4	0,297	0,716	0,133	0,461
-3	0,452	1,090	**0,691***	**1,976**
-2	**0,811***	**1,954**	0,810*	1,711

-1	-3,171***	-7,646	-3,107	-1,441
0	**1,058****	**2,551**	**1,234****	**2,176**
1	0,460	1,109	0,349	0,445
2	**-1,285*****	**-3,097**	**-1,333****	**-2,345**
3	0,692	1,669	0,571	0,698
4	-0,598	-1,443	**-0,673****	**-2,008**
5	-0,241	-0,582	-0,225	-0,699
6	-0,248	-0,599	-0,413	-0,595
7	-0,303	-0,731	-0,264	-0,912
8	-0,544	-1,312	-0,300	-0,982
9	-0,641	-1,545	-0,576	-1,476
10	0,592	1,427	**0,587****	**2,113**

What is more, after the announcement AAR on day 2 and 4 were negative and statistically significant in market adjusted model, while 10 days after the announcement the AARs were positive. In general, our research concluded that post-announcement period presented negative but not statistically significant AAR the most days.

CAAR of targets of horizontal M&As are showed in Table 8. They were negative in most windows examined both in market model and market adjusted model. The CAAR of the total window period (-10,+10) was negative in both models but not statistically significant.

Table 8. CAARs of Targets in horizontal M&As

INTERVAL	MARKET MODEL		MARKET ADJUSTED MODEL	
	CAAR %	**T-TEST**	**CAAR %**	**T-TEST**
CAAR (-10 +10)	**-2,665****	**-1,402**	-2,052	-1,080
CAAR (-10 -1)	-1,606	-1,225	-1,009	-0,770
CAAR (+1 +10)	**-2,665****	**-2,032**	-2,052	-1,565
CAAR (-5 +5)	-1,520	-1,105	-1,086	-0,790
CAAR (-5 -1)	**-1,606***	**-1,732**	-1,009	-1,088
CAAR (+1 +5)	-1,520	-1,639	-1,086	-1,171

CAAR (-1 +1)	-0,088	-0,123	0,574	0,799
CAAR (-1 0)	-0,548	-0,935	0,225	0,384

CAARs of the targets were statistical significant for the windows (+1,+10) and (-5,-1) and they were negative reflecting the market uncertainty for the upcoming merger.

5.2.2 Targets in vertical M&As

As it is depicted on the Table 9, based on the market model there was a strong statistical significance of positive abnormal returns from the day of the announcement until day 4. Especially on the day of the announcement, the next day of the deal announcement and the fourth day not only was the returns high but they were also significant at 1% level. For example, on day 1 the AARs reached a peak accounted for approximately 2,419% which means that the investors and generally market's expectations were strong and positive.

Table 9. AARs of Targets in vertical M&As

DATE ANNOUNCED	**MARKET MODEL RETURNS**		**MARKET ADJUSTED MODEL**	
N=36	**AAR%**	**T-TEST**	**AAR%**	**T-TEST**
-10	0,080	0,179	-0,055	-0,124
-9	-0,351	-0,782	-0,310	-0,699
-8	0,689	1,535	0,620	1,001
-7	**1,626*** **	**3,622**	**1,709** **	**2,399**
-6	0,384	0,855	0,438	0,801
-5	-0,149	-0,332	-0,271	-0,541
-4	-0,274	-0,610	-0,180	-0,399
-3	0,375	0,836	0,531	1,120
-2	0,037	0,082	0,175	0,358
-1	-0,346	-0,770	-0,277	-0,581
0	**1,942*** **	**4,326**	1,676	1,112
1	**2,419*** **	**5,388**	2,310	1,603
2	**0,908***	**2,023**	0,743	0,792

3	**0,874***	**1,946**	0,961	1,527
4	**1,390*****	**3,097**	1,104	1,031
5	0,366	0,816	0,276	0,379
6	0,634	1,412	0,477	0,972
7	-0,500	-1,113	-0,552	-1,193
8	-0,439	-0,977	-0,573	-1,418
9	-0,078	-0,173	-0,015	-0,026
10	-0,155	-0,345	-0,301	-0,788

Before day 0 the only day on which statistically significant returns appeared was day -7 which was the only day that was statistically significant in both models. Generally speaking, AAR in the market model from the day of the announcement until the fourth day presented substantial positive abnormal returns, then on day 5 and day 6 the average returns were neutral (around zero) showing that the market started to adopt to the new situation, while after the seventh day the sign became negative and the returns fell, maybe indicating shareholders' uncertainty. However, AARs in the Market Adjusted Model were not statistically significant around the announcement day but they were close to the critical value indicating that there may have been a weak statistical signal.

CAARs of targets participating on vertical M&As indicated strong statistically significant evidence (usually significant at 1% level). In Table 10, CAARs in different windows were positive and very high.

Table 10. CAARs of Targets in vertical M&As

INTERVAL	**MARKET MODEL**		**MARKET ADJUSTED MODEL**	
	CAAR %	**T-TEST**	**CAAR %**	**T-TEST**
CAAR (-10 +10)	**9,434*****	**4,586**	**8,485*****	**4,125**
CAAR (-10 -1)	2,072	1,459	2,379	1,676
CAAR (+1 +10)	**9,434*****	**6,645**	**8,485*****	**5,977**
CAAR (-5 +5)	**9,971*****	**6,697**	**9,450*****	**6,347**
CAAR (-5 -1)	**2,072****	**2,064**	**2,379****	**2,370**

CAAR (+1 +5)	**9,971*** **	**9,933**	**9,450*** **	**9,414**
CAAR (-1 +1)	**6,433*** **	**8,273**	**6,366*** **	**8,187**
CAAR (-1 0)	**4,014*** **	**6,322**	**4,055*** **	**6,387**

There was significance in almost all event windows and in most cases the significance level was at 1%. The only exception was CAAR (-10,-1) which was not significant in both models.

Comparing the results of targets in both M&A types, there were both similarities and differences. On the announcement date (day 0) there were statistically significant AARs, positive in both cases. This may indicate the shareholders' approval in the M&A transaction. On the other hand, on days 1 and 2 results were different. In vertical M&As, AARs on day 1 showed positive reaction of 2.42% in market model, significant at a level of 1%. In the horizontal case on day 2 the AARs were negative, 1.33% at a significant level of 1%. In addition, CAARs showed totally different results for both types. In vertical transactions, CAARs in almost all event windows were positive and statistically significant at a level of 1%. On the other hand, in the horizontal cases the results showed negative abnormal returns and statistical significance in the event windows (+10,+1) and (-5,-1). It seems that targets showed much volatility and positive reaction when it comes to vertical transactions rather than to horizontal ones.

5.3 Post-M&A profitability of acquiring firms

Having collected the ratios (ROE and Net Profit Margin) two years before and two years after the transaction was actually completed, we calculated the averages of the two years before and two years after the M&A.

Using quantitative methods and paired-test analysis, we analyzed the below variables:

- roe_a stands for the average ROE after the transaction,
- roe_b stands for average ROE before the transaction,
- margin_a stands for the average Net Profit Margin Ratio after the transaction,
- margin_b stands for the average Net Profit Margin Ratio before the transaction.

The Tables 11 and 12 summarize the descriptive statistics of the pre-M&A and post-M&A during the period examined for the acquiring companies. Descriptive statistics show the profitability performance of the firms based on accounting analysis, facilitating the comparison of profits evaluation before and after the integration. As we observe in Table 11, the post-M&A ROE (0.1420) was slightly lower than pre-M&A ROE (0.1704) and standard deviation reduced after the transaction, showing a lower post-M&A uncertainty (0.910). Finally, the minimum values our variables taken were very close while max values of variables presented a big difference.

Table 11. Summary of roe_a and roe_b. (Source: STATA)

```
. summ roe_a roe_b
```

Variable	Obs	Mean	Std. Dev.	Min	Max
roe_a	34	.1420735	.0910929	-.0715	.3675
roe_b	34	.1704412	.146897	-.0605	.7215

Regarding the Net Profit Margin Ratio that illustrates the companies' ability to generate profits, average net profit margin ratio seemed to be similar before and after the M&A (around 0.05), Table 12.

Table 12. Summary of margin_a and margin_b (Source: STATA)

```
. summ margin_a margin_b
```

Variable	Obs	Mean	Std. Dev.	Min	Max
margin_a	34	.0524265	.0281347	-.015	.1125
margin_b	34	.0508971	.0316057	-.018	.131

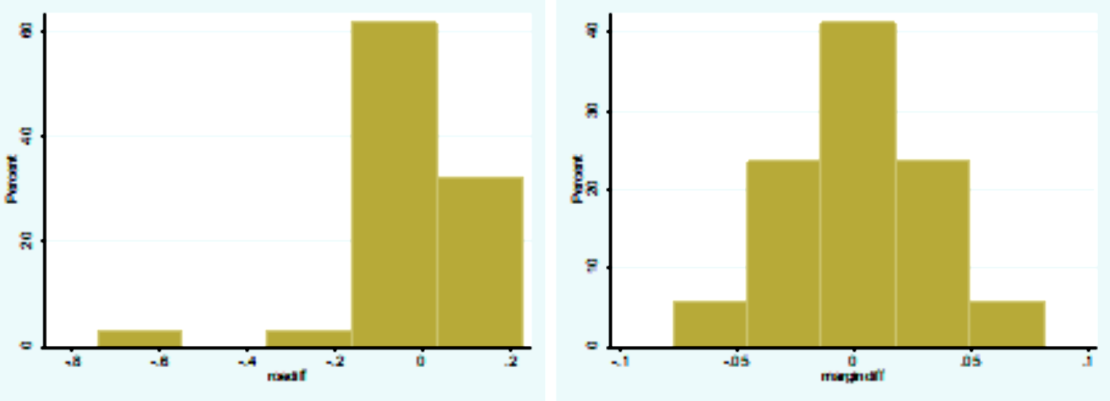
Standard deviation of the Net Profit Margin Ratio was low and similar both in the pre-M&A and the post-M&A period and the minimum and maximum values were also identical, indicating that there was not a significant difference on this ratio two years before and after the deal. According to previous studies that presented in the methodology section, performance ratios did not always follow an upward, stable or downward trend after the M&A. In our case the ROE showed a slight negative performance after the M&A while Net Profit Margin Ratio remained stable.

Consequently, we generated two variables on Stata:

- roediff represents the difference between the average ROE of two years before with two years preceding the integration and
- margindiff represents the difference between the average net profit margin ratio two years before with two years after the merger.

The Figure 10 depicts the distribution of the differences in ROE and Net Profit Margin Ratio between the period after and the period before the M&A. As it is shown in the left histogram, the vast majority (around 85%) of the ROE differences was concentrated between -0.2 and 0.2, indicating that there was a slight difference in the ratios while a small amount of observations presented a difference of around -0.6 to -0.8 or -0.2 to -0.4. On the other hand, the right histogram of the Net Profit Margin differences presented a normal distribution shape and 40% of the observations appeared to have a zero value.

Figure 10. Histograms of roediff and margindiff (Source: STATA)



We conducted paired sample t-Test using STATA in order to explore whether there was a significant difference on the mean of average of the profitability ratios – namely Net Profit Margin and ROE – at 5% significant level before and after the M&A.

Concerning the ROE, based on the Table 13, the mean difference before and after the transaction was around -0.0283 and the confidence interval of the true value laid between -0.0836 and 0.02690 in 95% confidence interval.

Table 13. T-test for ROE variable (Source: STATA)

```
. ttest  roe_a== roe_b

Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
roe_a	34	.1420735	.0156223	.0910929	.1102897	.1738573
roe_b	34	.1704412	.0251926	.146897	.1191864	.221696
diff	34	-.0283676	.0271669	.1584088	-.0836391	.0269038

```
     mean(diff) = mean(roe_a - roe_b)                              t =  -1.0442
 Ho: mean(diff) = 0                               degrees of freedom =       33

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.1520         Pr(|T| > |t|) = 0.3040          Pr(T > t) = 0.8480
```

As the Table 13 above shows, we fail to reject the null hypothesis that the difference between the pre- and post- M&A ROE was zero, because the p-value exceeds 0.05. This means that for the period 2008-2018, there was no significant difference in the ROE performance of the automotive acquirors after the completion of the deal.

Based on the Table 14, the mean Net Profit Margin Ratio difference was detrimental, accounting for 0.0015 with a low standard deviation (0.0344).

Table 14. T-test for Profit Margin variable (Source: STATA)

```
. ttest  margin_a== margin_b

Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
margin_a	34	.0524265	.0048251	.0281347	.0426098	.0622431
margin_b	34	.0508971	.0054203	.0316057	.0398693	.0619248
diff	34	.0015294	.0059143	.0344858	-.0105033	.0135621

```
     mean(diff) = mean(margin_a - margin_b)                        t =   0.2586
 Ho: mean(diff) = 0                               degrees of freedom =       33

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.6012         Pr(|T| > |t|) = 0.7976          Pr(T > t) = 0.3988
```

Similar to ROE case, paired sample t-Test for Profit Margin Ratio showed the same results. Therefore, we fail to reject the null hypothesis that there was a statistically significant difference on Net Profit Margin Ratio before and after the M&A, because p-value was estimated 0.7976, which is greater than 0.05. The Profit Margin Ratio difference ranked between -0.010 and 0.01356 at 95% confidence level. These results are consistent to the Sujud & Boutheina's study (2018), who also found that there is not a significant positive effect on ROE two years before and two years after the M&A.

6 Conclusion

Mergers and Acquisitions consist a popular corporate strategy examined by academics the last decades, as an increasing number of automotive companies decide either to acquire or to be acquired for economic and managerial reasons. The fact that several researches present contradictory findings (Warter & Warter, 2016), it makes obligatory throughout analysis of the results to be applied and intrigues the interest of different parties such as investors, shareholders and governance. In our research we focused on the automotive sector and we elaborated on the possible different reactions of the investors on the first public announcement of the M&A, based on the type of M&A, horizontal and vertical.

Having examined AAR and CAAR for both bidders and targets, for both horizontal and vertical M&A types, we can now have an overall conclusion. Comparing the horizontal and vertical types, we see that CAARs for both acquiring and target firms in vertical M&As were positive in all event windows, while in the case of horizontal transactions CAARs performed mostly negative figures. As theory suggests, targets usually take the most benefits of the transaction as their returns usually increase substantially in comparison with the acquirors' returns which often remain stable (Capron & Pistre, 2002). Regarding the target's performance in vertical integration, our research confirms this statement, as high CAARs were estimated in almost all windows. Not only were CAARs high, but they were also found both positive and statistically significant, thus indicating how much targets ameliorated their position with the M&A announcement. Similar results were found by Gross's and Lindstandt's study who indicated that among industries which are well-known for their M&A activity, in the automotive sector, the targets present the highest CAAR (27.5%). However, we need to point the unexpected results of targets' CAARs in the horizontal M&As which were reported negative (-2,6%) but statistically significant (at 5%) only in the event windows (+1,+10) and (-10,+10).

On the other hand, bidders of horizontal M&As performed CAAR (-10,+10) of -3,7% (market adjusted model) showed negative and statistically significant CAARs pre- and post- event announcement, while in vertical cases, CAARs appeared to be positive with little statistical significance, except from event window (-1,0), where it was reported

CAAR of 1,7% (1% significant level). Thus, bidder's abnormal returns in our study were not found null in accordance with Capron & Pistre (2002) but they calculated lower than the corresponding target's CAAR's. Therefore, our findings support Martynova & Renneboog's research (2008) that some bidders may perform "small losses".

Furthermore, comparing the two main M&A types, horizontal or vertical, our findings come in contrast with the study of (Kedia, Ravid, & Pons, 2008), who found that horizontal mergers resulted to significantly higher returns and vertical M&As reported negative abnormal returns after 1996. In our research, vertical M&As were reported positive and higher abnormal returns than companies engaged in horizontal M&As. Therefore, it seems that vertical M&As from 2008 until recently have been revised in the investor and corporate management audience. Shareholders endorse and welcome vertical integration as means for profitability and efficiency; also have expectations of value creation and positive market performance.

All in all, our findings support what previous studies and researches argued as for the capture of the gains by the target firms rather than by the bidder ones (Capron & Pistre, 2002), Corporate Finance (Brealey, Myers, & Allen, 2011), (Fresard, Hoberg, & Phillips, 2013). In our analysis, even in the case of horizontal mergers when both acquirors and bidders performed negative CAARs, target's negative CAAR were mainly lower, indicating smaller return loss. Finally, we are likely to verify our initial expectations, which concerned the relation of market reaction to the M&A type. We may conclude that until today the type of the transaction plays important role in the outcome and the consequences of a potential M&A.

According to the accounting-based analysis we followed, we concluded that there was not a significant improvement on profitability ratios (ROE and Profit Margin Ratio) of the acquiring firms during 2008-2018. Similarly to our results, Mishra and Chandra found out that no long-run profitability ratios increases after an M&A (Mishra & Chandra, 2010). No evidence of performance ratio amelioration has also been supported from some researches such as Sujud & Boutheina (2018) and Akinbli and Kelilume (2013).

Collectively, these findings suggest that further research on the phenomenon of merger and acquisition within the automotive industry is required. The limitations in our study

concern major factors which were not taken into account, such as the method of payment in relation to the abnormal returns. Alternatively, another challenge for future research could be the examination of the effects on aggregate abnormal returns for the companies (target and bidder) before merger and the abnormal returns of the group company afterwards in automotive sector.

Moreover, our analysis did not include the groups emerged after the completion of the merger, but we only investigated the performance of the acquiring firms. What is more, in the accounting-based analysis, we only examined the post-M&A performance of the acquiring firms, without considering target companies whatsoever. In order to examine the post-M&A performance of the target companies, we should determine which of them ceased to exist and merged with the bidder company and which of them remained active and continued trading their shares in the stock exchange. Finally, further investigation may be carried out in other financial ratios, such as leverage or operation both in horizontal and vertical transactions, in order to gain full insight of the effectiveness and profitability of M&As in the automotive companies.

To sum up, the overall success of most M&As remains subject to further research and discussions. Some failures, like the divestment of Rover by BMW and Chrysler by Daimler, further amplify the need to assess the motivations and the determinants that influence and may explain the complex process in all stages of M&As. Corporate management obtains useful information for future decisions. Moreover, the results of this study would be of essential value to potential shareholders and investors of automotive firms. The fact that an M&A creates or destroy value for automotive corporations may undoubtedly affect the decisions and the movements of potential investors.

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Appendix

Table A 1. SIC codes categories included /excluded in the population of vertical M&As

Range of SIC codes	Division	Include / exclude
0100-0999	Agriculture, forestry and fishing	Exclude all
1000-1499	Mining	Include
1500-1799	Construction	Exclude all
1800-1999	Not used	Exclude all
2000-3999	Manufacturing	Include
4000-4999	Transportation, communications, electric, gas and sanitary service	Include
5000-5199	Wholesale trade	Include
5200-5999	Retail trade	Include
6000-6799	Finance, insurance and real estate	Exclude all
7000-8999	Services	Include
9100-9729	Public administration	Exclude all
9900-9999	Nonclassifiable	Exclude all

Table A 2. SIC codes of forward targets in vertical M&As

Sic code	Operation	Vertical type
3715	Truck trailers	forward
3716	Motor homes	forward
3792	Traver trailers	forward
3799	Transportation ecquipement	forward
4111	Local and suburban transit	forward
4119	Local passenger transportation	forward
4121	Taxicabs	forward
4141	Local bus charter services	forward
4212	Local trucking	forward
4213	Trucking, except local	forward
4215	Courier services except air	forward
4724	Travel agencies	forward
4725	Tour operators	forward

4729	Arrangement of passenger transportation	forward
4731	Arrangement of tranportation of freigth and cargo	forward
4789	Transportation services	forward
4971	Irrigation systems	forward
5012	Automobiles and other motor vehicles	forward
5083	Farm and garden machinery	forward
5088	Transportation equipment & supplies	forward
5511	New and used car dealers	forward
5521	Used car dealers	forward
5531	Auto and home supply stores	forward
5561	Trailer dealers	forward
5571	Motocycle dealers	forward
5599	Automotive dealers, nec	forward
7359	Equipment rental & leasing, nec	forward
7514	Passenger car rental	forward
7515	Passenger car leasing	forward
7532	Top & body repair & paint shops	forward
7534	Tire repair stores	forward
7538	General automotive repair shops	forward
7539	Automotive repair shops, nec	forward
7542	Carwashes	forward

Table A 3 SIC codes of backward targets in vertical M&As

Sic code	Operation	Vertical type
1041	Gold ores	Backward
1061	Ferroalloy ores, except vanadium	Backward
1222	Bituninous coal and lignite surface mining	Backward
1311	Crude petroleum and natural gas	Backward
1382	Oil and gas field exploration	Backward
1446	Industrial sand	Backward
1479	Chemical and fertilizer mineral mining	Backward
2813	Industrial gases	Backward

2819	Industrial inorganic chemicals	Backward
2821	Plastics materials and synthetic resigns	Backward
2823	Cellulosic manmade fibers	Backward
2851	Paints, varnishes, lacquers and allied products	Backward
2861	Gum and wood chemicals	Backward
2869	Industrial organic chemicals	Backward
2891	Adhesives and sealants	Backward
2899	Chemicals	Backward
2911	Petroleum refining	Backward
3011	Tires and tubes	Backward
3052	Rubber and plastic hose and belting	Backward
3069	Fabricated rubber prod	Backward
3081	Unsupported plastics film and sheet	Backward
3089	Plastic products	Backward
3211	Flat glass	Backward
3229	Plessed and blown glass	Backward
3231	Glass products	Backward
3292	Asbestos products	Backward
3312	Steel works, blast furnaces	Backward
3321	Gray and ductile iron foundries	Backward
3322	Malleable iron foundries	Backward
3325	Steel foundries	Backward
3341	Secondary nonferrous metals	Backward
3356	Other metals	Backward
3357	Drawing and insulating noferrous wire	Backward
3363	Aluminum die casting	Backward
3365	Aluminum foundries	Backward
3399	Primary metal products	Backward
3429	Metal	Backward
3441	Metal	Backward
3442	Metal	Backward
3443	Metal	Backward
3444	Metal	Backward
3449	Metal	Backward

3452	Bolts, nuts, screws	Backward
3462	Iron and steel forgings	Backward
3465	Automobtive stampings	Backward
3469	Metal stampings	Backward
3479	Coating, engraving and allied services	Backward
3484	Small arms	Backward
3492	Fluid power valves	Backward
3494	Pipes	Backward
3498	Pipes	Backward
3499	Metal products	Backward
3511	Turbines	Backward
3519	Internal combustion engines, nec	Backward
3523	Farm machinery and equipment	Backward
3531	Construction machinery	Backward
3532	Mining machinery	Backward
3533	Oil and gas machinery	Backward
3537	Industrial trucks and tractors	Backward
3541	Tools	Backward
3548	Tools	Backward
3549	Tools	Backward
3559	Special industry machinery, nec	Backward
3561	Machinery	Backward
3566	Machinery	Backward
3567	Machinery	Backward
3568	Machinery	Backward
3569	Machinery	Backward
3571	Electronic computers	Backward
3572	Computer storage devices	Backward
3585	Heating equipement	Backward
3589	Machines	Backward
3592	Pistons	Backward
3593	Tools	Backward
3599	Machines	Backward
3612	Power distributors	Backward

3621	Motors and generators	Backward
3624	Carbon and graphite products	Backward
3629	Electrical industrial apparatus	Backward
3648	Lighting equipement	Backward
3661	Telephone apparetus	Backward
3663	Telephone apparetus	Backward
3669	Communication ecquipement	Backward
3674	Semiconductors and related devices	Backward
3677	Electronic coils transformers	Backward
3678	Electronic connectors	Backward
3679	Electronic components, nec	Backward
3691	Storage batteries	Backward
3692	Batteries	Backward
3694	Electric ecquipement for combustion engines	Backward
3699	Electric ecquipement	Backward
3714	Motor vehicle parts & accessories	Backward
3751	Motorcycles, bicycles, and parts	Backward
3812	Navigation ecquipement	Backward
3822	Environmental controls	Backward
3829	Measuring devices	Backward
3999	Manufacturing industries	Backward
4812	Radiotelephone communications	Backward
4911	Electric services	Backward
4922	Natural gas	Backward
4953	Refuse systems	Backward
5013	Motor vehicle supplies and new parts	Backward
5014	Tires and tubes	Backward
5015	Motor vehicle parts, used	Backward
5051	Metals services centers and offices	Backward
5162	Plastic materials	Backward
5171	Petroleum bulk stations	Backward
5172	Petroleum bulk stations	Backward
5541	Gasoline services stations	Backward
5734	Computer software stores	Backward

7319	Advertising	Backward
7336	Commercial art and graphic design	Backward
7371	Computer programming services	Backward
7372	Prepackaged software	Backward
7373	Computer integrated systems design	Backward
7374	Data processing and preparation	Backward
7375	Information retrieval services	Backward
7376	Computer facilities management	Backward
7389	Business services, nec	Backward
7549	Automotive services, nec	Backward
7623	Refrigeration and air conditioning services	Backward
8711	Engineering services	Backward
8731	Commercial physical research	Backward
8734	Testing laboratories	Backward
8744	Facilities support management services	Backward
8748	Business consulting, nec	Backward

Table A 4. Number of horizontal and vertical M&As during 2008-2018

	HORIZONTAL DEALS		VERTICAL DEALS	
PERIOD	**NUMBER OF DEALS**	**%of total (2008-2018)**	**NUMBER OF DEALS**	**% of total (2008-2018)**
2008	74	13,86%	85	11,60%
2009	76	14,23%	70	9,55%
2010	51	9,55%	71	9,69%
2011	66	12,36%	52	7,09%
2012	50	9,36%	42	5,73%
2013	38	7,12%	54	7,37%
2014	38	7,12%	52	7,09%
2015	31	5,81%	73	9,96%
2016	34	6,37%	65	8,87%
2017	37	6,93%	78	10,64%
2018	39	7,30%	91	12,41%
Total	**534**	**100,00%**	**733**	**100,00%**

Table A 5. Acquirors' nation per M&A type

Acquiror nation				
Nation	Horizontal M&As		Vertical M&As	
	Number of deals	% of total	Number of deals	% of total
China	165	30,90%	171	23,33%
Germany	56	10,49%	74	10,10%
United States	55	10,30%	127	17,33%
France	34	6,37%	25	3,41%
Japan	32	5,99%	60	8,19%
Italy	31	5,81%	17	2,32%
India	23	4,31%	43	5,87%
Russian Fed	23	4,31%	29	3,96%
South Korea	14	2,62%	35	4,77%
United Kingdom	13	2,43%	22	3,00%
Netherlands	10	1,87%	5	0,68%
Sweden	8	1,50%	14	1,91%
Brazil	8	1,50%	7	0,95%
Spain	6	1,12%	4	0,55%
Canada	6	1,12%	14	1,91%
Malaysia	6	1,12%	14	1,91%
Finland	4	0,75%	4	0,55%
Switzerland	3	0,56%	4	0,55%
Czech Republic	3	0,56%	6	0,82%
Turkey	3	0,56%	8	1,09%
Ukraine	3	0,56%	4	0,55%
Hong Kong	3	0,56%	9	1,23%
Vietnam	3	0,56%	5	0,68%
Argentina	2	0,37%	-	-
Belgium	2	0,37%	-	-
Portugal	2	0,37%	2	0,27%
Indonesia	2	0,37%	3	0,41%
Tunisia	1	0,19%	-	-
Taiwan	1	0,19%	5	0,68%

Cyprus	1	0,19%	-	-
Mexico	1	0,19%	-	-
Thailand	1	0,19%	3	0,41%
Egypt	1	0,19%	1	0,14%
Uzbekistan	1	0,19%	-	-
Norway	1	0,19%	-	-
Hungary	1	0,19%	-	-
Austria	1	0,19%	3	0,41%
New Zealand	1	0,19%	1	0,14%
Luxembourg	1	0,19%	3	0,41%
Saudi Arabia	1	0,19%	-	-
Australia	1	0,19%	-	-
Poland	-	-	3	0,41%
Greece	-	-	2	0,27%
Iran	-	-	1	0,14%
Kenya	-	-	1	0,14%
Kazakhstan	-	-	1	0,14%
Utd Arab Em	-	-	1	0,14%
Israel	-	-	1	0,14%
Qatar	-	-	1	0,14%
Total	**534**	**100,00%**	**733**	**100,00%**

Table A 6. Targets' nation per M&A type

	Target nation			
Nation	**Horizontal M&As**		**Vertical M&As**	
	Number of deals	**% of total**	**Number of deals**	**% of total**
China	145	27,15%	167	22,78%
United States	65	12,17%	131	17,87%
Germany	35	6,55%	54	7,37%
India	20	3,75%	39	5,32%
Russian Fed	37	6,93%	35	4,77%
Japan	18	3,37%	32	4,37%

South Korea	15	2,81%	31	4,23%
Italy	25	4,68%	26	3,55%
France	30	5,62%	24	3,27%
United Kingdom	23	4,31%	21	2,86%
Malaysia	8	1,50%	15	2,05%
Canada	3	0,56%	14	1,91%
Sweden	16	3,00%	11	1,50%
Turkey	2	0,37%	10	1,36%
Brazil	10	1,87%	9	1,23%
Hong Kong	4	0,75%	9	1,23%
Poland	-	-	9	1,23%
Spain	5	0,94%	7	0,95%
Indonesia	6	1,12%	6	0,82%
Israel	-	-	6	0,82%
Thailand	2	0,37%	6	0,82%
Ukraine	3	0,56%	6	0,82%
Austria	-	-	5	0,68%
Taiwan	1	0,19%	5	0,68%
Belgium	2	0,37%	4	0,55%
Czech Republic	3	0,56%	4	0,55%
Finland	4	0,75%	4	0,55%
South Africa	-	-	4	0,55%
Vietnam	4	0,75%	4	0,55%
Greece	-	-	3	0,41%
Mexico	2	0,37%	3	0,41%
Philippines	1	0,19%	3	0,41%
Argentina	4	0,75%	2	0,27%
Denmark	-	-	2	0,27%
Luxembourg	-	-	2	0,27%
Netherlands	7	1,31%	2	0,27%
Portugal	3	0,56%	2	0,27%
Australia	6	1,12%	1	0,14%
Belarus	-	-	1	0,14%
Croatia	1	0,19%	1	0,14%

Egypt	-	-	1	0,14%
Estonia	-	-	1	0,14%
Hungary	1	0,19%	1	0,14%
Iceland	-	-	1	0,14%
Ireland-Rep	-	-	1	0,14%
Morocco	-	-	1	0,14%
New Zealand	1	0,19%	1	0,14%
Norway	2	0,37%	1	0,14%
Oman	-	-	1	0,14%
Singapore	-	-	1	0,14%
Slovak Rep	-	-	1	0,14%
Slovenia	2	0,37%	1	0,14%
Utd Arab Em	-	-	1	0,14%
Kazakhstan	2	0,37%	-	-
Serbia	2	0,37%	-	-
Uzbekistan	2	0,37%	-	-
Yugoslavia	2	0,37%	-	-
Switzerland	2	0,37%	-	-
Romania	1	0,19%	-	-
Mauritius	1	0,19%	-	-
Saudi Arabia	1	0,19%	-	-
Colombia	1	0,19%	-	-
Kenya	1	0,19%	-	-
Bulgaria	1	0,19%	-	-
Iran	1	0,19%	-	-
Tunisia	1	0,19%	-	-
Total	**534**	**100,00%**	**733**	**100,00%**

Table A 7. Horizontal M&As used for event period analysis

Horizontal M&As		
Date announced	**Acquiror name**	**Target name**
03/03/2008	Porsche Automobil Holding SE	Volkswagen AG
03/03/2008	Volkswagen AG	Scania AB
03/06/2008	Volkswagen AG	MAN SE
04/10/2008	Toyota Motor Corp	Fuji Heavy Industries Ltd
09/16/2008	Porsche Automobil Holding SE	Volkswagen AG
10/27/2008	Porsche Automobil Holding SE	Audi AG
01/05/2009	Porsche Automobil Holding SE	Scania AB
01/19/2009	Porsche Automobil Holding SE	Volkswagen AG
02/13/2009	Volkswagen AG	Scania AB
03/12/2009	PSA Peugeot Citroen SA	Regie Natle Des Usines
03/19/2009	Hyundai Motor Co Ltd	Kia Motors Corp
06/20/2009	Daimler Ag	Porsche Automobil Holding SE
07/14/2009	Ford Motor Co	SC Automobile Craiova SA
11/24/2009	Tata Motors Ltd	Swaraj Mazda Ltd
11/27/2009	Regie Natle Des Usines	Avtovaz
12/01/2009	MAN SE	Scania AB
12/03/2009	PSA Peugeot Citroen SA	Mitsubishi Motors Corp
12/09/2009	Volkswagen AG	Suzuki Motor Corp
03/17/2010	Geely Automobile Holdings Ltd	Manganese Bronze Holdings PLC
04/07/2010	Daimler Ag	Nissan Motor Co Ltd
04/07/2010	Daimler Ag	Regie Natle Des Usines
07/29/2010	Ashok Leyland Ltd	Optare PLC
11/15/2010	Scania AB	MAN SE
11/15/2010	Scania AB	MAN SE
11/19/2010	Nissan Motor Co Ltd	Avtovaz
11/23/2010	Mahindra & Mahindra Ltd	Ssangyong Motor Co Ltd
01/10/2011	Fiat SpA	MAN SE
01/11/2011	Fiat SpA	Scania AB
03/22/2011	GAC	GAC Changfeng Motor Co Ltd
04/14/2011	MAN SE	Isuzu Motors Ltd

05/09/2011	Volkswagen AG	MAN SE
07/13/2011	Toyota Motor Corp	Kanto Auto Works Ltd
07/13/2011	Toyota Motor Corp	Toyota Auto Body Co Ltd
09/18/2011	Volkswagen AG	Suzuki Motor Corp
10/21/2011	Navistar International Corp	Oshkosh Corp
11/14/2011	Swaraj Automotives Ltd	Mahindra & Mahindra Ltd
11/25/2011	Isuzu Motors Ltd	SML ISUZU Ltd
12/20/2011	Ashok Leyland Ltd	Optare PLC
12/21/2011	Ashok Leyland Ltd	Optare PLC
01/09/2012	Drb-Hicom Bhd	Proton Holdings Berhad
01/16/2012	Drb-Hicom Bhd	Proton Holdings Berhad
02/29/2012	General Motors Co	PSA Peugeot Citroen SA
04/12/2012	Volkswagen AG	MAN SE
04/29/2012	General Motors Co	Isuzu Motors Ltd
01/23/2013	Marcopolo SA	New Flyer Industries Inc
02/14/2013	Mahindra & Mahindra Ltd	Ssangyong Motor Co Ltd
09/13/2013	Sollers	UAZ
02/21/2014	Volkswagen AG	Scania AB
04/29/2014	Sollers PAO	UAZ
07/02/2014	Volkswagen AG	PACCAR Inc
07/17/2014	Volkswagen AG	Fiat SpA
03/13/2015	Fiat Chrysler Automobiles NV	General Motors Co
12/11/2015	Nissan Motor Co Ltd	Regie Natle Des Usines
01/29/2016	Toyota Motor Corp	Daihatsu Motor Co Ltd
05/12/2016	Nissan Motor Co Ltd	Mitsubishi Motors Corp
08/04/2017	Toyota Motor Corp	Mazda Motor Corp
09/19/2017	Regie Natle Des Usines	AVTOVAZ PAO
03/07/2018	Nissan Motor Co Ltd	Regie Natle Des Usines
03/29/2018	Nissan Motor Co Ltd	Regie Natle Des Usines

Table A 8. Vertical M&As used for event period analysis

Vertical M&As		
Date announced	**Acquiror name**	**Target name**
03/31/2008	Kinetic Motor Co Ltd	Mahindra & Mahindra Ltd
04/30/2008	Tognum AG	Daimler AG
05/05/2008	Avtodizel PAO	GAZ
05/14/2008	Kinetic Motor Co Ltd	Mahindra & Mahindra Ltd
07/30/2008	Soosung Lift Mfg Co Ltd	THACO
07/30/2008	S&T Motors Co Ltd	S&T Motiv Co Ltd
02/09/2009	Fras-Le SA	Randon SA Implementos
07/10/2009	ZMZ	UAZ
01/14/2010	Aichi Machine Industry Co Ltd	Nissan Motor Co Ltd
03/31/2010	Metalart Corp	Daihatsu Motor Co Ltd
07/13/2010	Tognum AG	Daimler Ag
07/22/2010	Swaraj Engines Ltd	Mahindra & Mahindra Ltd
08/12/2010	Saeron Automotive Corp	Mando Corp
08/13/2010	New Name Tech Co Ltd	AD Motors Co Ltd
09/08/2010	Hinduja Foundries Ltd	Ashok Leyland Ltd
11/26/2010	New Name Tech Co Ltd	AD Motors Co Ltd
12/16/2010	CNH Global NV	Fiat Industrial SpA
01/28/2011	Glovis Co Ltd	Hyundai Motor Co Ltd
02/09/2011	EPC Industrie Ltd	Mahindra & Mahindra Ltd
02/25/2011	SGL Carbon SE	Bayerische Motoren Werke AG
03/23/2011	Apple International Co Ltd	Isuzu Motors Ltd
07/07/2011	HellermannTyton Group PLC	Delphi Automotive Plc
07/19/2011	Sirit Inc	Federal Signal Corp
11/18/2011	BTC Korea Co Ltd	SJM Holdings Co Ltd
12/16/2011	Astra Otoparts Tbk PT	PT Astra International Tbk
02/17/2012	KAMAZ	Daimler AG
02/24/2012	Punjab Tractors Ltd	Mahindra & Mahindra Ltd
04/23/2012	Renk AG	Volkswagen AG
05/30/2012	KAMAZ	Daimler AG
06/09/2012	Deutz AG	Volvo AB
12/18/2012	SJM Co Ltd	SJM Holdings Co Ltd

04/10/2013	SGL Carbon SE	Volkswagen AG
11/08/2013	S&T Corp	S&T Motiv Co Ltd
12/08/2014	EPC Industrie Ltd	Mahindra & Mahindra Ltd
12/19/2014	Shiroki Corp	Aisin Seiki Co Ltd
12/19/2014	Valeo SA	Ashok Leyland Ltd
04/23/2015	Ichitan Co Ltd	Fuji Heavy Industries Ltd
07/30/2015	Huayu Automotive Sys Co Ltd	SAIC Motor Corp Ltd
12/18/2015	Futaba Industrial Co Ltd	Toyota Motor Corp
05/23/2016	GKN PLC	SAIC Motor Corp Ltd
09/14/2016	S&T Corp	S&T Motiv Co Ltd
04/28/2017	ALBERT Inc	Toyota Motor Corp
09/28/2017	Sanoh Industrial Co Ltd	Suzuki Motor Corp
12/07/2017	Avtodizel PAO	GAZ
03/07/2018	Delphi Corp	General Motors Corp
05/15/2018	Tech Mahindra Ltd	Mahindra & Mahindra Ltd
09/06/2018	Hydrogenics Corp	Motors Liquidation Co
10/25/2018	WSI Industries Inc	Polaris Industries Inc