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MASTER'S THESIS

THE ANNOUNCEMENT EFFECT OF CROSS-BORDER M&A ON A STOCK PRICE BEHAVIOR IN THE CHEMICAL INDUSTRY

Ljubljana, March 2014 NICK DRAGOŠ

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INTRODUCTION

Multinational enterprises have several possibilities when expanding to new markets. Expansion strategies range from independent export entry to a completely dependent wholly owned subsidiary. These entry modes differ by risk, capital (human and financial), and involvement in the foreign market. Export is a low risk, capital and involvement strategy that is usually used to gain some knowledge about the market, while a wholly owned subsidiary is a high risk and capital investment strategy that is usually the method used by large companies that have foreign market experience. This thesis is about cross-border mergers and acquisitions (hereinafter: CBM&A) which is considered a wholly owned subsidiary entry strategy. Cross-border mergers are gaining in importance and growing worldwide, from 23% of total mergers in 1998 to 45% in 2007 (Erel, Liao, & Weisbach, 2012, p. 1046).

The chemical industry involves complex processes. Its operations and organizations are engaged in manufacturing chemicals and their derivatives. It may also be described as an industry of chemicals and chemical reactions that produce a product. From 2007 to 2011, the chemical industry was ranked fourth in revenues per year among 21 industries analyzed in 2013 (Friese, Gehrlein, Gocke, Plaschke, Schoenberger, & Willers, 2013). The chemical industry is faced with limited attractive growth prospects, because incumbents face competition from upstairs and developing markets (Morawietz, Thiedig, & Herrman, 2013). Recently the chemical industry experienced a significant share of CBM&A aimed to increase their global footprint, yet cross-border deals are still scarce. Future predictions in the chemical industry predict more acquisitions, where companies from developing countries will target established markets, like the European market (Morawietz et al., 2013).

Mergers and acquisitions (hereinafter: M&A) is one of the ways to achieve greater returns for shareholders (Bruner, 2004, p. 48). With the latest increase in CBM&A, the research in this area failed to keep up with this trend and needs to be researched further, while returns to the shareholders at the announcement of a domestic M&A has been the topic of numerous studies (Mallikarjunappa & Nayak, 2013; Danbolt & Maciver, 2012; Mulherin & Boone, 2000). These studies affirm a positive return in domestic and cross-border M&A to the shareholders of a target company, while there is still a discussion on the effect in domestic and cross-border M&A for the shareholders of an acquiring company. Rani and Yadav (2012) researched the domestic M&A in India and found that the combined abnormal return surrounding the merger announcement is -2.82%, while Asquith, Bruner, and Mullins (1983) researched mergers from 1963-1979 and reached a conclusion that there is a positive abnormal return of 3.48%, surrounding the announcements. Abnormal returns surrounding the announcement for the acquirer companies are not clear and need to be further researched, which is a goal for this thesis. The majority of M&A research is based on the US and UK banking industry, while none were detected for other non-banking or non-financial industries. This thesis examines abnormal returns by the acquiring company's shareholders in the chemical industry for the most valuable CBM&A from 2003 to 2009. This thesis will hopefully shed some light on the acquirer's abnormal returns in CBM&A.

An event study methodology (MacKinlay, 1997, p. 13) is chosen to determine possible abnormal returns for the days surrounding the announcement. The objective of an event study is to investigate whether average abnormal returns are realized by shareholders, where an abnormal return is the difference between the observed return and the realized return of the security at the announcement of CBM&A. Event methodology is based on the market efficiency hypothesis which states that the market reacts immediately on security prices. Event studies have a certain procedure where the first task is to determine the event of interest, followed by selecting the sample of companies, identifying the estimation period and event window, calculating abnormal returns in the event window, and testing the significance of results with parametric and non-parametric tests.

This thesis examines abnormal returns by the acquiring company's shareholders in the chemical industry for the most valuable CBM&A from 2003 to 2009. The full sample consists of 84 CBM&A transactions which are further divided into two subsamples: prior to the crisis (2003-2006) and during the crisis (2007-2009). My first hypothesis states that CBM&A announcements in the chemical industry have a negative or no effect on abnormal returns for the acquirers' company shareholders for the short- and long-term. The first hypothesis is based on research findings. The second hypothesis regarding the two subsamples states that CBM&A announcements in the chemical industry pre-crisis have lower abnormal returns than during the crisis in the short- and long-term. The second hypothesis predicts that abnormal returns in the crisis are expected to be higher than prior to the crisis. Abnormal returns during the crisis are expected to be higher due to the fact that limited companies have financial resources and can afford to make sound acquisitions which will give a positive signal to the market and lead to higher abnormal returns. To reach a conclusion on whether the average abnormal returns and cumulative average abnormal returns are significantly different from zero, this thesis uses parametric and non-parametric tests.

This thesis contributes to the knowledge in the field of announcement effect of CBM&A in short- and long-term, and gives new insights to the acquirers' abnormal returns in the chemical industry.

There are certain limitations to the thesis. First, the majority of literature researched is based on domestic M&A while this thesis concentrates solely on CBM&A. Second, the chosen sample being analyzed is focused on chemical companies. Third, this thesis only examines acquirers' abnormal returns and not the targets involved in the acquisitions. Lastly, this thesis will focus on the short-term (5-day, 11-day, 17-day, and 21-day event windows) and long-term (1 year after the announcement) abnormal returns. The reasons for these limitations are further justified in chapter 4.

This thesis is structured as follows: The introduction presents short descriptions of the thesis topics, research methods as well as limitations of the thesis. Chapter 1 provides a thorough description of possible expansion strategies, procedures for entering new markets, timing of entry, and exit. Chapter 2 shifts to the mergers and acquisitions aspect, M&A in the chemical

industry, past and present and cross-border M&A. Chapter 3 is an overview of current literature on the subject of announcement effect in M&A. Chapter 4 describes the methodology applied in this thesis. Chapter 5 presents data selection with a description of the sample, as well as the differences between two subsamples. Chapter 6 provides the results of the analyses and conclusions.

1 THEORETICAL AND EMPIRICAL BACKGROUND

1.1 International expansion strategies

There are models and theories to determine the reasons that companies want to enter international markets. The establishment chain model is one of the earliest models which states that companies gradually develop their activities abroad. The first stage of expansion starts in their own market, than nearby foreign markets are explored and with a successful venture they begin seeking foreign markets around the world. Reaching foreign markets depends on the psychic distance, market size, and need for control. Psychic distance is a psychological perception that the foreign market is too distant and different with regards to environment and culture. Lack of knowledge about the targets' culture, market and resources are all obstacles when entering foreign markets (Ghauri & Cateora, 2010, p. 267).

Once a company decides to go international, it must decide on the degree of involvement and commitment. Many companies appear to grow internationally through a series of developments. Exporting is usually the first choice for entering new markets, because it requires little risk and low resources. Low risk allows the company to evaluate its product effectiveness in a new market using little resources. Positive results from entering a foreign market can gradually lead to owning a wholly owned subsidiary someday. The process of reaching this stage can be done by either building their own facility in the new market or by an easier and usually more popular version of merging or acquiring the foreign company. In this way the buyer can use the already organized distributional channels to sell its product. Some companies carefully plan their arrival in the market with long- and short-range goals and fully developed strategy. These companies have three main objectives (Ghauri & Cateora, 2010, p. 269):

- market expansion,
- efficiency improvement,
- resource seeking.

Market expansion strategy is when a company is seeking a new market for its products. This might be due to saturation of the domestic market or because the company wishes to penetrate a new market. With efficiency improvement the company looks to enter new markets to achieve efficiency in different ways, e.g., through R&D and other infrastructural effects. Companies seeking to lower operational costs try to enter foreign markets to gain access to low-cost raw materials, etc. Certain companies look for a combination of benefits in order to

reap multiple benefits that will improve their status in the market (Ghauri & Cateora, 2010, p. 275).

1.1.1 The determinants of entry mode

Determinants of entry can be classified into two categories: External (environment specific) and internal (company specific). External mode of entry investigates the risks involved in entering a new market, factors that influence the decision, reasons why entry modes are necessary (Kotabe & Helsen, 2010, p. 293):

- Risk related to economic and political environment. Companies are less prone to make huge investment decisions in a country when the risk is greater.
- Market size and growth. Larger markets have greater potential that demand more resources to succeed, usually joint ventures or wholly owned subsidiaries. The future of the market is measured by growth rate, which can be more volatile in emerging markets.
- Government regulations. Government intervenes when dealing with large companies or large transactions. A foreign company can rarely have a majority share in a foreign country due to foreign protection policies (Vella, 2008).
- Competitive environment. New entrants might face severe competition due to market saturation in the market and it might be difficult to achieve the desired market share. A perfect example of gaining a bigger market share in a competitive environment is Nestlé and General Mills. Nestlé and General Mills, rivals of Kellogg Co., went through a joint venture and gained a substantial piece of the pie in the cereal industry, which was previously dominated by Kellogg.
- Cultural distance. It is argued that cultural gap plays an important role when there is a high percentage of equity ownership in a foreign country. With joint ventures instead of wholly owned subsidiaries multinational corporations are able to close the risk exposure in culturally distant markets (Tihanyi, Grifith, & Russell, 2005, p. 275).

Internal determinants of entry are those that have a direct impact on the company. Internal determinants are company objectives, need for control, flexibility, and internal resources, assets and capabilities.

These are described below (Kotabe & Helsen, 2010, p. 295):

- Company objectives. Entry strategy depends on the company's goals and motives. Certain companies prefer to start their foreign venture with a low resource entry, like exporting. Other companies want fast growth and take riskier entries, like M&A.
- Need for control. Most multinational corporations prefer control at certain positions in the company (positioning, advertising, pricing, distribution, etc.). Companies entering a new market must decide between resources and control. High resources are needed to have high control of the company.

- Internal resources, assets, and capabilities. Companies with low resources (financial or human) have limited control over their products in a foreign market. Most of the control is held in the hands of the foreign contractor.
- Flexibility. Change is inevitable and markets that are attractive today, might not be in 5 or 10 years. Local competitors learn fast and become more competitive and sophisticated. Fast growing markets may get saturated quickly.

1.1.2 Modes of entry

This section covers the following modes of entry: exporting, licensing, contract manufacturing, franchising, joint ventures, strategic alliances and wholly owned subsidiaries.

1.1.2.1 Exporting

Most companies start their international venture by exporting. Companies thinking of engaging in exporting have three options (Lambin, 2007):

- Indirect exporting. Exporters sell products in a foreign market through independent intermediaries. An expert merchant is a company that buys the product at its own risk and resells the product in a foreign market. The expert is usually specialized in certain products and geographical regions in which he is competent. An export agent that works on behalf of the company, seeks and negotiates purchases and receives a commission. No major resource commitments are required when the middleman's revenue is based on his successful deals. The drawback of indirect exporting is that the foreign expert might do a poor job and tarnish the company's reputation.
- Cooperative Exporting. Companies that only have limited resources but still want to have some control over the distribution, might look for cooperative exporting. The most common form of cooperative exporting is piggyback exporting. Companies use an already existing distribution channel of another company for selling its goods in a foreign market. For example, Wrigley the U.S. gum company did the same in India with their partner Parry's. Wrigley used Parry's distributional channel and had instant access to 250,000 retail outlets.
- Direct exporting. A company sets its own distribution center in a foreign country, with the aid of local companies, sells its product through their distribution channel.

Choosing the right exporting method depends on various factors. Financial resources and degree of control are usually essential when complying with the company's strategy. There are many ways to enter a foreign market, this thesis concentrates on CBM&A which is entry through a wholly owned subsidiary. Exporting is usually the first step to test a new market, while CBM&A is an entry strategy for established companies. CBM&A is a high risk and return investment, which needs to be carefully planned and executed in order to be successful.

1.1.2.2 Licensing

In a licensing arrangement, a company transfers the right to use its industrial property (patents, know-how, or trademarks) to a foreign entity (usually another company) for a defined period of time in return for royalties or other compensation. Licensing is another way to enter a market with limited risk. The licensee makes products with patent rights, trademark rights, copyrights and the right to use technological processes, with the approval of the licensor. The licensee will also market these products in its market, pay the royalties related to sales of the product and produce the licensor's products (Lambin, 2007).

A few companies confine their foreign operations solely on licensing, but rather supplementary to manufacturing or exporting. A company's resources for licensing are not very demanding and are seen as an appealing option for entering new markets. Low human and capital resources allow the licensor to get to a market that would otherwise be closed. Foreign tobacco companies in China are a good example, where the high import tax is too high to cover the costs. By choosing to license its product, low costs give the licensee a chance to evade the high import tax. Lowering exposure to the economic or political instabilities is another benefit, since licensors receive royalties based on income stream and have no direct connection to the foreign market (Chetham, 1996).

The major caveat in licensing is potentially lower royalties compared to some other entry modes, such as exporting. Tarnishing the licensor company with nonsufficient quality might harm the licensor. Other risks include not receiving payment, loss of control, and failing to produce adequate quantities in a timely manner. Since licensing occurs in a foreign market and a license has an expiration date, the potential threat could be that the licensee company can use the acquired know-how in its own company to produce competitive products. In this case, the licensor should seek patent or trademark protection abroad (Lambin, 2007). Even with patent protection abroad, the licensee company can still go around the patent, by making certain changes to the product. These changes would not infringe on the patent and the licensee could make the product without breaking the agreement. Protection of legal rights in a country needs to be sufficiently high for the licensing strategy to work.

Comparing licensing to CBM&A, it is obvious that licensing is an approach for small companies entering a foreign market, while M&A is an approach that only bigger companies can afford. It takes low capital and human resources to license, which is balanced by the relatively low revenues one can obtain. In contrast CBM&A, demands high capital and human resources and extensive analysis before entering a market, while high end price of the products and high revenues are not guaranteed. Licensing has a low entry price for extending trade to foreign markets.

1.1.2.3 Contract manufacturing

Contract manufacturing also known as outsourcing, involves a contract with a local company to manufacture or assemble the whole product or parts of it. Contract manufacturing is usually used when it is either impossible or undesirable to supply foreign markets from domestic production. This occurs due to high transportation costs, custom rates or government preferences for local products and companies. Benefits of contract manufacturing are (Ghauri & Cateora, 2010, p. 272):

- increasing market share,
- lower production costs,
- incentives given by public authorities,
- focus on core competencies (marketing, design, etc.),
- flexibility and access to external expertise.

Contract manufacturing also has some drawbacks like nurturing future competitors, by allowing the manufacturer to use acquired skills and other similar drawbacks to licensing. For example, Schwinn the U.S. bicycle company signed a manufacturing contract with Giant manufacturing and after the agreement expired, Giant began manufacturing its own bicycles and in time became the largest bicycle manufacturer in the world, pushing Schwinn to file for bankruptcy a couple of years later (Upham, 2006, p. 47).

CBM&A is an approach for companies who already have access to a foreign market and have done extensive research regarding growth possibilities, cultural differences, costs and foreign market analyses. Compared to contract manufacturing where more time is spent on locating the right company manufacture its product. Low capital, risks and human resources are needed to manufacture, which is balanced by the relatively low revenue. On the other hand, M&A demands high capital and human resources.

1.1.2.4 Franchising

Franchising can be considered a cousin to licensing, except that the franchisee provides the capital, market knowledge and personal involvement in management. Franchising can be defined as a system where the franchisee pays fees and royalties to a parent company in return to be associated with the trademark, to sell the franchisors services or products. Franchise agreements tend to be longer and the franchisor offers more resources, which include: equipment, an operational manual, managerial system, training, site approval and support needed to run the business the same as the franchisor. Advantages of international franchising are (Twarowska & Kakol, 2013):

- low cost,
- low political risk,
- fast expansion into different markets,
- selected partners bring the resources and managerial capabilities to the operation capabilities.

While franchising seems to be an attractive way to enter international markets, there are some downfalls (Twarowska & Kakol, 2013):

- the franchisee may turn into a future competitor,
- starting to franchise a company can lead to hasty decisions when choosing the franchisee,
- choosing the wrong franchisee might ruin the image of the company and other franchisees'.

Franchising compared to M&A is a low resource approach for entering a foreign market. McDonald's, KFC, Burger king, Domino's, Starbucks and many more are famous worldwide brands. The decision to start a franchise made them known worldwide, but to achieve such success depends on many factors. Probably the most important factor is to choose the right franchisee and to set a solid and easy to use process of teaching new franchisees. CBM&A demands high capital, human resources, costs and risks, while revenues are not guaranteed. Franchising is a common strategy for companies that have success in their home market and are looking to expand to different markets, which holds true for CBM&A as well, except that in franchising expanding occurs through others and not on its own, like in CBM&A.

1.1.2.5 Joint ventures

Foreign joint venture is similar to licensing, with the exception that the international company has equity and managerial voice in a foreign company. Partnership between the host and home country is formed, resulting in creation of a third company. Depending on the equity stake, the following three forms are possible (Byrne & Popoff, 2006):

- majority ownership (more than 50% ownership),
- fifty percent ownership (both companies have 50% ownership),
- minority ownership (less than 50% ownership).

Joint ventures provide a less risky way to enter a foreign market which pose legal and cultural barriers. The local partner can often provide the outsider help in understanding their culture (Ghauri & Cateora, 2010, p. 274). For penetrating markets like China (i.e., country with high tariffs) joint ventures exceed in allowing a company to gain a competitive price advantage over importers. By manufacturing locally rather than importing, these companies avoid high Chinese tariffs (150% on cosmetics, 200% on motor vehicles, etc.) and the company reaps the benefits of low-cost labor (Minbaeva, 2008, p. 708).

A lack of control is for many multinational corporations still the biggest shortcoming of joint ventures. The most logical way to gain more control is by increasing equity share, but some countries rule out this option. Another way could be to deploy leadership in the multinational corporation's key line positions, thereby controlling marketing, finance and other critical operations of a venture. Additional support services in personnel training, quality control and

customer service will increase control. As in licensing, the same potential threat could be that the manufacturing company can use the acquired know-how and build their own company producing a competitive product on the market (Kotabe & Helsen, 2010, p. 301).

Academicians studied important drivers behind successful international joint ventures and made the following conclusions:

- Picking the right partner. The multinational corporations should spend more time in finding a proper candidate. Future partners should have complementary skills and resources, yet still have compatible goals. Some evidence suggests that partners should be similar in size and resources, as well as have balanced contributions to assure trust and a harmonious relationship (Hyder & Ghauri, 2000, p. 207).
- Establishing a relationship at the start. To make a smooth transition and avoid any unnecessary problems, it is essential to clarify expectations and needs immediately (Martinsons & Tseng, 1995, p. 51).
- Closing the cultural gap. Agony can be avoided, when foreign investors bridge cultural differences. For instance, when setting a joint venture in a foreign country, a middleman is recommended, someone that is from the foreign country or has the same background, to reduce the cultural difference (Martinsons & Tseng, 1995, p. 51).
- Top managerial commitment and respect. Choosing managers with relevant experience to lead a joint venture, e.g. venture managers. Venture managers should also have complete support and access from the parent company (Lincoln, 2009).
- Incremental approach is best. Starting on a small scale and gradually increasing the scope of the joint venture by adding new responsibilities and activities. A foreign partner starts with a minority stake and increases its equity gradually (Bamford, Ernst, & Fubini, 2004, p. 94).

Joint ventures provide a less risky way to enter a foreign market than CBM&A. Mergers and acquisitions are a riskier option which is usually chosen due to high control of the company and high revenues. Joint venture is a good entry strategy when establishing a company that wants to expend to foreign markets, but is not ready or does not possess the know-how. Working together with a foreign company in a foreign country, local partner can often provide the outsider help in understanding their culture, business rules, while sharing responsibilities. M&A is responsible for all the mistakes, while joint ventures share the responsibility of their mistakes.

1.1.2.6 Strategic alliances

Strategic alliance is a term used to describe a coalition of two or more organizations to achieve strategically significant goals that are mutually beneficial. Alliances can be based on a single licensing agreement between two or more partners. The nature of strategic alliances varies depending on what the partner brings to the alliance (Kotabe & Helsen, 2010, p. 303):

- In high-tech industries strategic alliance is based on technology swaps. Here companies pool their resources and learn from one another.
- Cross border M&A involves marketing-based assets and resources, a way to access distribution channels or trademarks. An example is the alliance of Coca Cola and Nestlé to produce ready-to-drink coffees and teas under the Nescafe and Nestea brand names. They used their resources to combine a well-established brand name with a vast distribution network.
- Search for scale of economies in logistics/operations activities.
- Operations-based alliances are formed to transfer manufacturing know-how. A great example is Toyota and General Motors coming together under the NUMMI strategic alliance to exchange car manufacturing expertise.

Figure 1 shows four generic reasons for strategic alliances based on strategic importance and divided into core and peripheral. The core strategy consists of the defence phase, where a company is searching for a perspective alliance company in order to maintain its lead position. The catch up phase is where the company tries to gain a bigger market share. The peripheral strategy can be divided into the remain phase and restructure phase. Remain phase is where a business division tries to hold the leading position. Restructure phase is when a core position undergoes a restructuring process in order to improve its position. Business market position differentiates between the leaders who defend or remain in the top position and followers who try to catch up or need to restructure their business. Each of the four strategies are clarified in detail below (Lorange, Ross, & Brøn, 1992):

- Defend. Companies that are market leaders and wish to stay on top are looking for another perspective alliance company, which could rejuvenate a business and learn new skills and technologies, as well as, getting access to new markets. A way to reinforce their leadership (Lei & Slocum, 1992, p. 85).
- Catch-up. Creating an alliance to shore a core business in which they are not market leaders. General Mills with Nestle joined to launch an attack on Kellogg's dominance in the cereal industry.
- Remain. For a business division that has a leading position which plays a small role in the company's business portfolio.
- Restructure. A way to restructure a business that is not core and has no lead position in the market.

Figure 1. Generic motives for strategic alliances

		Business market position	
		Leader	**Follower**
Strategic importance	**Core**	Defend	Catch up

in Parent's portfolio	**Peripheral**	Remain	Restructure

Source: P. Lorange, J. Roos, & P.S. Brøn. *Building successful strategic alliances*, 1992, p. 11.

Strategic alliances are usually formed by companies that need each other's help to improve its own product, while CBM&A is working by itself in a foreign market. A CBM&A is a high risk and return strategy that may fail to bring expected returns due to the huge risk of merging or acquiring a company in a foreign country. Strategic alliance entry is not involved in a foreign market alone, but has a local partner. The foreign partner provides the alliance partner information to help improve its product or vice versa. Strategic alliances are less risky and resources are not as high as in M&A.

1.1.2.7 Wholly owned subsidiaries

Entering a market with a 100% ownership without help of other companies. Mergers & acquisitions and greenfield investments are two of the most common ways to have a wholly owned subsidiary in a foreign market. Developing in a foreign market without any support of a third party can be a very demanding task. Market related risk, economic risk (e.g. currency devaluation) and substantial political risk must be factored in. Multinational corporations that enter a foreign market with 100% ownership, can also be seen as a threat to the host country. A good example is InBev, a Belgian/Brazilian brewery that wanted to take over the American company Anheuser-Busch. Several U.S. politicians and Barack Obama were concerned, and Barack Obama held a press conference in order to raise possible concern, about a known American company being owned by a foreign company (Cavico, 2008).

Many multinational corporations choose M&A to expand globally for a number of reasons. M&A allows fast entry to a new market while a cross-border approach allows an easier access to foreign distribution channels of suppliers, marketing and clients. Another benefit is that M&A prevents major players in the industry from becoming too strong. By combining activities such as R&D, procurement, marketing, and other cost components that result in cost reduction. M&A provides a rapid means of allowing access to the local market compared to greenfield investments. For relative latecomers it is a viable option to obtain well-established brand names, instant access to distribution channels or technology. General characteristics (resources, risk, and return) are higher for greenfield investment, since more effort and time is needed than with M&A, but if there is a need for control due to complex operations, greenfield investment might be a better option. Mergers and acquisitions are becoming more popular and the number of deals are increasing yearly.

Companies sometimes choose entering a foreign market through greenfield operations that are built from scratch. With M&A it is hard to find an appropriate candidate to acquire, in order to take apart their company, sometimes it is more costly than building an operation from scratch. Greenfield operations are more flexible in regards to suppliers, human resources, plant layout, manufacturing technology, and logistics which avoid the cost of integrating the acquisition

with the parent company (Li, 1995, p. 39). Making a large investment in a foreign country can motivate the host government to include extra incentives (e.g. tax holidays) to the founders of the large investment. The biggest disadvantage is that greenfield operations require an enormous investment of capital and time (Kotabe & Helsen, 2010, p. 307).

1.1.3 Timing of entry

Timing a market entry is a crucial step in international expansion and many large companies had to retreat due to wrong timing. Ikea, the Swedish furniture company, decided to enter the Japanese market in 1974 and fairly soon decided to withdraw after they realized that the Japanese were not yet ready for the concept of self-assembly and they preferred to pay more (Ikea, 2005). Research on international entry timing is scarce. A study about entry timing decisions of U.S. Fortune 500 companies in China, found that companies tend to enter China earlier when (Gaba, Pan, & Ungson, 2002, p. 44):

- the size of the company is larger,
- the level of international experience is higher,
- there is a broad range of products and services,
- competitors are already present in the market,
- the risk (business and political) conditions are more favourable,
- there are lower commitment entries (e.g., licensing, exporting, non-equity alliances).

The research shows that companies that entered China later than their competitors often had an advantage over earlier entrants. The reason is most likely due to fewer restrictive business regulations than their predecessors.

Another study looked at entry-timing pattern for nineteen multinational corporations. The study developed a concept of near-market knowledge, which is defined as knowledge (economic or cultural) generated in a similar foreign market. The key findings of this study are (Mitra & Golder, 2002, p. 360):

- near market knowledge accumulated from successful foreign entries will lead to an early entry in similar markets,
- cultural similarity with the home market is not related to foreign market entry timing,
- countries with wealthier consumers, more developed infrastructure, larger economy and easier accessible consumers are likely to enter earlier,
- economic factors are superior to cultural factors regarding timing of entry.

1.1.4 Exit strategy

Exits in global business are not uncommon. For example, Wal-Mart retreated twice in a row from South Korea and also retreated two stores in Germany due to no business, and Nokia is no stranger to exiting, as well as some other big players on the market. Decisions to exit or

divest in a foreign market are not taken lightly, but the most likely reasons to do so are (Kotabe & Helsen, 2010, p. 311):

- Sustained losses. Markets with high expectations are often entered with a long term plan, but sometimes companies realize that their payback is not realistic and are willing to absorb the losses for a short period of time. At some point the losses are overbearing and exiting might be the only option.
- Difficulties in cracking the market. When a foreign market presents certain difficulties that cannot be cracked, it might be time to exit. Nokia, the Finnish mobile phone company, decided to stop selling and making phones in Japan, because they could not comprehend the Japanese market.
- Volatility. Many companies usually overestimate the host country's economic and political situation. Luring prospects of a huge population with rising income might blind some companies' eyes. Countries with high growth potential are usually more volatile. There are also risk associated with political instability, economic risk, inflation and exchange rate volatility.
- Premature entry. Entries can be premature due to low buying power, underdeveloped marketing infrastructure (e.g. distribution, supplies) and lack of strong local partners.
- Ethnical reasons. Companies operating in countries with questionable human rights might get bad publicity that can tarnish the company's image and reputation (AP, 2006).
- Intense competition. Countries with high growth and cost deductive possibilities attract numerous companies, where intense competition eventually plays out. The outcome may result in price wars, overcapacity, and ending up in a lose-lose situation.
- Resource relocation. A strategic review of the company's foreign business usually leads to a shake-up of the company's portfolio, creating a resource relocation across markets.

A decision to exit a market or country should not be taken easily since there might be exit barriers that hedges the country or market from losing players, as well as, have an effect on the company. Barriers from divestment decisions include (Kotabe & Helsen, 2010, p. 313):

- Fixed cost of exiting. In Europe, several countries have strict labour laws that can make an exit very costly (e.g. severance package).
- Damage to corporate image. Closing down an operation results in job loss and severe reduction in family incomes which may tarnish the company's reputation. For example, when Nokia closed down a manufacturing plant in Germany and decided to venture to Eastern Europe, it led to a boycott of Nokia's phones in Germany.
- Disposition of assets. Assets that are used for a specific purpose, might be hard to sell, which can be viewed as an exit barrier. Liquidation value might be very low, because of limited buyers in that location.
- Signal to other markets. Another concern when exiting one country is that other countries where the company operates might receive negative signals. Exits can lead to losing after-

sales service support, job losses for the host country, and loss of support from distributors. Therefore exiting can create a spill over effect to other markets by raising a red flag.

- Long-term opportunities. Rather than closing a shop it might pay off to sustain short term losses and maintain a presence on the market, if that market has any future. Re-entering is a hard task since the competitors that stayed there have a big advantage as well as distributors and prospective partners might be leery about doing business with someone who already retrieved before.

Growing through international expansion is not the right answer for every company and the lure of emerging markets, such as BRIC countries (Brazil, Russia, India, and China) with a high potential, does not always live up to the high expectations.

Table 1 presents international expansion strategies and their characteristics, these are divided into four categories: resources, risk, control, and returns. Exporting, licensing and contract manufacturing are entry modes for researching the foreign market, testing the response of the company's product in a foreign market with little responsibility and resources needed. Franchising is usually a strategy for companies that have success in their own market and are looking to expand to a foreign market. The combination of low financial resources and medium returns can increase its share in foreign countries faster than other strategies. Joint ventures and strategic alliances are entry strategies that have medium control, risks, while resources needed and returns are also medium. A joint venture is when a company is working together with a foreign company in a foreign country, the local partner can often provide the outsider help in understanding their culture and business, while sharing costs and returns. Strategic alliances are usually formed by companies that need each other's help to improve its product. M&A and greenfield investments are high risk and return entry strategies. There is a huge risk of failure which bring low returns or it can be a big success and bring high returns. Full ownership provides control over the company and takes high resources to start.

Table 1. Different entry mode characteristics

Entry mode	**Control**	**Resources**	**Risks**	**Returns**
Exporting	Low	Low	Low	Low
Licensing	Low	Low	Low	Low
Contract Manufacturing	Low	Low	Low	Low
Franchising	High	Low	Medium	Medium
Joint ventures	Medium	Medium	Medium	Medium
Strategic Alliances	Medium	Medium	Medium	Medium
Wholly Owned	High	High	High	High

Subsidiaries

2 MERGERS AND ACQUISITIONS

2.1 Definitions

There is no generally acceptable term for mergers and acquisitions in the literature. The subject of M&A has expanded to include corporate control, takeovers and related issues of corporate restructuring, and changes in the ownership structure of companies. Therefore we can say that M&A are all the transactions that lead to changes in the ownership structure. A merger is a combination of two corporations where the acquiring corporation survives and the merged corporation ceases to exist (Guaghan, 2007). Consolidation also differs from merger, in consolidation two or more companies join and form a new company. Acquisition is defined as an act of acquiring and gaining possession (Acquisition, n.d.).

2.2 Motives for M&A

Motives for M&A are classified as competitive consideration, responses to change, and inefficient market capital. Each of these motives are separately described. Motives for competitive consideration are mostly derived from organization literature (Cantwell & Santangel, 2002, p. 416):

- Fast entry into foreign markets. Acquisitions allow a fast entry into a new market, with a great amount of time being saved. A cross-border approach allows instant access to foreign distribution channels of suppliers, marketing channels, clients and other important skills. CBM&A can be used to enter new markets and expand sales of current goods (Martin et al., 1998) and provide established sales volume (Datta & Pula, 1995, p. 343). United Nations conference on trade and development (2000) states that CBM&A provide a faster international expansion strategy compared to joint venture and greenfield investment. For example Heineken, Dutch beer brewer, decided for a cross-border merger and acquisition approach to acquire the Spanish brewery Cruzcamps, which automatically guaranteed a 37% market share in the Spanish beer market. Heineken used the Cruzcamps distribution channels to distribute its own beer which resulted in rapid market penetration.
- Increasing political and market power. Having greater market power also means having the ability to impact prices. A horizontal merger with limited competitors or vertical acquisition to additionally control the value-added chain can result in additional market power (Ahammad & Glaister, 2010). In the past companies that merged had a desire to achieve a strong market position, hopefully a monopoly power.
- Defensive reactions. In order to prevent major players in the industry from becoming too strong, M&A between smaller companies occurs in order to get bigger and therefore harder to acquire.

- Synergies. Combining activities such as R&D, procurement, marketing, economies of scope and other cost components which result in cost reduction. Gaughan (1991), Bradley, Desai, & Kim (1998), and Trautwein (1990) argue that synergies from combining are the most common reason to enter M&A.
- Reduction of transportation and information costs. Goldman and Gorton (2000) argue that costs can be reduced by implementing integrated planning and detailed coordination within companies, instead of market transactions. M&A allow companies to have better information at lower costs within joined companies, rather than information between two different companies.
- Diversification. A corporate strategy to increase sales for new products in new unrelated markets. Seth, Song, and Pettit (2000) report that geographical market diversification is a source of value in CBM&A. Bruner (2004) provides numerous studies that diversification destroys value. Hence, the benefits/drawbacks of diversification are still unclear and need to be further researched.

Inefficient capital market and responses to a changing environment are motives for M&A, these changes are mostly due to regulations, new markets and technologies. The literature states that it is possible to correct inefficient capital markets by the following actions:

- Removal of inefficient management. Gaughan (1991) believes that in some cases M&A are motivated by a belief that the acquiring company's management can manage the target's resources better. In most cases the acquirer is a bigger company and believes that acquiring a smaller company can improve management skills and increase the value under its control. The smaller companies are usually run by entrepreneurs that started the company, but after a rapid growth they require different sets of managerial skills. Acquisitions can fulfil a lack of managerial skill which makes the company more competent in a broader market place. Managerial skills is what an acquirer can offer the target.
- Corporate hedging. Conglomerate mergers between companies whose earnings are not correlated may enhance coinsurance and reduce diversification risks. A company can smoothen its earnings to avoid bankruptcy and save corporate tax (Cantwell & Santagelo, 2002, p. 428).
- Internal capital markets. M&A allow creation of internal capital markets by sharing information among divisions which reduces financial costs and avoids asymmetric information (Cantwell & Santagelo, 2002, p. 429).
- Managerial motive. The empire building theory suggests that managers want company growth for their personal reasons. A managers wage is correlated with the size of the company, increasing the size of the company also increases the manager's wage. Acquisitions can be overpaid, due to fear of managers and lack of governance mechanism to control managers, which would result in a bad return for the acquirer after the acquisition (Ahammad & Glaister, 2010).

M&A provides numerous motives, but as explained there are also some disadvantages that need to be addressed in order to make the right decision.

2.3 Drivers of profitability

Studies on M&A yield some interesting findings regarding which M&A are profitable and in which direction a company should be looking when expanding. These findings are:

- Diversification destroys value while focus conserves it. Berger and Ofek (1995) found that average loss in individual business segments is between 13 and 15% when diversifying. It is also known that conglomerate mergers have the poorest returns and the worst performance compared to other types of mergers. DeLong (2001) found that mergers which focus on geographical and activity enhancement, gain 2 - 3% more in share value than other types of mergers. The higher the degree of relatedness between the buyer and seller, the higher the returns.
- Expected synergies are important drivers of wealth creation. A study by Houston & James (2001) found a significant relationship between forecasted cost savings and revenue enhancements at the announcement date.
- Building market power in M&A does not pay. Trying to enhance the market power through M&A does not lead to better performance but rather worse (Hankir, Rauch, & Umber, 2009)
- Paying in cash is better than paying in stocks. Stock based deals were found to have negative returns at deal announcements, while cash based deals yielded neutral or slightly positive returns (Kohens & Kohens, 2000).
- Using M&A to seek excess cash generally destroys value. Companies with a high amount of cash usually seek to acquire a company in order to seek growth, because otherwise they would have to distribute the cash to their shareholders through dividends. Studies report value destruction at the announcement of M&A for companies with access cash. Bruner (1988) stated that M&A enhances value because of increase in debt ratios after the acquisition.
- Tender offers create value for acquirers. Tender offers are take-it-or-leave-it proposals directly to targets shareholders. Bypassing the targets management and appealing to targets shareholders can pay more (Rau & Vermaelen, 1998).
- More value is created when managers have something to gain from the M&A. The profitability of individual takeovers vary widely, especially when the transaction characteristics are under management control.
- The initiation of M&A is associated with creating value. Gregory (1997) showed that when companies announce M&A or series of acquisitions due to some strategic objectives, their share price rose significantly.

2.4 Types of mergers

Mergers are categorized as vertical, horizontal and conglomerate. Vertical mergers happen when a combination of buyer-seller relationships occur. For example, Merck, the world's largest drug company, decided to acquire Medco Containment Services, Inc. which was the largest mail-drug distributor. With this acquisition Merck became the largest distributor of pharmaceuticals as well as the largest drug company in the world. Merck acquired the middle man and in this way drugs could be distributed faster giving them a competitive advantage. A horizontal merger occurs when two competitors combine. A good example comes from the oil industry, when Exxon and Mobil combined to increase their market share and experience by working together. The last category is conglomerate merger where there is no buyer-seller nor competitor relationship between the companies. Philip Morris, or now called Altria, decided to diversify outside of their tobacco industry by acquiring General Foods, Kraft, and Nabisco. The decision to acquire companies outside their industry was due to the growth decline in the U.S. tobacco industry, this way Altria became more of a food business in order to hedge themselves from the decline in growth of the tobacco industry (Gaughan, 2007).

2.5 M&A in the chemical industry

The chemical industry involves complex processes. Its operations and organizations are engaged in manufacturing chemicals and their derivatives. The chemical industry may also be described as an industry of chemicals and chemical reactions to produce a product. Definitions vary from country to country, for instance the Standard International Trade Classification by the United Nations includes pyrotechnic products and explosives in the definition, but do not include man-made fibres, although the preparation of raw materials starts with chemical reactions (Chemical industry, n.d.).

From 2007 through 2011, the chemical industry was ranked fourth among 21 industries analyzed (Friese et al., 2013). The chemical industry is faced with limited attractive growth prospects, because incumbents face competition from upstairs and developing markets (Morawietz et al., 2013). Value creation and growth appetites are changing in the chemical industry. Major companies are starting to change their growth strategies from inorganic to organic, therefore moving from old cash deployment strategies of share buybacks, incremental capital investments, and debt payment to utilizing M&A, joint ventures, and other expansion strategies. To capitalize M&A to the fullest, the company leaders have to incorporate updated techniques, identify their capabilities and structure, and evaluate their opportunities.

2.5.1 Cross-border expansions in the chemical industry

Recently chemical industry experienced a significant share of CBM&A aimed to increase their global footprint, yet cross-border deals are still scarce. Typically, Western acquirers chose targets from other western countries which is considered a cautious approach. Despite this, geographical expansions are expected to drive more deals beyond home regions. Acquiring companies from developing markets, especially the Chinese market is challenging, since most

Chinese companies are part of a large conglomerate and are most likely state owned. Due to this particular challenge, there are only limited sizable transactions that can be done. Therefore, there is a much higher possibility of acquisition occurring, where companies from developing countries will target established markets, like the European market (Morawietz et al., 2013).

2.5.2 Chemical industry: past and present

Due to the global economic environment there has been a steady decline in growth since 2008. Companies are now facing new challenges to achieving growth like price volatility of raw materials, economic challenges of European countries, China's declining growth and continuous problems in the Middle East.

A history of acquisitions in chemical M&A transactions show us that from the year 2001 to the peak in 2008 there was a transaction increase of 60%, going from 845 transactions in 2001 to a record high of 1410 in 2008. The decline started in 2011 when it hit a new bottom with 979 transactions, which is a 30% decline from 2008. Asian companies lead with 46% transactions in 2012, Europe and North America following with 24%. Interestingly transactions of European companies have been dropping since 2001 while North American companies stayed fairly constant throughout this period. Even though China is the most targeted country, this has been declining since 2009 (ATKearney, 2013).

The value of transactions is another important determinant. Larger value deals were mostly made by European and North American companies, together they had 65% of all transactions that were higher than 5 billion EUR in value. Asia is leading the chart in smaller transactions, probably due to their consolidation strategy (ATKearney, 2013).

Fertilizers & the agricultural chemical sector and industrial gases are the two leading sectors in the chemical industry. These have commanding premium multiples due to their focus on yield-enhancing innovative products. Industrial gases have higher demand and are less prone to cyclicality due to durable business models (Deloitte, 2013).

Various regions of the world have different perspectives. North America is expected to increase its M&A activity in 2014 due to an upswing in the construction sector. An upswing will increase demand for adhesives, paints and coatings. Chemical companies in North America are taking advantage of lower utility costs and cheaper feedstock which leads to lower manufacturing costs and lower margins. There is also an increase in crop prices, agricultural chemicals which are all good indications that the market in North America is in an upstream (Deloitte, 2013).

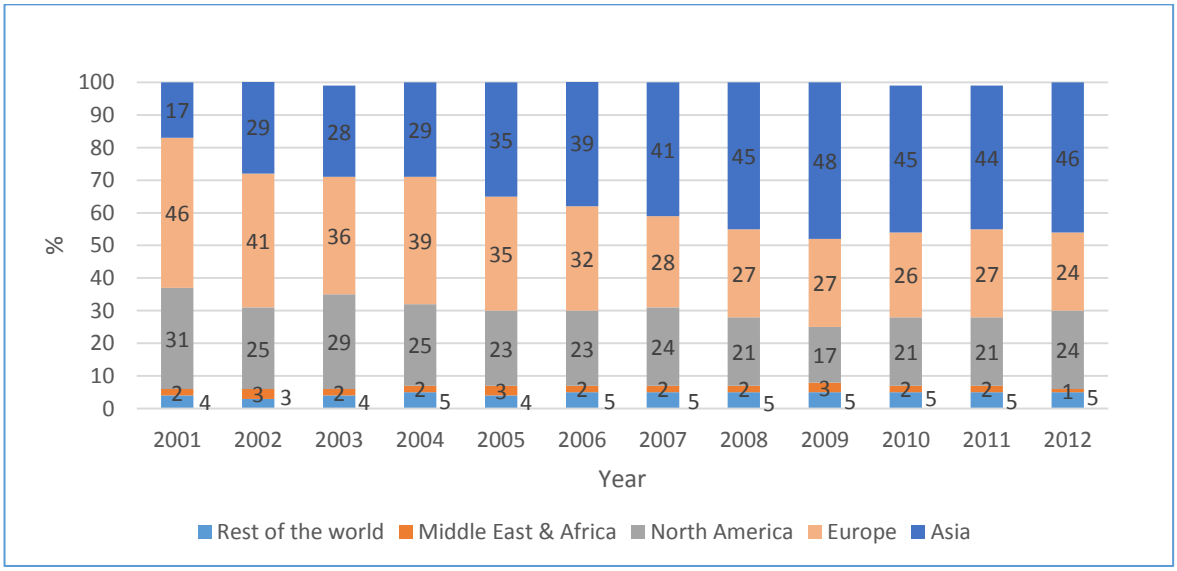
The European chemical industry continues to be one of the more attractive markets for M&A activity, mostly because of their strong balance sheets, realigned portfolios, and increasing investment decisions in overseas markets. Companies are conservative and try to minimize M&A risk and with the unresolved debt issue in Europe many decide for joint ventures and investment in specific markets, which would rationalize the 40% decline in M&A activity for

acquisitions from Europe (Deloitte, 2013). Germany and Russia are top acquirers with 44% of all acquisitions in 2012 (ATKearney, 2013).

China's chemical sector reached a mature state after an amazing increase of 27% per annum nominal value between 2005 and 2010. Consolidations between Chinese chemical companies have accelerated in the past and are successfully challenging competitors from around the world entering their market. Chinese companies are still welcoming foreign multinational corporations, but foreigners are presented with challenges when investing, because of integration due diligence (Deloitte, 2013).

Figure 2 presents chemical M&A transaction of acquirers by region. Asia is currently leading with 46% of all transactions, while European and North American acquirers are behind with 24%, followed by the rest of the world with 6%. From the beginning of 2001 until 2012, acquirers from Asian countries have increased their M&A activity by 170%, while European and North American countries have decreased theirs by 48% and 22%, respectively. China was a major contributor to the major rise of M&A activity, due to their consolidation strategy.

Figure 2. Chemical M&A transactions of acquirers by region



Source: ATKearney, *Chemicals executive M&A report 2013*, 2013.

2.6 Cross-border M&A

Cross-border is a term that refers to any financing arrangement that crosses national borders (Cross border financing, n.d.). Companies that have success in their market may see CBM&A as expanding to gain higher revenues and profits. Further pursuit of growth in the domestic market might lead to diminishing returns, while cross-border deals can provide access to other markets. It is important to fully analyze the company and assess possible risks, the amount of capital needed and other possibilities before venturing in CBM&A. Acquisition deals involve transaction costs, information asymmetries, agency conflicts, and cultural differences which

can all prevent a deal from closing. Living in an increasingly globalized world puts stress on corporations to produce fast growth and this can be achievable through cross-border acquisitions. Rossi & Volpin (2004) found that the volume of M&A activities is larger in countries that have better accounting standards and better shareholder protection. Probability of cross-border deals decreases, if the target's country is protected.

3 ANNOUNCEMENT EFFECT OF MERGERS AND ACQUISITIONS

Over the past decade there have been numerous articles on the announcement effects of M&A, but less focus was given to the acquirer's return and consequences of cross-border deals. Globalization changed the market, expanded opportunities, and increased in cross-border M&A, but domestic M&A is still the most common. Due to globalization, companies must look for new markets to expand, seek new opportunities and possibly grow in the global market. (Shimizu et al., 2004, p. 310).

3.1 Returns to target companies

The target company shareholders receive positive cumulative average abnormal returns (CAAR) from 10.4% (Mulherin & Boone, 2000, p. 117) to 36.7% (Mallikarjunappa & Nayak, 2013, p.23) in the event window. Different event window lengths result in higher or lower cumulative average abnormal returns, depending on the sample. Positive abnormal returns for the target company shareholders is proven with multiple studies.

A study by Mallikarjunappa & Nayak (2013) showed a positive cumulative average abnormal return of 27-37% in a 61-day window prior to the announcement, probably due to information leakage or market anticipation of takeover announcements. There were also significant positive abnormal returns after the takeover announcement.

Loughran & Vijh (1997) researched the long-term after-effect of acquisitions. In the 5 year period after acquisitions, research shows that tender offers, take-it-or-leave-it proposals directly to targets shareholders, yielded the highest returns in the long-term, reaching cumulative average abnormal returns of 126.9%, while mergers only increased the cumulative average abnormal return by 29.6%. It goes to show that tender offers are value maximizing.

Table 2 contains important findings in the last three decades in the field of announcement effect in M&A for target companies. Cumulative average abnormal returns for the target company shareholders are positive, reaching from 10%, shown in a 3-day event window, to 36.7% for a 61-day event window. An event study by Loughran & Vijh (1997) showed an increase of 126.9 % for tender offers in a 5-year period after the announcement, which provides evidence that the target company shareholders have positive cumulative average abnormal returns in the short- and long-term.

Table 2. Summary of target shareholders return for M&A

Study	CAAR (%)	Sample size	Sample period	Event window	Notes
Mallikarjunappa & Nayak (2013)	+ 36.7	227	April 1998-July 2007	(+30, -30)	Indian market
Danbolt & Maciver (2012)	+ 20.9	251	1980-2008	(+1,-1)	CBM&A
	+ 10.9				DM&A
Mulherin & Boone (2000)	+ 10.4	376	1990-1999	(-1, 1)	Multiple industries
Leeth & Borg (2000)	+ 13.27	72	1919-1930	(-40, 0)	/
Loughran & Vijh (1997)	+ 29.6 merger	419	1970-1989	(-2, 1250)	Long-term (5yr); post-acq.returns
	+126.9 tender				
	+ 47.9 combined	135			
Schwert (1996)	+ 23.64	666	1975-1991	(-42, 126)	Mergers and tender offers
Smith & Kim (1994)	+ 30.19	177	1980-1986	(-5, 5)	Successful and unsuccessful tender offers
	+ 15.84			(-1,0)	
Berkovitch & Narayanan (1993)	+130.1$M	330	1963-1988	(-5, 5)	Tender offers
Kaplan & Weisgach (1992)	+ 26.9	209	1971-1982	(-5, 5)	US mergers
Servaes (1991)	+ 23.64	704	1972-1987	(-1, Close)	Mergers and tender offers
Jarell & Poulsen (1989)	+ 28.99	526	1963-1986	(-5, 5)	Tender offers

Source: E. Berkovitch & M.P. Narayanan, *Motives for takeovers: An empirical investigation*, 1993, p. 347; J. Danbolt & G. Maciver, *Cross-border versus domestic acquisitions and the impact on shareholder wealth*, 2012, p.1028; S.N. Kaplan & M.S. Weisbach, *The success of acquisitions: Evidence from divestitures*, 1992, p. 107; G.A. Jerell & A.B. Poulsen, *The returns to acquiring firms in tender offers: Evidence from three decades*, 1989, p. 12; J.D. Leeth & J.R.Borg, *The impact of takeovers on shareholder wealth during the 1920s merger wave*, 2000, p. 217; T. Loughran & A.M. Vijh, *Do long-term shareholders benefits from corporate acquisitions?*, 1997, p. 1765; T. Mallikarjunappa & P. Nayak, *A study of wealth effects of takeover announcements in India on target company shareholders*, 2013, p. 23; J.H. Mulherin & L.A. Boones, *Comparing acquisitions and divestitures*, 2000, p. 117; G.W. Schwert, *Mark-up pricing in mergers and acquisitions*, 1996, p. 153; H. Servaes, *Tobin's Q and the gains from takeovers*, 1996, p. 409; R.L. Smith & J.H. Kim, *The combined effect of free cash flow and financial slack on bidder and target stock returns*, 1994, p. 281.

3.2 Returns to acquirer companies

Abnormal returns to acquirers compared to targets are much smaller and unclear. Studies of the acquiring company shareholder returns are still unclear, regarding profitability. Tender offers do bring profitability that range from a cumulative average abnormal return of 0.5% to 9%, during different short-term event windows. Research done after the acquisition shows that only tender offers make a profitable deal, while other deals result in a long-term negative cumulative average abnormal return. Announcements made in different event windows in the majority show negative cumulative average abnormal returns, except for the research made by Kohens & Kohens (2000, p.40), who provide insights on value creation in high-tech mergers. They provide evidence that acquirers of high-tech targets experience significant abnormal returns, whether the acquisition is made with cash or stocks. The time period in which mergers occur, high-tech affiliation of acquirer, ownership structure of acquirer, and target's ownership status are all factors that determine the size of the acquirer's returns. Positive abnormal returns can be explained by the high risk, high growth nature of high-tech industries. Acquisitions in matching high-tech industries show that abnormal returns are higher, which is a sign that investors are more certain that such companies are capable of value enhancement through an acquisition.

Jerrell & Poulsen (1989) researched why acquirers' of takeovers have zero or negative returns at the announcement. The literature suggests three reasons: First, the whole effect to acquirers cannot be observed, due to certain hidden information. Second, due to competition among acquirers the abnormal returns went to the target. Third, returns reflect a poor investment decision. Researchers supported the first two assumptions. The acquirer experiences higher stock price if the target company grows. Competing with fellow acquirers tends to decrease any possible abnormal returns due to a bidding war that ends up going in favour of the target, who assumes abnormal returns and the acquirers are left with zero or negative returns in some cases. Also tender offers present value maximization for acquirers as well.

DeLong (2001) found that merger announcements in the bank industry, which focus on the same activity and geographical region, enhance stockholder value by 3.0% while deviations from activity and geographical location do not create value. Among other factors like size and

target, also corporate governance or agency costs influence the return on bank mergers. Acquirers that focus on both activity and geographical location do not experience decrease in value as a result of merger announcements, but target companies always and everywhere experience an increase in value.

Rau & Vermaelen (1998) researched the acquirers effects in mergers 3 years after the acquisition. The analysis shows that acquirers in mergers on average underperform while tender offers overperform in the three-year period following the acquisition. Companies with low book-to-market ratios tend to make poor decisions regarding acquisitions. Research demonstrates that a short-term abnormal return does not capture the market's reaction, but it is a mere reflection of market imbalance. Louhran & Vijh (1997) demonstrated that the size of a company effects abnormal returns and they extended the analysis to prove that the method of payment is also important.

Antoniou et al. (2007) researched the difference in acquiring a public, private or a subsidiary target. Research showed that acquirers in the short-term breakeven when acquiring a publicly traded company, but when acquiring a private or subsidiary target there are significant gains. Long-term evidence reveals significant losses for acquirers of publicly, private as well as subsidiary targets which proves that the market may overreact initially to the acquisition announcements.

Table 3 contains findings made by researchers in the last three decades in the field of announcement effect in M&A for acquiring companies. Cumulative average abnormal returns for the acquirer company shareholders are positive and negative. Research shows mixed results, reaching from a maximum cumulative average abnormal return of 3.48% (Asquith et al., 1983, p. 121) when analyzing only mergers to -2.82% (Rani & Yadav, 2012, p. 179) for domestic M&A in India. Long-term after announcement effect was research by Loughran & Vijh (1997), who demonstrated positive cumulative average abnormal returns of 61.3% for tender offers and -14.2% for mergers. It is assumed that the short- and long-term announcement effect is negative for most cases except for tender offers and high-tech industries.

Table 3. Summary of acquirers' shareholders return for M&A

Study	**CAAR (%)**	**Sample size**	**Sample period**	**Event window**	**Notes**
Rani & Yadav (2012)	+ 1.6 - 2.82	268	2003-2008	(-2, 2) (-20, -2)	Domestic M&As in India
Danbolt & Maciver (2012)	- 0.3 - 1.8	251	1980-2008	(+1,-1)	CBM&A DM&A

Antoniou et al. (2007)	+ 1.26	1401	1987-2004	(-2, 2)	UK acquirers
DeLong (2001)	- 1.68	280	1988-1995	(-10, 1)	Bank industry

table continues

continued

Mulherin & Boone (2000)	- 0.37	281	1990-1999	(-1, 1)	Multiple industries
Kohens & Kohens (2000)	+ 1.37 cash deals	961	1987- 1996	(0, 1)	Mergers in high-tech industries
	+ 1.09 stock	673			
	+ 1.26 sample	1634			
Leeth & Borg (2000)	+ 3.12	466	1919-1930	(-40, 0)	/
Rau & Vermaelen (1998)	- 4.0 mergers	3968	1980-1991	(0, 36 moths)	Long-term post acq.
	+ 9.0 tender offers	348			
Loughran & Vijh (1997)	- 14.2 merger	434	1970-1989	(1, 1250)	Long-term (5yr); post-acq. returns
	+ 61.3 tender				
	- 0.1 combined	100			
Schwert (1996)	+ 1.4	666	1975-1991	(-42, 126)	Mergers and tender offers
Danbolt (1995)	+ 0.23*	71	1986-1991	(-1, 0)	CBM&A
Smith & Kim (1994)	+ 0.5	177	1980-1986	(-5, 5)	Suc. and unsuc. tender offers
	- 0.23			(-1,0)	
Berkovitch & Narayanan (1993)	- 10$M	330	1963-1988	(-5, 5)	Tender offers
Kaplan & Weisgach (1992)	- 1.49	271	1971-1982	(-5, 5)	Mergers and tender offers
Servaes (1991)	- 1.07	384	1972-1987	(-1, Close)	Mergers and tender offers
Loderer & Martin (1990)	+ 1.72	970	1966-1968	(-5, 0)	Mergers and tender offers
	+ 0.57	3401	1968-1980		
	- 0.07	801	1981-1984		

Jarell & Poulsen (1989)	+ 0.92	461	1963-1986	(-5, 5)	Tender offers

table continues

continued

Bradley et al. (1983)	+ 2.35 Successful	161	1962-1980	(-10, 10)	Tender offers
Asquith et al. (1983)	+ 3.48 Successful	170	1963-1979	(-20, 1)	Mergers only
	+ 0.7* Unsuc.	41			

*Note. * Not statistically significant at a 5% level.*

Source: A. Antoniou, D. Petmezas, & H. Zhao, *Bidder gains and losses of firm involved in many acquisitions*, 2007, p. 1221; P. Asquith, R.F. Bruner, & D.W. Mullins, *The gains to bidding firms from merger*, 1983, p. 121.; E. Berkovitch & M.P. Narayanan, *Motives for takeovers: An empirical investigation*, 1993, p. 347; M. Bradley, A. Desai, & E.H. Kim, *The rationale behind interfirm tender offers*, 1983, p. 183; J. Danbolt & G. Maciver, *Cross-border versus domestic acquisitions and the impact on shareholder wealth*, 2012, p.1028; J. Danbolt, *An analysis of gains and losses to shareholders of foreign bidding companies engaged in cross-border acquisitions into the United Kingdom, 1986-1991*, 1995, p. 279; L.G. DeLong, *Stockholder gains from focusing versus diversifying bank mergers*, 2001, p. 221; S.N. Kaplan & M.S. Weisbach, *The success of acquisitions: Evidence from divestitures*, 1992, p. 107; G.A. Jerell & A.B. Poulsen, *The returns to acquiring firms in tender offers: Evidence from three decades*, 1989, p. 12; N. Kohens & T. Kohens, *The value creation potential of high-tech mergers*, 2000, p. 40; J.D. Leeth & J.R.Borg, *The impact of takeovers on shareholder wealth during the 1920s merger wave*, 2000, p. 217; C. Loderer & K. Martin, *Corporate acquisitions by listed firms: The experience of a comprehensive sample*, 1990, p. 17; T. Loughran & A.M. Vijh, *Do long-term shareholders benefits from corporate acquisitions*, 1997, p. 1765; J.H. Mulherin & L.A. Boone, *Comparing acquisitions and divestitures*, 2000, p. 117; N. Rani & S.S. Yadav, *The impact of domestic mergers and acquisitions and divestitures*, 2000, p. 117; P.R. Rau & T. Vermaelen, Glamour, value and post-acquisition performance of acquiring firms, 1998, p. 223; G.W. Schwert, *Mark-up pricing in mergers and acquisitions*, 1996, p. 153; H. Servaes, *Tobin's Q and the gains from takeovers*, 1996, p. 409; R.L. Smith & J.H. Kim, *The combined effect of free cash flow and financial slack on bidder and target stock returns*, 1994, p. 281.

3.3 Combined returns

Combined returns are returns of targets and acquirers together. Combined cumulative average abnormal returns for shareholders are positive and range from 2.5% (Mulherin & Boone, 2000, p. 117) to 9.1% (Healy et al., 1990, p. 135). A study of combined returns by Mulherin & Boone (2000) supports the synergistic theory of corporate restructuring, which states that there are possible synergies that can be reaped by corporate restructuring. Divestitures are also proven to bring a positive cumulative average abnormal return of 3.04%.

Berkovitch & Narayanan (1993) suggest that there are three motives for takeovers: synergy, hubris, and agency problem. Synergy is an effect arising between two or more agents, factors, or substances that produce an effect greater than the sum of their individual effects, while an

agency problem is conflict arising when people entrusted to look after the interests of others use the power for their own benefit instead. Hubris is a characteristic of excessive confidence or arrogance, which can lead a person to believe that they can do no wrong. In order to confirm the three in the sample, a correlation between target and total gains was carried out. Analysis was carried out between the two subsamples: positive total gains and negative total gains. Results showed that a subsample with positive total gains indicated synergies as the primary motive for takeovers, but also an existence of hubris is found in the sample. Subsample with negative total gains had a negative correlation which indicated agency as a primary motive for takeovers. Therefore synergies are the main reason for takeovers, but agency problems seem to be the major reason for value-reducing acquisitions.

Table 4 shows findings made by researchers in the last two decades in the field of announcement effects in M&A for target and acquired companies together. Cumulative average abnormal returns for combined companies are positive. Large positive effects from target shareholders overcome the usually small negative cumulative average abnormal return by the acquirers. Positive cumulative average abnormal returns may extend from 2.53% to 9.1%.

Table 4. Summary of combined shareholders return for M&A

Study	CAR	Sample size	Sample period	Event window	Notes
Mulherin & Boone (2000)	+ 2.53%	116	1962-1997	(-1, 0)	Incomplete acquisitions
Berkovitch & Narayanan (1993)	+120$M	330	1963-1988	(-5, 5)	Tender offers
Kaplan & Weisgach (1992)	+ 3.74%	209	1971-1982	(-5, 5)	US mergers
Servaes (1991)	+ 3.66%	384	1972-1987	(-1, 0)	Mergers and tender offers
Healy et al. (1990)	+ 9.1%	50	1979-1984	(-5, 5)	US mergers

Source: J.H. Mulherin & L.A. Boone, *Comparing acquisitions and divestitures*, 2000, p. 117; E. Berkovitch & M.P. Narayanan, *Motives for takeovers: An empirical investigation*, 1993, p. 347; S.N. Kaplan & M.S. Weisbach, *The success of acquisitions: Evidence from divestitures*, 1992, p. 107; H. Servaes, *Tobin's Q and the gains from takeovers*, 1996, p. 409; P.M. Healy, K.G. Palepu, & R.S. Ruback, *Does corporate performance improve after mergers*, 1990, p. 135.

3.4 Cumulative average abnormal returns for cross-border M&A deals

Cumulative average abnormal returns for the shareholders in cross-border deals tend to be mainly positive. Danbolt & Maciver (2012) confirm positive cumulative average abnormal returns of cross-border M&A announcements. An analysis was made to compare cross-border M&A to domestic ones, where CBM&A proved to yield higher abnormal returns. Targets outperform acquirers in cross-border acquisitions, since targets experienced 10.1% abnormal returns while acquirers only 1.5%. This difference is not a cause of overpaying, but rather reflects higher overall abnormal returns in cross-border than in domestic acquisitions. While acquirers earn significant negative abnormal returns in domestic acquisitions which implies that cross-border deals have insignificant impact on the acquirers' stock price. Expanding their research they also found that cross-border acquirers coming from a superior governance system than the targets, experience significantly higher abnormal returns.

Danbolt (1995) analyzed 71 cross-border deals of acquired UK companies during 1986-1991. Short-term average abnormal returns during the announcement month revealed insignificant 0.23% returns, using the market model. Acquirers targeting the UK on average encountered negative abnormal returns in the five months following the announcement which amount to cumulative average abnormal returns of -9.79%. Danbolt also stressed the importance of the event window length and favourable results that a short-term period brings to the acquiring company.

4 METHODOLOGY

Event study methodology measures the effect of an event on the value of the company. The effect of CBM&A activity is evaluated on an approach which compares the measurement of stock returns, subsequent to an announcement of M&A, and estimated value that is calculated on the assumption that the M&A has not occurred. In this thesis, the observed event is the announcement day, i.e. the day the announcement becomes public (McKinlay, 1997). The event study methodology is not only used in economics, but it also has many applications. One of them being M&A, earnings announcements, announcements of trade deficits, and issue of new debt or equity (McKinlay, 1997). The two major reasons for event studies are: to test the null hypothesis in order to test whether market efficiency incorporates information and to examine an impact of certain events on shareholders stock returns, under a market efficiency hypothesis (Binder, 1998).

Market efficiency is essential in event studies. Market efficiency hypothesis states that a market is efficient when security prices fully reflect all available information at any given time. This strong hypothesis presumes that trading costs and information costs to be zero. Three different categories evolved from the market efficiency theory: The weak, semi-strong, and strong form of the efficient market hypothesis (Jensen, 1978).

- The weak form. The information set is based solely on past price history of the markets. Stock prices only respond to new information which arrive randomly and in order to earn abnormal return one must take advantage of the presented information.
- The semi-strong form. Includes all information that is publicly available as well as prices in the past.
- The strong form. All the information known to anyone, including public and private information (Frankfurter & McGoun, 2002).

Event studies are based on the semi-strong form of the market efficiency hypothesis, since prices should reflect all publicly available information. Additional assumptions are that the announcement was unforeseen and that there were no other events during the examined event window. Not having other events during the examined event window is particularly important since it is difficult to isolate the impact of a particular event in the event window (McWilliams & Siegel, 1997).

Event studies have a history reaching back to 1933 when James Dolley examined the price effect of stock splits, using a sample of 95 splits and found that in 26 cases the price declined and in 53 it increased. Sophistication of event studies increased over time, until Eugene Fama in 1969 introduced the methodology that is essentially the same today. Since then certain modifications have been made and Stephen Brown & Jerold Warner issued a paper in 1985 that dealt with the issue of daily data (McKinley, 1997).

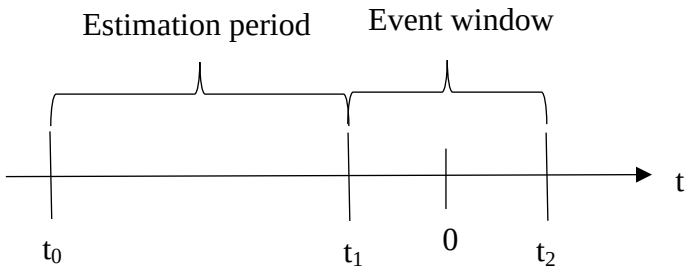
4.1 Event study procedure

Event study methodology has no standardized procedure, but there are certain steps that need to be followed in order to answer our hypothesis, which states that CBM&A announcements in the chemical industry have a negative or no effect on the abnormal returns for the acquirers company shareholders in the short- and long-term. Crucial characteristics usually stay the same, while some areas are open to change (e.g. duration of the event window and estimation period). The calculations mentioned were all made with the full sample of 84 acquiring companies, unless noted otherwise. The calculation framework is based on MacKinlay (1997).

4.1.1 Event window and estimation period

The initial task is to determine the event of measurement and define the period in which security prices of the company will be examined, i.e. the event window. The event study methodology compares realized returns around the announcement day with expected (normal) returns. Expected returns are those that would be realized if no event occurs, i.e. if no M&A is announced. Expected returns are estimated using a period prior to the event window, called estimation period. (MacKinlay 1997). Figure 3 shows that the estimation period and event window do not overlap, which is required to prevent the estimation of expected returns from being influenced by the event. The announcement is taking place in the event window, between t_1 and t_2 (MacKinlay, 1997).

Figure 3. Time line of an event study



The length of the event window and estimation period depends on the study. In order to examine the period surrounding the event, the event window is therefore usually larger than the specific period of interest. In practice this window is usually multiple days, including at least the day of the announcement and the day after. Some researchers expand this period to 21 days (10 days before the announcement, the announcement day and another 10 days after the announcement). There are benefits from having longer periods (improved prediction model) and caveats (model parameter instability) that need to be considered. Armitage (1995) stated that when handling with daily studies an estimation period of 100-300 days is sufficient for a satisfactory assessment. Following Armitage's guidelines, the estimation period is set to 160 days and there are 4 different symmetric event window periods. There is a 5-day event window (2 days before the announcement, the announcement day and two days after), an 11-day event window (5 days before the announcement, the announcement day and 5 days after), a 21-day event window (10 days before the announcement, the announcement day and 10 days after), and the event window that shows the highest cumulative average abnormal return. Different event windows are tested, because length of an event window affects the cumulative average abnormal return. This way there are different event windows that also give us a clearer picture of the average abnormal returns around the event window. To extend the research of this thesis, the long-term effect of the announcement was also included. The long-term effect measures abnormal returns after the announcement for the following year.

4.1.2 Calculating abnormal return

Abnormal return is defined as a difference between the return on stock i on day t and the expected return of the same stock at the same time. Expected return or normal return which would be expected, if there was no announcement made. Abnormal return is calculated as:

$$AR_{it} = R_{it} - NR_{it} \quad (1)$$

AR_{it} is the abnormal return of stock i on day t
R_{it} is the return of stock i on day t
NR_{it} is the expected (normal) return of stock i on day t

To obtain abnormal return, return of the stock needs to be calculated. Returns of the stock are automatically calculated by the information source Datastream. Returns show a theoretical growth in value of a share over a certain period, assuming that dividends are reinvested to purchase additional units of equity at the closing price applicable on the ex-dividend date. Datastream provides returns that are constructed using annualized dividend yield. Local market returns for individual stocks were retrieved from Datastream in order to calculate the expected returns.

Expected returns are calculated using a market model which is the most used method. Ordinary least squares (OLS) determines the relationship between the market return and the return of the security. OLS is an estimation procedure for the market model under the Gauss-Markov assumption for a simple regression, which is linear. The regression coefficients from the OLS are estimated in the estimation period (MacKinlay, 1997). The OLS regression coefficients were calculated for each individual stock using Microsoft Excel functions intercept (α) and slope (β). The OLS values for the whole sample is provided in the Appendix, Table B. Once the coefficients for an individual stock in the estimation period are calculated, the expected return was calculated for the event windows as:

$$NR_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

NR_{it} is the expected (normal) return of stock i on day t
α_i, β_i are OLS regression coefficients
R_{mt} is the return of the market index m on day t
ε_{it} is the zero mean disturbance term ; $\varepsilon_{it} = 0$
t = 160 days

If we combine formula (1) and (2) we arrive at (3), a combined formula for calculating abnormal returns. Abnormal returns for individual stocks in the event windows (1 year, 21 days, 11 days, 5 days and the maximum cumulative average abnormal return period) are calculated.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (3)$$

AR_{it} is the abnormal return of stock i on day t

R_{it} is the return of stock i on day t
α_i, β_i are OLS regression coefficients
R_{mt} is the return of the local market index *m* on day t
t = 1 year, 21 days, 11 days, 5 days and maximum cumulative average abnormal return period

In the past different methods of calculating expected return were used, yet in the past couple of years only the market model has been mentioned. There is an economic and statistical approach to measuring the expected return of a security. The statistical approach relies on statistical assumptions concerning asset returns, while economic approach relies on assumptions concerning investors behavior and statistical assumptions as well. The potential advantage arises from calculating a more precise normal return. Models for measuring normal return are (MacKinlay, 1997):

- Constant mean return model. This is considered to be one of the easiest models and yet it still provides similar results, compared to more sophisticated ones. This model lacks sensitivity, but results are similar to those of more complicated models.
- Market model. It relates any given return of a security to a market portfolio return. The main benefit will depend on the R^2 of the market regression. The higher the R^2 correlation the greater is the reduction of the variance in the abnormal return, therefore the gain is larger.
- Mean-adjusted and market-adjusted return models. The mean-adjusted model uses average returns over a period as expected returns, thus it does not correct for market movements since it assumes that the price movement is due to the event and not the overall market. Results are biased since the stock prices can be partially or completely caused by the market. Market-adjusted return model solves this problem, since it uses market returns for expected returns, but the assumption that the price of a security completely follows the market is not correct as well.
- Economic models. Most common economic models are the capital asset pricing model (hereinafter: CAPM) and the arbitrage pricing theory (hereinafter: APT). These models cast restrictions on the expected returns. CAPM model is based on covariance with the market portfolio while the APT assumes that the expected return is a linear combination of multi-risk factors. Economic models cease to exist in event studies and statistically motivated models dominate.

4.1.3 Aggregating the abnormal returns

When calculating abnormal returns for individual stocks in event windows it is important to aggregate abnormal returns. Aggregation of the abnormal return will result in an overall conclusion regarding the announcement effect of cross-border M&A in the chemical industry. The aggregation occurs in two dimensions: across time and stocks (DeJong et al., 1992; MacKinlay, 1997). First the abnormal returns are aggregated across stocks as:

$$\overline{AR}_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \quad (4)$$

$\overline{AR}_t$ are average abnormal returns on day t
AR_{it} is the abnormal return on stock i on day t
N is the number of M&A announcements in the sample

In order to test the results with the parametric test, variance is calculated as:

$$var(\overline{AR}_t) = \frac{1}{N^2}\sum_{i=1}^{N} AR_{it} \quad (5)$$

The abnormal returns are gathered on the announcement of the acquisition, so other factors that influence the abnormal returns are cancelled out. Deviations from zero indicate abnormal returns (DeJong, 2007).

Abnormal returns are also calculated around the announcement since the effect of the announcement might occur on a different day than the announcement, due to information leakage or lags in market adjustments. The next step is to aggregate average abnormal returns over time in order to analyze the M&A performance over longer event windows. There are 5 different periods being tested, 4 are short-term (5, 11, 21, and maximum CAAR value event window) and a 1 year long-term event window. Average abnormal returns are aggregated across time as:

$$CAAR\ [t_1;\ t_2] = \sum_{t_1}^{t_2} \overline{AR}_t \quad (6)$$

$CAAR\ [t_1;\ t_2]$ are cumulative average abnormal returns from t_1 to t_2 (event window)

The variance of the cumulative average abnormal return is

$$var\left(\overline{CAR}(t_1; t_2)\right) = \sum_{t_1}^{t_2} var(\overline{AR}_t) \quad (7)$$

or

$$var\left(\overline{CAR}(t_1; t_2)\right) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2(t_1; t_2) \quad (8)$$

where

$$\sigma_i^2(t_1;t_2) = (t_2 - t_1 + 1)\hat{\sigma}_{\varepsilon i}^2 \quad (9)$$

$\hat{\sigma}_{\varepsilon i}^2$ is the sample variance measured from the OLS regression. Sample variance was calculated for an individual stock is the estimation period, while the AAR and CAAR variances were calculated according to formula (5) and (8).

4.1.4 Test statistics

For the purpose of this thesis we used parametric and non-parametric tests in order to test average abnormal returns and cumulative average abnormal returns. The null-hypothesis being tested is:

$1H_o$: CBM&A announcements in the chemical industry have a negative or no effect on the abnormal returns for the acquirers company shareholders in the short- and long-term.

The alternate hypothesis is

$1H_1$: CBM&A announcements in the chemical industry have a positive effect on abnormal returns for the acquirers company shareholders in the short- and long-term.

The full sample size of 84 acquiring companies is also divided into two subsamples: prior to the crisis and during the crisis. The acquirer companies analyzed in this thesis are presented in the Appendix, Table A and the order of companies in the crisis and pre-crisis period analyzed are presented in Appendix, Table D. It is expected that the CBM&A will yield positive abnormal returns for the shareholders and abnormal returns should be higher during the crisis. It is expected that the healthier and economically more stable companies will have the power to invest during the crisis which will lead to higher positive abnormal returns than in the pre-crisis period.

The subsamples hypothesis prior to the crisis and during the crisis is:

$2H_0$: CBM&A announcements in the chemical industry pre-crisis have lower abnormal returns than during the crisis in the short- and long-term.

The alternate hypothesis is:

$2H_1$: CBM&A announcements in the chemical industry pre-crisis have higher abnormal returns than during the crisis in the short- and long-term.

Parametric tests use variance and the mean of abnormal returns to determine statistical significance (Serra, 2002). Variances of abnormal returns and cumulative abnormal returns used in this thesis are presented in the Appendix, Table C. MacKinlay (1997) proposed two

parametric tests, one for average abnormal returns and one for cumulative average abnormal returns. The first parametric test will test average abnormal returns in the event window, if they are statistically significant from zero, as in formula (11).

$$\theta_1 = \frac{\overline{AR}(t_1; t_2)}{\sqrt{var(\overline{AR}(t_1; t_2)}} \sim N(0,1) \quad (10)$$

The second parametric test will test cumulative average abnormal returns in the event window, if they are statistically significant from zero, as in formula (12).

$$\theta_1 = \frac{\overline{CAR}(t_1; t_2)}{\sqrt{var(\overline{CAR}(t_1; t_2)}} \sim N(0,1) \quad (11)$$

Non-parametric sign tests make no restrictive assumptions about the distribution of abnormal returns (Cowan, 1992). Normal distribution can be assumed if the sample size is larger than 30, under the central limit theorem. Smaller samples might experience very poor approximations to normal distribution (DeJong et al., 1992). Keep in mind that the test is not valid if the abnormal returns are skewed, which might be the case for some days in the event window (MacKinlay, 1997). The sign test will be used to support the findings of the parametric test in the long- and short-term. Some event days in the short-term event windows are not normally distributed. The sign test will only be used for days in the event window where data is not skewed. A non-parametric test will provide evidence if the event window presents more positive or negative abnormal returns. The null hypothesis states that there will be negative or no effects on abnormal returns, associated with the announcement effect of cross-border M&A in the chemical industry. If there are more positive abnormal returns than negative, the sign test will provide a positive number. A significance level higher than 5% will provide evidence that the null hypothesis is confirmed or vice versa, therefore under the sign test the null hypothesis is confirmed if:

$$H_o: p \leq 0.5 \quad (12)$$

p probability that the abnormal return is positive

The alternative hypothesis under the sign test is

$$H_1: p > 0.5 \quad (13)$$

To calculate the sign test, we need the number of stocks with positive abnormal returns (N^+) and the total number of cases (N), letting θ_2 be the test statistic (Cowan, 1992).

$$\theta_2 = \left(\frac{N^+}{N} - 0{,}5\right) * \frac{\sqrt{N}}{0{,}5} \sim N(0,1) \quad (14)$$

4.1.5 Issues with using daily data

The use of daily data in event studies has a number of drawbacks. This section presents these and possible solutions (Brown & Warner, 1985):

- Non-normality. Evidence from previous studies suggests that the distribution of daily returns are fat-tailed compared to a normal distribution. This issue can be solved rather easily with a large sample. The central limit theorem guarantees that the distribution of the abnormal returns of the sample tend to converge to normality, once the number of securities increase, which only occurs when the securities are independent and distributed from a finite variance distribution.
- Non-synchronous trading and estimation of the market model parameter. Problems occur when security returns and market index returns are each measured over a different interval, OLS parameters are then biased and inconsistent.
- Variance estimation. Estimation of the variance is important for tests of statistical significance. There are three issues: time-series properties of the daily returns as a non-synchronous trading consequence, cross-sectional dependence of security-specific abnormal returns, and stationary daily variances.

Non-normality and non-synchronous trading are not considered as very important in event studies, while as variance estimation is a cause of concern.

5. DATA DESCRIPTION

5.1 Data selection

The data was collected from Bureau Van Dijk's database Zephyr, which contains data on M&A, IPOs', private equity, venture capital deals and rumors. Data collected for this thesis consists of cross-border M&A most valuable deals in the chemical industry, which were officially completed between 1 January 2005 and up to 1 January 2010. Merger and acquisition deals in this thesis met the following criteria:

- Acquirer or target had to be involved in the wider definition of the chemical industry (manufacturer of chemicals and chemical products)
- Acquired stake had to be at least 50%
- Acquirer had to be a publicly listed company, while the target could be a private company as well
- The announcement of the CBM&A had to be completed

The preliminary sample contained 449 acquisition announcements which followed the above mentioned criteria. The 100 most valuable transactions were chosen. These were then matched with Datastream database for gathering financial information, where the local market return and stock return were gathered. After gathering needed data to conduct event studies, 16

transactions were excluded from the sample, due to lack of data. These did not have stock prices on the majority of the dates required to conduct the OLS regression. Missing returns in the estimation window could lead to biases in the calculation of abnormal returns. Stocks that are traded less than 40% of the time in the estimation period and event window are defined as thinly traded stocks (Bartholdy et al., 2007). If stocks are not traded frequently it also means that the returns are not realized. The exclusion of these thinly traded stocks led to the final sample of 84 CBM&A announcements in the chemical industry.

The total sample was also divided into two categories: Pre-crisis (2003-2006) and crisis (2007-2010) period. Based on Guillen M.F. (2012) the global crisis started at the beginning of 2007 when the HSBC announced losses linked to US subprime mortgages.

5.2 Sample characteristics

The sample contains 84 M&A most valuable transaction announcements in the chemical industry between 2003 and 2010. The largest acquisition was between GlaxoSmithKline plc. and Stiefel laboratories Inc. for EUR 2.53 billion, while the lowest acquisition was made for EUR 33.5 million . The most represented acquirers came from the U.S.A. with a total of 15 acquisitions among the total 84, followed by Japan and Switzerland with 8, and 6, respectively, then France, Germany and Australia with 5, India with 4, while the other 33 acquisitions were from different countries.

The sample frequency and size of acquisition announcements are presented in table 5. The total sample size consists of two subsamples, i.e. the pre-crisis and crisis period. There are 43 announcements in the pre-crisis period (2003-2006) and 41 during the crisis period (2007-2009). The second part of the table is the sample frequency by years, which shows that the number of announcements are steadily increasing from year 2003 to 2006, where it peaked at 24 announcements per year. A steady increase is shown in the pre-crisis period, but from the year 2007 when the crisis period started, numbers fell from 20 announcements in 2007 to 7 announcements in 2009.

Table 5. Sample size and frequency of CBM&A announcements in the chemical industry

Sample	**Quantity**	**Percentage (%)**
Whole sample	84	100
Pre-Crisis	43	50
Crisis	41	50

Frequency by years	**Quantity**	**Percentage (%)**
2003	1	1.1
2004	4	4.8

2005	12	14.3
2006	24	28.6
2007	21	25.0
2008	15	17.9
2009	7	8.3
Total	84	100

Table 6 reports the frequency of cross-border merger & acquisition acquirers by location for the full sample. European acquirers are first with 36 CBM&A announcements (42.9%), followed by the Far East and Central Asia with 23 (27.4%), North America with 16 (19%), Oceania with 6 (7.1%), and South & Central America with 3 (3.6%).

Table 6. Frequency of CBM&A acquirers by region for the full sample

	Quantity	**Percentage (%)**
Europe	36	42.6
Oceania	6	7.1
South & Central America	3	3.6
Far East and Central Asia	23	27.4
North America	16	19.0
Total	*84*	*100*

When the whole period is divided into pre-crisis and crisis period, as seen in figure 4, we can see that only the European and the South & Central American region have more announcements in the crisis period. However the difference between the two periods is small for all the regions.

Figure 4. Frequency of CBM&A acquirers' by region for the pre-crisis and crisis period

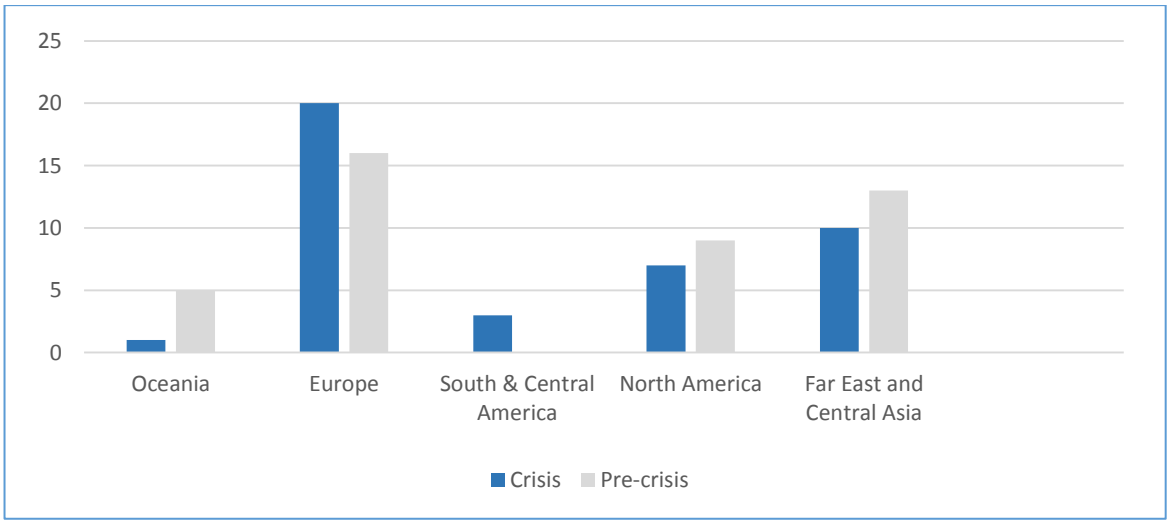


Table 7 presents the frequency of CMB&A classification by industry of the acquirer for the whole sample. Manufacturers of chemicals is the most represented acquirer in this sample with a total of 35.52%, followed by mining with 8.33%, oil and gas with 7.14%, fertilizers with 5 representatives which is 5.95% and the rest have 5 or less representatives in the full sample. Pharmaceuticals & biotechnology and other do not fit in the wider definition of the chemical industry, both make 26.2% of the whole sample, which can be interpreted that a good quarter of the acquirers in the sample diversified their portfolio.

Table 7. Frequency of CBM&A by industry of the acquirer for the whole sample

Industry	**Quantity**	**Percentage (%)**
Pharmaceuticals & Biotechnology	3	3.57
Perfumes	4	4.76
Oil & Gas Producers	6	7.14
Mining	7	8.33
Chemicals	29	34.52
Fertilizers	5	5.95
Consumer care	3	3.57
Explosives	4	4.76
Alternative energy	4	4.76
Other	19	22.62

Figure 5 presents the graphical presentation of CBM&A acquirers by industry for the whole sample. It is clear that the majority of the sample produces chemicals, while the group other presents various industries where the core business is not related to chemistry.

Figure 5. Frequency of CBM&A by industry of the acquirer for the whole sample

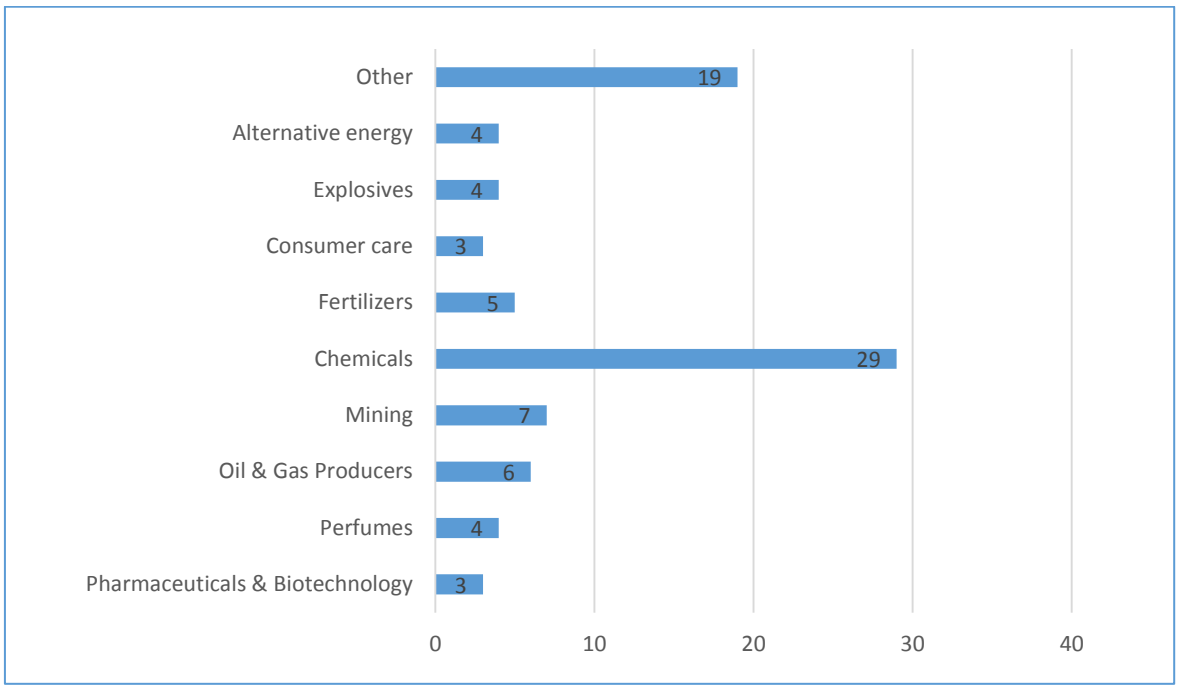


Table 8 presents the distribution of acquirers by countries, for deals over EUR10 million, which demonstrates that the acquirer and target companies are mainly from developed countries. Among the most valuable acquisitions we can see that the U.S.A. is targeted, more than it is acquiring, with 36.04% U.S.A. is the most targeted chemical country in the sample. Possible reasons for being targeted is because the U.S.A. is a developed country with advanced technology and has highly intelligent scientists. Germany, Switzerland, Great Britain, and France all have 3 or more targets and acquirers and all of them are economically developed.

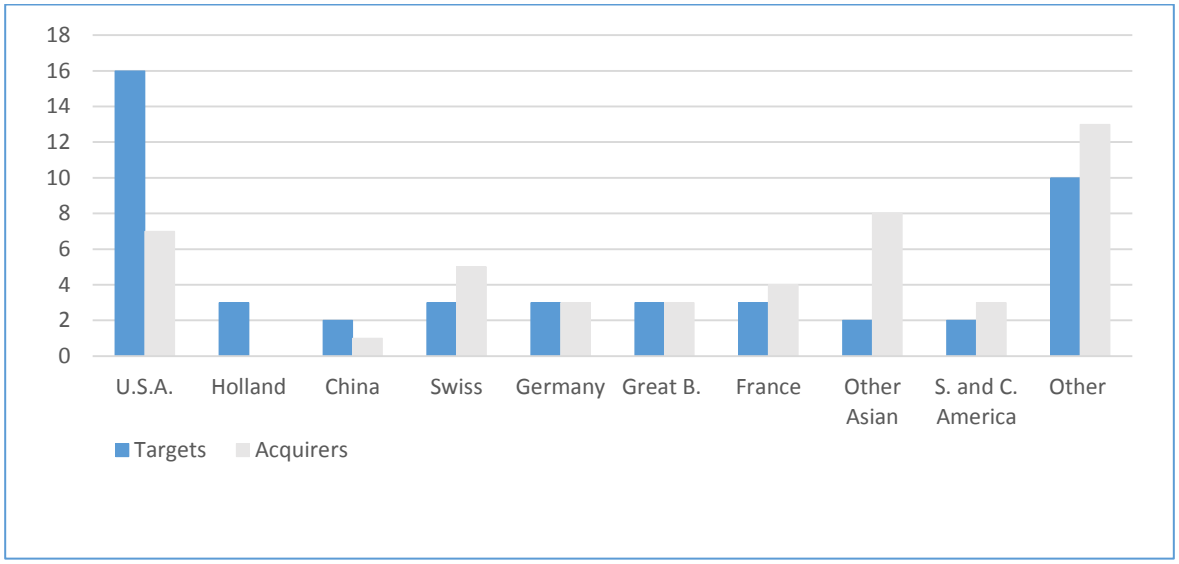
Table 8. Distribution of acquirers and targets by countries for deals over EUR 10 million

Acquirers	**Quantity**	**Percentage (%)**	**Targets**	**Quantity**	**Percentage (%)**
U.S.A.	7	14.89	U.S.A.	16	34.04
Australia	4	8.51	Holland	3	6.38
China	1	2.13	China	2	4.26
Swiss	5	10.64	Swiss	3	6.38
Germany	3	6.38	Germany	3	6.38
Great B.	3	6.38	Great B.	3	6.38
France	4	8.51	France	3	6.38
Other Asian	8	17.02	Other Asian	2	4.26
S. and C. America	3	6.38	S. and C. America	2	4.26
Other	9	19.15	Other	10	21.28

Figure 6 presents the distribution of acquirers and targets by countries for transactions over EUR 10 million. The figure shows that there is a difference between the U.S.A and other

Asian countries, between the numbers of acquisitions made and times being targeted. The U.S.A. is targeted two times more often than it is acquired, while other Asian countries are acquired 4 times more than they are being targeted.

Figure 6. Distribution of acquirers and targets by countries for deals over EUR 10 million



6 EMPIRICAL RESULTS

This thesis investigates whether the announcement of cross-border M&A generates value to shareholders of acquired companies in the chemical industry by examining the effect on stock prices in the short- and long-term. This effect of the event is analyzed by abnormal returns (hereinafter: AAR), i.e. returns generated by the M&A announcement. The event methodology is used in the thesis to determine possible abnormal returns. Abnormal returns are calculated by removing general stock price movement and separating the effect of the event. The analysis is conducted for the full sample and two subsamples: pre-crisis and crisis period. The results for the full sample will be explained first, followed by the pre-crisis sample and crisis sample.

6.1 Full sample

The full sample consists of 84 of the most important cross-border M&A transactions in the chemical industry, which were officially completed between 1 January 2005 and 1 January 2010. The goal was to investigate possible abnormal returns that could have been captured by the acquirers' shareholders.

6.1.1 Average abnormal return

The average abnormal returns surrounding the announcement of CBM&A for the full sample is presented in table 9. The days leading to the announcement mostly show positive average abnormal returns, while there seems to be some negative returns right after the announcement,

on the second and third day after the announcement. There is also a possibility of information leakage or insider trading, which results in possible gain of 0.503% three days prior to the announcement. The highest gain is presented at the announcement (day 0), with an average abnormal return increase of 0.703%. The result is significant at a 1% level to reject the $1H_0$ null hypothesis, while the sign test provides significance at a 10% level. There is another statistically significant result at a 5% level 3 days prior to the announcement that shows a positive average abnormal return of 0.391%, which also rejects the $1H_0$ null hypothesis. Results that are statistically significant above the 5% level are not considered to be statistically important and are not discussed in this thesis.

Ten days prior to the announcement there is a negative average abnormal return of -0.309%, which is statistically significant at a 10% level. Other days surrounding the announcement do not seem to be significant enough to confirm or reject the hypothesis.

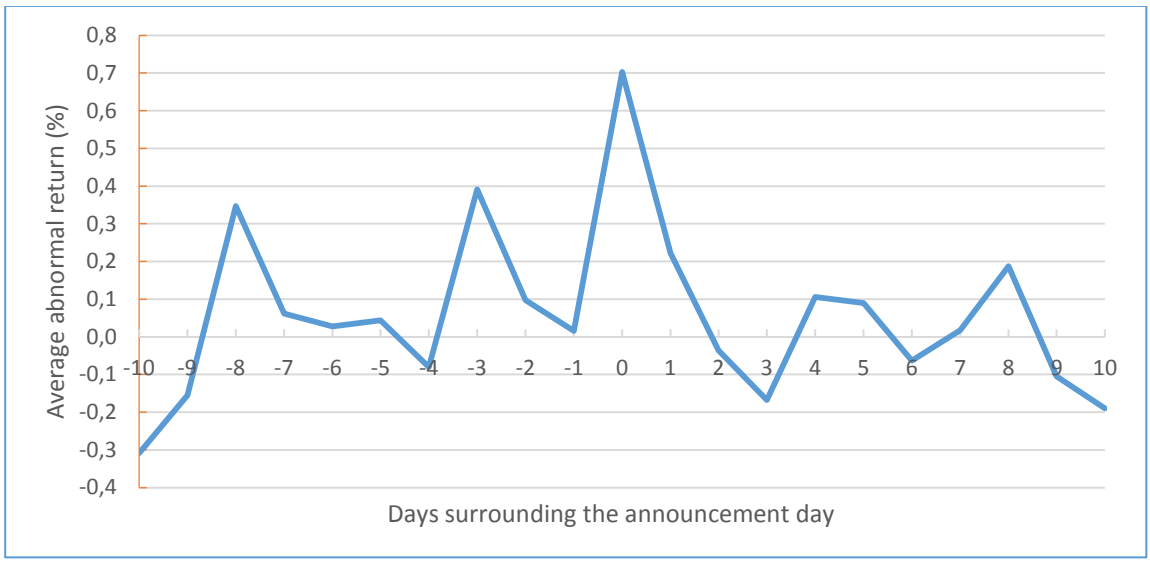
Table 9. Average abnormal returns surrounding the announcement of CBM&A for the full sample

Days surrounding the announcement	**Average abnormal return (%)**	**MacKinlay AAR parametric test**	**Sign test**
-10	-0.309	-1.408 *	0.000
- 9	-0.155	-0.706	-0.436
- 8	0.347	1.584 *	-0.655
- 7	0.062	0.282	-0.873
- 6	0.028	0.127	-1.091
- 5	0.044	0.199	0.873
- 4	-0.080	-0.366	-1.091
- 3	0.391	1.785 **	2.182 ***
			table continues
continued			
- 2	0.097	0.444	-1.746 **
- 1	0.015	0.070	0.655
0	0.703	3.206 ***	1.528 *
1	0.222	1.012	0.000
2	-0.036	-0.165	-0.873
3	-0.167	-0.763	-1.528 **
4	0.106	0.481	-0.218
5	0.090	0.408	0.000
6	-0.063	-0.287	-2.182 ***
7	0.017	0.079	-0.218
8	0.188	0.856	0.873
9	-0.105	-0.480	-0.873
10	-0.190	-0.864	-0.655

Note. The full sample consists of 84 acquisition announcements. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 7 presents a graph of average abnormal returns surrounding the announcement of CBM&A for the full sample. There are high positive peaks at days -8, -3 and on the announcement day, which present positive average abnormal returns higher than 0.3%. The announcement day and day 3 prior to the announcement are both statistically significant at a 1% and 5% level, which confirm the alternative hypothesis that there are positive abnormal returns in the event window.

Figure 7. Average abnormal returns surrounding the announcement of CBM&A for the full sample



6.1.2 Cumulative average abnormal return

Cumulative average abnormal return (hereinafter: CAAR) surrounding the announcement of CBM&A for the full sample is presented in table 10. There are 4 different event windows which are classified into the narrow window (5-day event window) and wider windows (11-day, 21-day, and the maximum cumulative average abnormal return value event window).

The non-parametric sign test shows that more than half of the sample has negative abnormal returns in the event window, therefore the test supports the $1H_0$ null hypothesis. From the sign test we can observe that there are more negative abnormal returns in the sample, but the values of negative abnormal returns are much smaller than the values of positive abnormal returns. This confirms that abnormal returns are not symmetrically distributed and only the results where the skewness is between the values of -1.0 and 1.0, since it is considered that between these levels the sample is still symmetrically distributed.

Table 10 shows us that the cumulative average abnormal returns are increasing from a 5-day event window to the 17-day event window, while the longest 21-day event window is seen to have a lower cumulative average abnormal return. The MacKinlay parametric test provides evidence that the 5-, 11- and 17-day event windows are statistically significant at a 5% level, which refutes the $1H_0$ null hypothesis. Acquirers' shareholders could take advantage of a cumulative average abnormal return of 1.963%, which would maximize their profits in the event window.

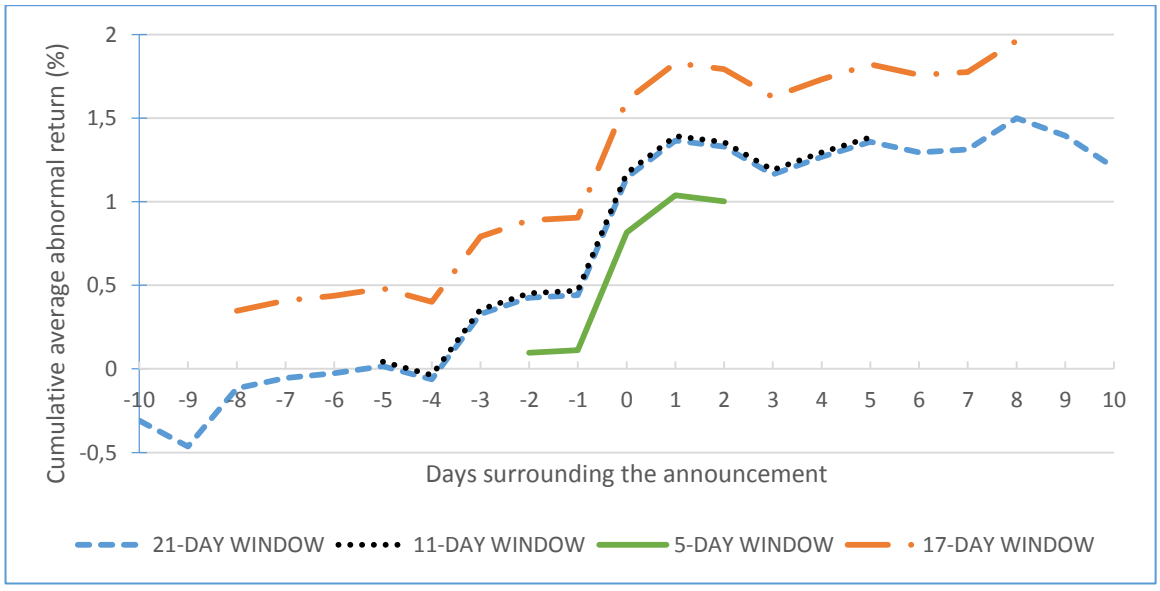
Table 10. Cumulative average abnormal returns surrounding the announcement of CBM&A for the full sample

Event window length	CAAR (%)	MacKinlay CAAR parametric test	Sign test
5-day event window	1.002	2.043 **	-0,195
11-day event window	1.384	1.903 **	-0,066
21- day event window	1.205	1.199	-1,059
17- (max. CAAR) day event window	1.963	2.171 **	-1,381

Note. The full sample consists of 84 acquisition announcements. ** indicate statistical significance at the 5% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 8 provides a graph of cumulative average abnormal returns surrounding the announcement of CBM&A for the full sample. The 17-day event window results in the highest CAAR, while the narrow event window provides the smallest increase in CAAR. The literature stressed that the narrower event windows provide higher CAAR values, this is not the case in this thesis.

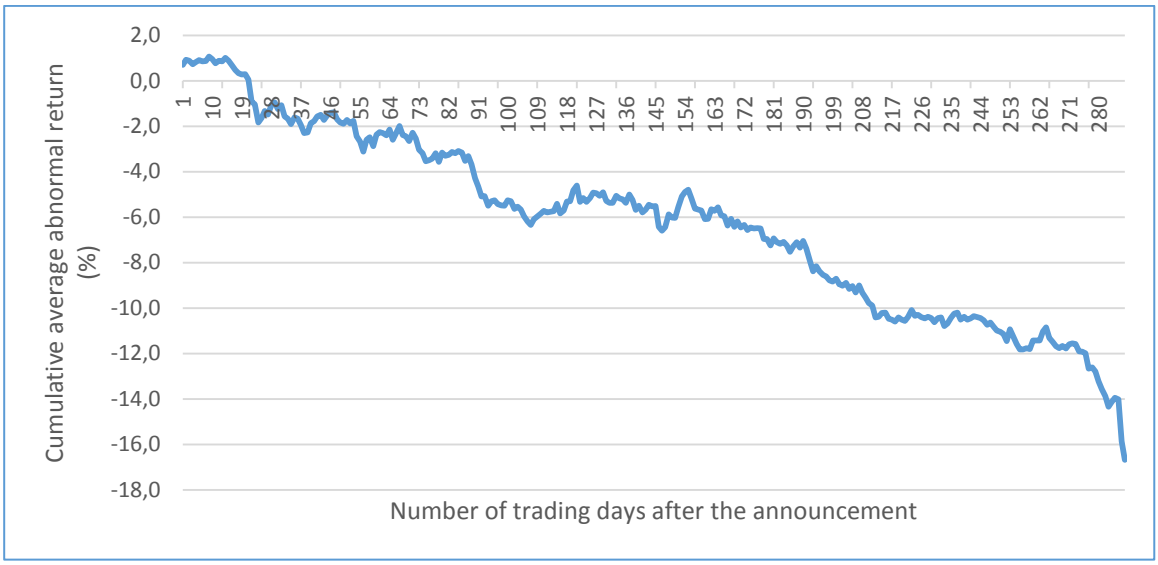
Figure 8. Cumulative average abnormal returns surrounding the announcement of CBM&A for the full sample



6.1.3 Long-term effect

Figure 9 presents long-term (1 year) cumulative average abnormal returns for the full sample. Abnormal returns for the full sample were calculated for 1 year after the announcement. Abnormal returns were averaged across securities to obtain average abnormal returns, which were than cumulated over time to obtain full cumulative average abnormal return for 1 year following the announcements. Figure 6 shows us that the cumulative average abnormal return was positive for 20 days after the announcement, when it slowly decreases and reaches a bottom cumulative average abnormal return of -16.68%, after 288 trading days (1 year). The MacKinlay parametric test and sign test both confirmed the $1H_0$ hypothesis at a 1% level. Thus providing evidence of a negative long-term effect of CBM&A on the acquirers in the chemical industry.

Figure 9. Long-term (1 year) cumulative average abnormal return for the full sample



6.2 Pre-crisis sample

The pre-crisis sample consists of 43 of the most valuable cross-border M&A deals in the chemical industry, which were officially announced before 1 January 2007, when the pre-crisis period ended.

6.2.1 Average abnormal return

Average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample is presented in table 11. There does not seem to be any information leakage or insider trading, since there are mostly negative average abnormal returns leading to the announcement. The highest gain is presented at the announcement (day 0), with an average abnormal return of 1.11%. The parametric test and sign test reject the $1H_0$ null hypothesis at a 1% level. Rejecting the $1H_0$ null hypothesis at a 1% level confirms the $1H_1$ alternative hypothesis, that the announcement has positive effect on the abnormal return for the acquirers'

company shareholders. Due to the fact that abnormal returns are skewed, little importance is put on the non-parametric sign test in some days surrounding the announcement. The analysis also shows an average abnormal return increase of 0.749% 8 days prior to the announcement, which is significant at a 1% level. The parametric test provides a statistically significant result that supports the $1H_1$ alternative hypothesis.

The first negative average abnormal return of -0.468%, which is statistically significant at a 5% level is seen 2 days after the announcement. The sign test confirms the MacKinlay parametric test, which further confirms the $1H_0$ null hypothesis.

Table 11. Average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample

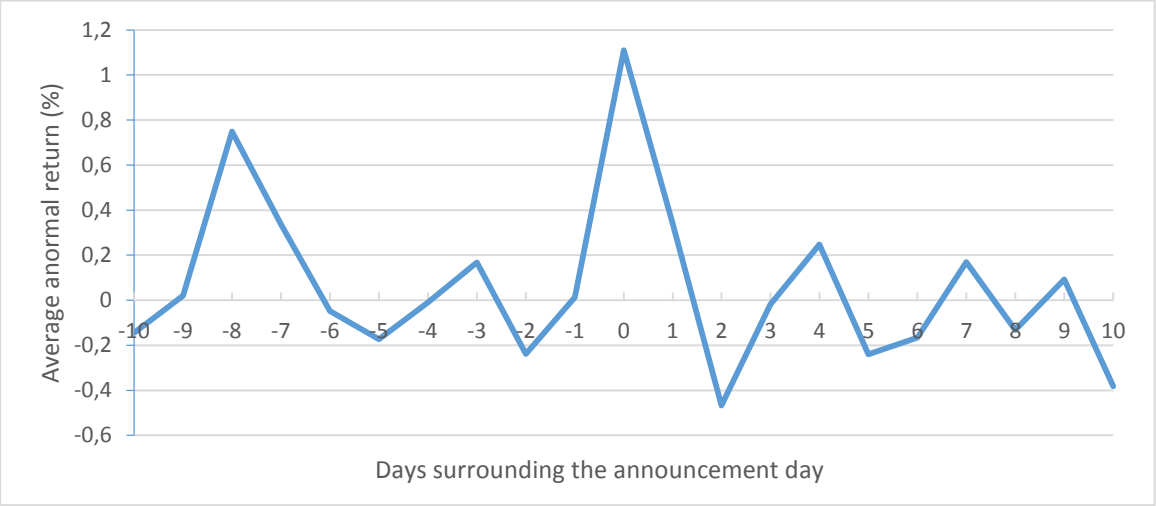
Days surrounding the announcement	Average abnormal return (%)	MacKinlay AAR parametric test	Sign test
-10	-0.144	-0.529	0.457
- 9	0.020	0.075	-0.762
- 8	0.749	2.738 ***	-0.152
- 7	0.337	1.234	-0.457
- 6	-0.049	-0.179	-0.152
- 5	-0.173	-0.633	0.762
- 4	-0.010	-0.037	-0.457
- 3	0.168	0.613	0.152
- 2	-0.238	-0.870	-2.592 ***
- 1	0.014	0.049	0.457
0	1.110	4.061 ***	2.287 ***
1	0.338	1.238	1.206
2	-0.468	-1.712 **	-1.809 **
			table continues
continued			
3	-0.018	-0.067	-1.809 **
4	0.248	0.906	0.603
5	-0.240	-0.878	-0.603
6	-0.166	-0.608	-1.809 **
7	0.169	0.617	0.302
8	-0.133	-0.485	0.000
9	0.093	0.339	0.603
10	-0.383	-1.400 *	-0.603

Note. The full sample consists of 84 acquisition announcements. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 10 presents a graph of average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample. There are high positive peaks at 8 days leading to the announcement and at the announcement day, which presents positive average abnormal

returns higher than 0.7%. The announcement day is statistically significant with a parametric and non-parametric test, which proves that there is a positive average abnormal return effect on the announcement day. A decrease is seen 2 days after the announcement, which is statistically significant at a 5% level, therefore confirming a negative average abnormal returns surrounding the announcement.

Figure 10. Average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample



6.2.2 Cumulative average abnormal return

Cumulative average abnormal return surrounding the announcement of CBM&A for the pre-crisis sample is presented in table 12. A decrease in CAAR was seen from the 5-day to the 11-day event windows, an increase occurred on the 17-day event window and then decreased again at the 21-day event window. Cumulative average abnormal returns were lower at the narrower event windows, while the wider event windows showed higher values. The MacKinlay CAAR parametric test provides evidence that the 17-day event window is statistically significant at a 10% level.

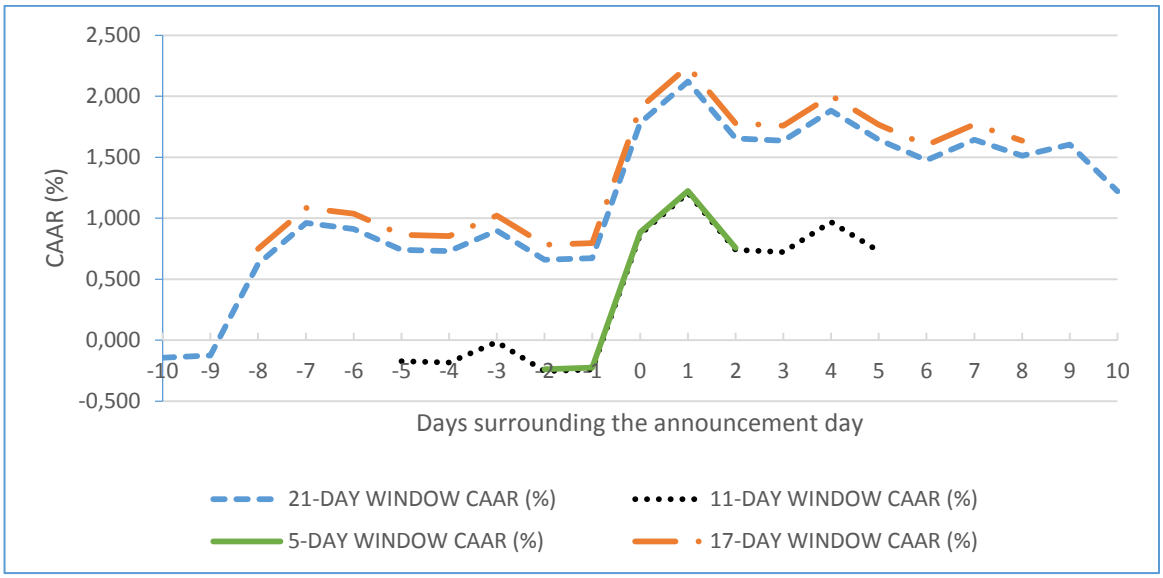
Table 12. Cumulative average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample

Event window length	CAAR (%)	MacKinlay CAAR parametric test		Sign test
5-day event window	0.756	1.237		-0,048
11-day event window	0.730	0.805		-0,322
21-day event window	1.22	0.975		-0,311
17-(max. CAAR) day event window	1.636	1.452	*	-0,703

Note. The full sample consists of 84 acquisition announcements. * indicates statistical significance at a 10% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 11 provides a graphical presentation of cumulative average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample. The highest cumulative average abnormal return is seen with the 17-day event window, while the smaller event windows (5- and 11-day) provide the smaller cumulative average abnormal return. Acquirer shareholders would increase their profits the most, if they invested during the 17 days surrounding the announcement.

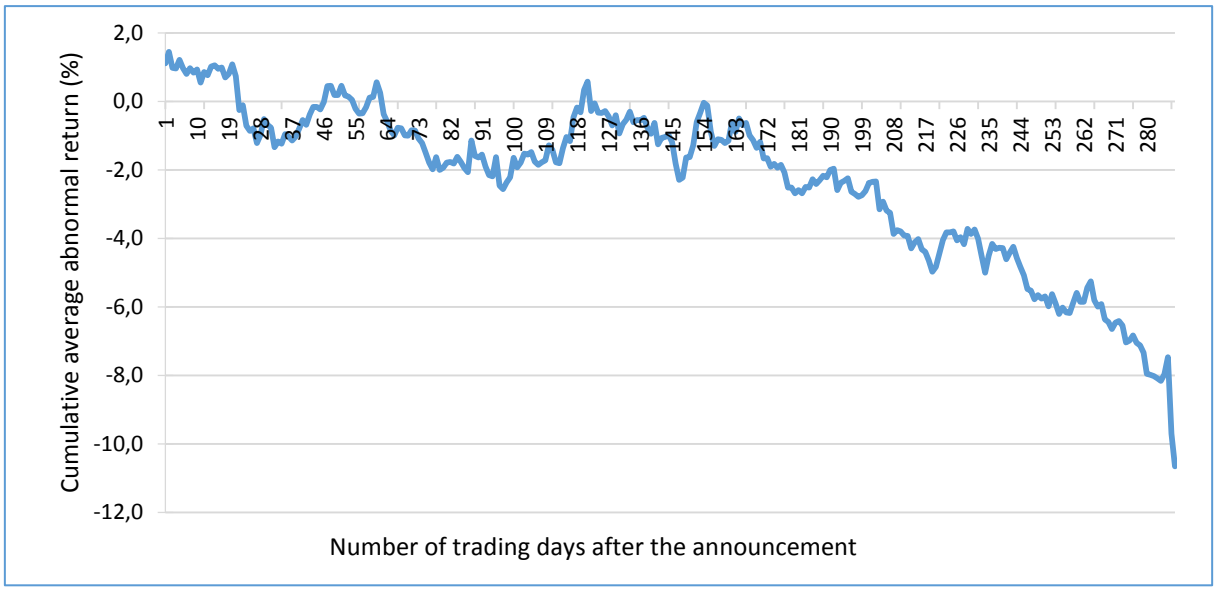
Figure 11. Cumulative average abnormal returns surrounding the announcement of CBM&A for the pre-crisis sample



6.2.3 Long-term effect

Figure 12 presents long-term (1 year) cumulative average abnormal returns for the pre-crisis sample. Cumulative average abnormal returns for the pre-crisis sample were calculated for 1 year after the announcement. Figure 13 shows us that the sample obtained a relatively small negative cumulative average abnormal return effect of around -2% for 170 trading days after the announcement, but after 170 trading days a significant decrease is seen. A decrease of more than 8% is seen in the last 110 days of the 1 year after the announcement window. The cumulative average abnormal return at the end of one year is -10.661%. The result is statistically significant with the parametric and non-parametric tests at a 1% level. Thus providing evidence of a negative long-term effect of CBM&A on the acquirers in the chemical industry for the pre-crisis period

Figure 12. Long-term (1 year) cumulative average abnormal return for the pre-crisis sample



6.3 Crisis sample

The crisis subsample consists of 41 valuable cross-border M&A transactions in the chemical industry, which were officially announced between 1 January2007 and 1 January2010.

6.3.1 Average abnormal return

Average abnormal returns surrounding the announcement of CBM&A for the crisis sample are presented in table 13. There is a possibility of information leakage or insider trading, since there are possible gains (1.092%) that could have been realized before the announcement. The highest average abnormal return increase of 0.626% is evident 3 days before the announcement. The parametric test shows significance at a 5% level, while the sign test shows significance at a 1% level, confirming the positive average abnormal return surrounding the announcement day. There are two more days that have a positive average abnormal return, which are significant at a 10% level by the parametric test. The first one is 2 days before the announcement, with an average abnormal return of 0.449% and the second is 8 days after the announcement with an average abnormal return of 0.524%.

The parametric test also provides a statistically significant negative result at a 10% level, for the result 10 days before the announcement with an average abnormal return of -0.481%, however the sign test does not confirm the parametric test and therefore it is inconclusive.

Table 13. Average abnormal returns surrounding the announcement of CBM&A for the crisis sample

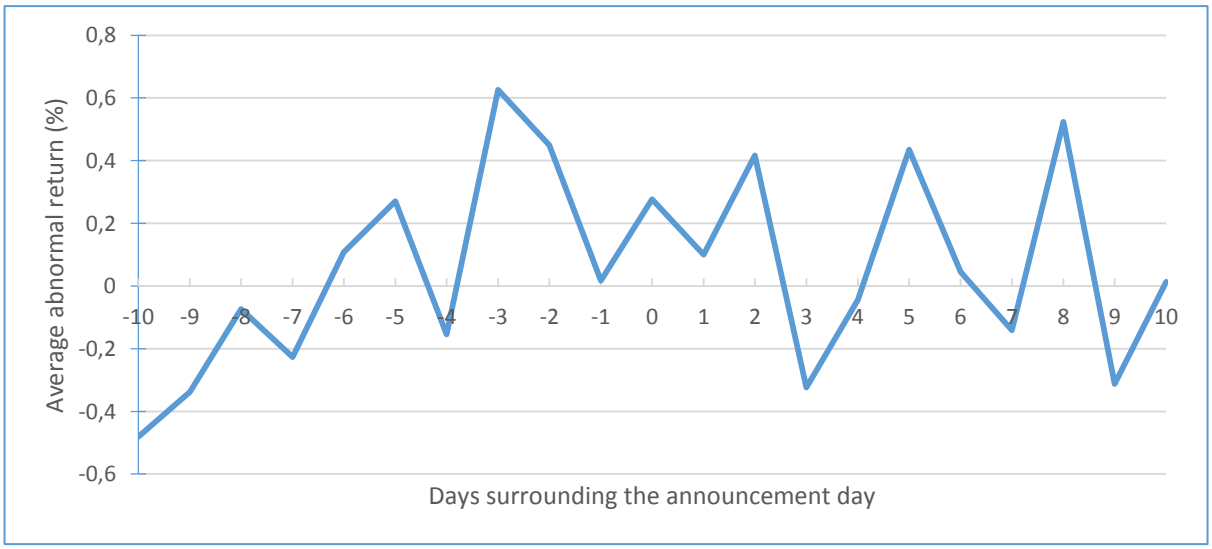
Days surrounding the announcement	Average abnormal return (%)	MacKinlay AAR parametric test	Sign test
-10	-0.481	-1.390 *	-0.469
- 9	-0.339	-0.978	0.156

- 8	-0.073		-0.212		-0.781	
- 7	-0.227		-0.656		-0.781	
- 6	0.108		0.313		-1.406	*
- 5	0.271		0.783		0.469	
- 4	-0.154		-0.445		-1.093	
- 3	0.626		1.810	**	2.967	***
- 2	0.449		1.298	*	0.156	
- 1	0.017		0.050		0.469	
0	0.277		0.800		-0.156	
1	0.100		0.289		-1.093	
2	0.417		1.204		0.781	
3	-0.324		-0.935		-0.156	
4	-0.043		-0.126		-0.781	
5	0.435		1.257		0.781	
6	0.045		0.131		-1.093	
7	-0.141		-0.408		-0.469	
8	0.524		1.513	*	1.406	*
9	-0.313		-0.904		-1.718	**
10	0.013		0.038		-0.156	

Note. The full sample consists of 84 acquisition announcements. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 13 presents a graph of average abnormal returns surrounding the announcement of CBM&A for the crisis sample. There are high positive peaks at 3 days prior to the announcement and 2, 5, and 8 days after the announcement, which presents positive average abnormal returns higher than 0.4%. Surprisingly the announcement day does not provide a positive statistically significant average abnormal return.

Figure 13. Average abnormal returns surrounding the announcement of CBM&A for the crisis sample



6.3.2 Cumulative average abnormal return

The cumulative average abnormal return surrounding the announcement of CBM&A for the crisis sample is presented in table 14. A 5-day event window shows a cumulative average abnormal return of 1.260% and the 11-day event window already shows a 1% higher cumulative average abnormal return. A major difference is also seen between the 17- and 21-day event windows, where the cumulative average abnormal return decreases by almost 0.9%. The maximum cumulative average abnormal return is 2.307% at the 17-day event window. The 11-day event window is statistically significant at a 5% level with the MacKinlay parametric test. Other event window lengths, except for the 21-day event window, are statistically significant at a 10% level with the parametric test.

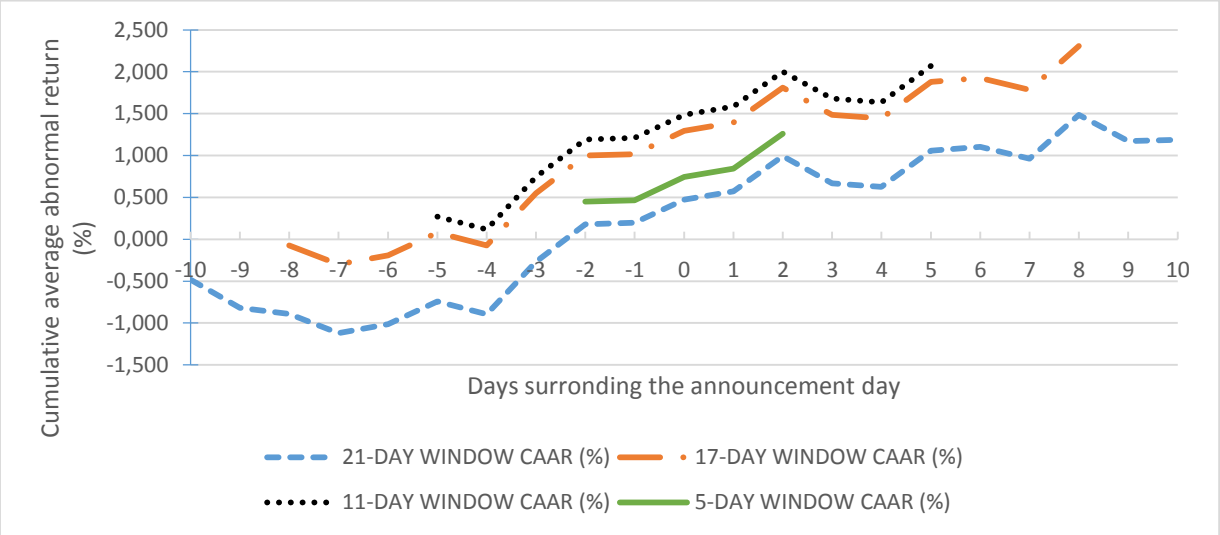
Table 14. Cumulative average abnormal returns surrounding the announcement of CBM&A for the crisis period

Event window length	CAAR (%)	MacKinlay parametric test		Sign test
5-day event window	1.260	1.628	*	0,070
11-day event window	2.071	1.805	**	0,706
21-day event window	1.187	0.749		-0,648
17-(max. value) day event window	2.307	1.617	*	-0,189

Note. The full sample consists of 84 acquisition announcements. * and ** indicates statistical significance at 10% and 5% level. Sign test results colored in grey are abnormal returns where the skewness is greater than 1.0 (or less than -1.0) and are not used in the analysis.

Figure 13 provides a graphical presentation of cumulative average abnormal returns surrounding the announcement of CBM&A for the crisis sample. We can see that the 17-day event window gives the highest cumulative average abnormal return, while the longest 21-day event window provides the smallest cumulative average abnormal return. A 4-day difference between the 17- and 21-day event windows gives us the highest and the lowest cumulative average abnormal return, therefore the first and last 2 days in the event window resulted in a high negative cumulative average abnormal returns.

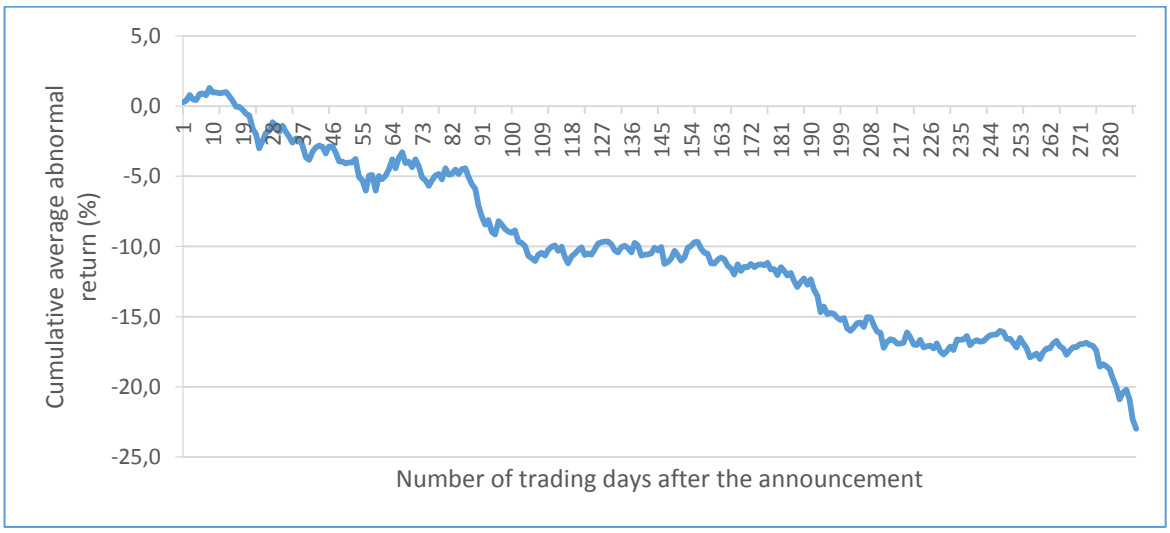
Figure 13. Cumulative average abnormal returns surrounding the announcement of CBM&A for the crisis period



6.3.3 Long-term effect

Figure 14 presents long-term (1 year) cumulative average abnormal return for the crisis sample. The results for the crisis period are similar to the one for the full sample, but with an even lower cumulative average abnormal return over a one year period. Figure 12 shows us that the cumulative average abnormal return was positive for 20 days after the announcement, when it slowly decreased and reached a bottom at a cumulative average abnormal return of -22.788%, after 288 trading days (1 year). The MacKinlay parametric test and sign test both demonstrated a decrease of -22.788% at a 1% level. Thus providing evidence of a negative long-term effect of CBM&A on the acquirers in the chemical industry.

Figure 14. Long-term (1 year) cumulative average abnormal return for the crisis sample



CONCLUSION

The purpose of this thesis was to analyze the short- and long-term announcement effects of cross-border M&A on acquirer company's stock values in the chemical industry. A sample of 84 acquirers were analyzed in order to find empirical evidence that supports the $1H_0$ null hypothesis. The $1H_0$ null hypothesis states that there will be negative or no effects on abnormal returns, associated with the announcement effect of cross-border M&A in the chemical industry. The full sample of 84 is further divided into pre-crisis (2003-2006) and crisis (2007-2009) period.

The event study methodology was applied in order to determine abnormal returns to acquirer shareholders of cross-border M&A announcements in the chemical industry. There were 4 different event windows, a short-term period of 5 days, 11 days, 21 days and an event window that provides maximum cumulative average abnormal return value. The observed returns only reflect the news of the announcement. A long-term 1 year period was also chosen in order to observe the after effects of the announcement.

Average abnormal returns for the full sample show that the highest gain is evident on the announcement day (day 0), with an average abnormal return of 0.703%. The result is statistically significant at a 1% level with a parametric test. Another statistically significant result at the 5% level, with an average abnormal return of 0.391% was seen 3 days prior to the announcement. The result rejects the $1H_0$ null hypothesis and proves the $1H_1$ alternative hypothesis that there are positive abnormal returns 3 days prior to the announcement. The possible average abnormal return gain of 0.5%, three days prior to the announcement shows the possibility of information leakage or insider trading. A cumulative average abnormal return for the four different event windows provided statistically significant results at a 2.5% level for the 5-day and 17-day event windows. The 5-day event window and the wider 17-day event window show positive cumulative average abnormal returns of 2.043% and 2.171%. The middle 11 day event window that is statistically significant at a 5% level shows a positive cumulative average abnormal return of 1.903%. A long-term effect of the announcement shows that there is negative cumulative average abnormal returns of -16.680%, one year after the announcement, which supports the $1H_0$ null hypothesis at a 1% level with the sign and MacKinlay parametric tests.

The pre-crisis sample consists of 43 cross-border M&A deals in the chemical industry that were announced between 2003 and 2006. Average abnormal returns for the pre-crisis sample showed that the highest gain is presented at the announcement, with an average abnormal return of 1.110%. Parametric and non-parametric tests rejected the $1H_0$ null hypothesis at a 1% level, which proves that there is a positive average abnormal return at the announcement. A negative average abnormal return of -0.468% is seen 2 days after the announcement, which is statistically significant at a 5% level with both statistical tests. A cumulative abnormal average return of 1.636% for the 17-day event window is the only event window that is statistically significant, but only at a 10% level. Long-term effects of the announcement show that there is a negative cumulative average abnormal return of -10.661%, one year after the announcement, which supports the $1H_0$ null hypothesis at a 1% level with the sign and MacKinlay parametric

tests. Thus providing evidence of negative long-term effects of CBM&A on the acquirers in the chemical industry in the pre-crisis period.

The crisis sample consists of 41 cross-border M&A deals in the chemical industry that were announced between 2007 and 2009. The highest average abnormal return gain of 0.626% is presented 3 days before the announcement which is statistically significant at a 5% and 1% level with parametric and non-parametric test. The statistical tests rejected the $1H_0$ null hypothesis and prove that there is a positive average abnormal return 3 days prior to the announcement. A cumulative average abnormal return of 2.071% shows that the 11-day event window is statistically significant at a 5% level, which proves the $1H_1$ alternative hypothesis that there are positive cumulative average abnormal returns during the days surrounding the announcement. Long-term effects of the announcement show that there is a negative cumulative average abnormal return of -22.788% one year after the announcement, which supports the $1H_0$ null hypothesis at a 1% level with the sign and MacKinlay parametric tests. Thus providing evidence of negative long-term effects of CBM&A on the acquirers in the chemical industry in the pre-crisis period.

This thesis provides evidence that there is a negative cumulative average abnormal return from -10.661% in the pre-crisis to -22.788% in the crisis period, for the long-term after effects of the cross-border M&A announcement in the chemical industry. We can also conclude that statistically significant average abnormal returns are near the announcement day, which were from 3 days prior until 3 days after the announcement. Days further away from the announcement are usually not statistically significant. Analysis of the cumulative average abnormal returns show that the 17- day event period brings the highest cumulative average abnormal returns and also that the narrower (5- and 11-day) event windows bring lower cumulative average abnormal returns than the 21-day event window. The hypothesis for the full sample, that abnormal returns are negative or have no effect in the event windows is rejected for the short-term event windows but confirmed for the long-term event window. The subsample hypothesis that the pre-crisis period has lower abnormal returns than the crisis period is confirmed for the short-term event window but rejected for the long-term event window.

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APPENDIXES

TABLE OF APPENDIXES

Appendix A: Deal announcements analysed with announcement dates used in this thesis

Table 1. Deal announcements analysed with announcement dates used in this thesis

#	Acquirer name	Target name	Acq. Country	Tar. Country	Announcement date	Deal value in thousands (EUR)
1	GLAXOSMITHKLINE PLC	STIEFEL LABORATORIES INC.	GB	US	20.4.2009	2,532,796.74
2	PPG INDUSTRIES INC.	SIGMAKALON (BC) HOLDCO BV	US	NL	4.10.2007	2,200,000.00
3	GIVAUDAN SA	QUEST INTERNATIONAL NEDERLAND BV	CH	NL	22.11.2006	1,733,426.02
4	SOLVAY SA	LABORATOIRES FOURNIER SA	BE	FR	24.3.2005	1,615,000.00
5	CYTEC INDUSTRIES INC.	UCB SURFACE SPECIALTIES	US	BE	1.10.2004	1,425,000.00
6	YARA INTERNATIONAL	SASKFERCO PRODUCTS INC.	NO	CA	14.7.2008	1,069,882.24
7	OMV AG	BOREALIS A/S	AT	DK	30.6.2005	1,000,000.00
8	TATA CHEMICALS LTD	GENERAL CHEMICAL INDUSTRIAL PRODUCTS INC.	IN	US	31.1.2008	640,888.50
9	CRODA INTERNATIONAL PLC	UNIQEMA	GB	US	29.6.2006	608,674.29
10	DOW CHEMICAL COMPANY, THE	WOLFF WALSRODE AG	US	DE	18.12.2006	540,000.00
11	ORICA LTD	DYNO NOBEL ASA'S	AU	NO	19.9.2005	532,724.50
12	ORICA LTD	MINOVA INTERNATIONAL LTD	AU	GB	17.10.2006	532,529.08
13	ORICA LTD	EXCEL MINING SYSTEMS INC.	AU	US	24.9.2007	465,650.00
14	MEXICHEM SA DE CV	AMANCO HOLDING INC.	MX	PA	22.2.2007	380,650.00
15	AIR PRODUCTS AND CHEMICALS INC.	BOC GAZY SP ZOO	US	PL	8.1.2007	370,000.00
16	BASF AG	JOHNSON POLYMER LLC	DE	US	2.5.2006	369,514.00
17	LONZA GROUP AG	CAMBREX CORPORATION'S BIOPRODUCTS AND BIOPHARMA SUBSIDIARIES	CH	US	24.10.2006	355,534.00
18	NOVA CHEMICALS CORPORATION	NOVA INNOVENE	CA	CH	16.11.2004	332,800.00
19	COMPAGNIE DE SAINT-GOBAIN SA	NORANDEXREYNOLDS DISTRIBUTION CO	FR	US	17.7.2007	270,703.86
20	ISRAEL CHEMICALS LTD	SUPRESTA LLC	IL	US	25.6.2007	257,593.60
21	PROCTER & GAMBLE COMPANY	SPD SWISS PRECISION DIAGNOSTICS GMBH	US	CH	18.7.2006	239,395.00

table continues

continued

22	CHINA PETROLEUM & CHEMICAL CORPORATION	SINOPEC MITSUBISHI CHEMICAL POLYCARBONATE (BEIJING) CO., LTD	CN	CN	21.5.2009	233,177.37
23	JOHNSON MATTHEY PLC	ARGILLON GMBH	GB	DE	10.12.2007	214,000.00
24	HUNTSMAN CORPORATION	CIBA SPECIALTY CHEMICALS HOLDING'S	US	CH	20.2.2006	212,224.93
25	KEMIRA OYJ	CYTEC INDUSTRIES	FI	US	17.7.2006	198,500.00
26	HEWLETT-PACKARD COMPANY	SCITEX VISION LTD	US	IL	11.8.2005	190,670.00
27	MEXICHEM SA DE CV	PETROQUIMICA COLOMBIANA SA	MX	CO	23.2.2007	187,600.00
28	NIPPON PAINT CO., LTD	ROHM AND HAAS	JP	US	7.8.2006	181,516.00
29	OM GROUP INC.	ROCKWOOD HOLDINGS INC.'S	US	FR	8.10.2007	180,014.50
30	FUJI PHOTO FILM CO., LTD	SERICOL LTD	JP	GB	19.1.2005	173,493.60
31	MITSUBISHI RAYON CO., LTD	DAESAN MMA CORPORATION	JP	KR	10.5.2006	161,861.67
32	KEMIRA OYJ	VERDUGT BV	FI	NL	7.2.2005	145,000.00
33	NUFARM LTD	AGRIPEC QUIMICA E FARMAC?UTICA SA	AU	BR	3.5.2007	134,933.61
34	BASF AG	AIR PRODUCTS & CHEMICALS	DE	US	31.3.2006	127,239.50
35	SEKISUI CHEMICAL CO., LTD	CELANESE CORPORATION'S POLYVINYL ALCOHOL BUSINESS	JP	US	27.4.2009	123,276.97
36	ASHLAND INC.	DEGUSSA AG'S WATER TREATMENT UNIT	US	DE	30.3.2006	122,000.00
37	LONZA GROUP AG	UCB-BIOPRODUCTS	CH	BE	17.1.2006	120,000.00
38	FRESENIUS MEDICAL CARE AG & CO.KGAA	NABI BIOPHARMACEUTICALS INC'S	DE	US	12.10.2006	116,805.00
39	IMERYS SA	ASTRON CO., LTD	FR	CN	29.8.2007	112,053.65
40	ARCELORMITTAL SA	KOPPERS HOLDINGS	LU	US	4.8.2008	113,568.00
41	SYNGENTA AG	MONSANTO COMPANY'S GLOBAL SUNFLOWER ASSETS	CH	US	6.8.2009	112,107.20
42	UNITED PHOSPHOROUS LTD	CEREXAGRI SA	IN	FR	14.11.2006	111,000.00
43	NUPLEX INDUSTRIES LTD	AKZO NOBEL NV'S COATING RESINS BUSINESS	NZ	NL	15.10.2004	106,986.09
44	SOLVAY SA	ALEXANDRIA SODIUM CARBONATE CO.	BE	EG	17.10.2008	105,713.63
45	AIR LIQUIDE SA	LINDE GAS UK LTD	FR	GB	8.3.2007	105,000.00
46	SYNGENTA AG	CONRAD FAFARD INC.	CH	US	10.7.2006	104,623.95
47	AIR LIQUIDE SA	AIR LIQUID SEVERSTAL ZAO	FR	RU	7.7.2005	100,000.00

table continues

continued

48	GLOBAL BIOCHEM TECHNOLOGY GROUP CO., LTD	CHANGCHUN DACHENG INDUSTRIAL GROUP CO., LTD	KY	CN	29.6.2005	95,771.86
49	TATA CHEMICALS LTD	BRUNNER MOND GROUP LTD	IN	GB	24.11.2005	95,045.05
50	SUMITOMO BAKELITE CO., LTD	VYNCOLIT NORTH AMERICA INC.	JP	US	29.4.2005	93,391.89
51	MORGAN CRUCIBLE COMPANY PLC, THE	CARPENTER ADVANCED CERAMICS	GB	US	21.12.2007	91,702.35
52	MITSUI CHEMICALS, INC.	SHANGHAI SINOPEC MITSUI CHEMICALS	JP	CN	25.3.2004	89,549.80
53	LINDE AG	BIRLESIC OKSIJEN SANAYI AS	DE	TR	5.4.2007	87,072.00
54	FAR EASTERN POLYCHEM INDUSTRIES LTD	ORIENTAL PETROCHEMICAL	BM	CN	7.5.2003	85,726.90
55	3M COMPANY	EMFI SA	US	FR	22.7.2008	85,000.00
56	CELANESE CORPORATION	ACETATE PRODUCTS LTD'S BUSINESS	US	GB	29.8.2006	84,843.00
57	KUALA LUMPUR KEPONG BHD	DR W KOLB HOLDING AG	MY	CH	18.12.2006	83,842.81
58	SYMRISE AG	MANHEIMER FRAGRANCES	DE	US	25.9.2008	77,790.00
59	CHEMRING GROUP PLC	SIMMEL DIFESA SPA	GB	IT	30.3.2007	77,000.00
60	SINOHYDRO CORPORATION	SOCIETE PAR ACTIONS A RESPONSABILITE LIMITEE	CN	CD	23.4.2008	71,050.00
61	ZOLTEK COMPANIES INC.	CYDSA SA DE CV'S	US	MX	3.10.2007	70,527.00
62	SYNGENTA AG	ZERAIM GEDERA LTD	CH	IL	9.7.2007	69,317.70
63	MITSUI CHEMICALS, INC.	SILVUE TECHNOLOGIES GROUP INC.	JP	US	8.5.2008	61,094.50
64	GIVAUDAN SA	QUEST INTERNATIONAL INDIA	CH	IN	22.11.2006	60,658.52
65	CHEMRING GROUP PLC	TECHNICAL ORDNANCE INC.	GB	US	1.2.2006	58,814.00
66	YINGLI GREEN ENERGY HOLDING CO., LTD	CYBER POWER GROUP LTD	KY	CN	7.1.2009	58,735.44
67	MCBRIDE PLC	CHEMOLUX SA	GB	LU	26.3.2007	57,709.19
68	COROMANDEL FERTILISERS LTD	TUNISIAN INDIAN FERTILISERS S A	IN	TN	22.8.2006	51,994.80
69	CABOT MICROELECTRONICS CORPORATION	ARKEMA SA	US	TW	19.12.2008	51,833.82
70	AIR LIQUIDE SA	FOSHAN PLASTICS GROUP CO., LTD	FR	GB	1.10.2007	51,000.00
71	ART & FRAGRANCE SA	LALIQUE SA	CH	FR	14.2.2008	49,000.00
72	SIGMA-ALDRICH CORPORATION	EPICHEM GROUP LTD	US	GB	12.2.2007	46,140.00
73	CHEMRING GROUP PLC	MARTIN ELECTRONICS INC.	GB	US	24.6.2008	44,933.00

table continues

continued

74	PERKINELMER INC.	SYM-BIO LIFESCIENCE CO LTD	US	CN	12.6.2009	44,428.15
75	OJI PAPER CO., LTD	ILFORD IMAGING SWITZERLAND GMBH	JP	CH	1.7.2005	44,414.19
76	ALICORP SAA	THE VALUE BRAND COMPANY	PE	AR	2.6.2008	41,801.50
77	YARA INTERNATIONAL ASA	BALDERTON FERTILISERS SA	NO	CH	4.9.2006	41,745.45
78	AUSTRALIAN ETHANOL LTD	DIVERSIFIED ENERGY COMPANY LLC	AU	US	31.10.2005	41,578.92
79	HEALTHCARE TECHNOLOGIES LTD	NEXGEN 2007 INC.	IL	US	3.1.2008	39,399.40
80	AKRON OAO	101109718 SASKATCHEWAN LTD	RU	CA	26.6.2008	38,681.75
81	KORDSA GLOBAL ENDÜSTRIYEL IPLIK VE KORD BEZI SAN VE TIC AS	PT BRANTA MULIA	TR	ID	22.12.2006	38,466.09
82	BP PLC	TROPICAL BIOENERGIA SA	GB	BR	24.4.2008	38,167.26
83	ARKEMA SA	DOW CHEMICAL COMPANY'S CLEAR LAKE OPERATIONS AND UCAR EMULSION SYSTEMS BUSINESSES	FR	US	3.8.2009	35,329.44
84	FOSHAN PLASTICS GROUP CO., LTD	INVISTATM FIBER (FOSHAN) CO., LTD	CN	US	6.4.2005	33,419.60

Source: Online database, in *Zephyr-Bureau van Dijk*, n.d.

Appendix B: OLS estimators of the market model parameters for the full sample

Table 2. OLS estimators of the market model parameters for the full sample

Securities	α_i **(intercept)**	β_i **(slope)**	**Securities**	α_i **(intercept)**	β_i **(slope)**
1	0,00017	0,54110	36	0,00375	0,38367
2	0,00008	0,54799	37	0,00017	1,89525
3	0,00598	0,70246	38	0,00216	0,32663
4	-0,00034	1,15020	39	-0,00048	1,53005
5	-0,00052	1,25695	40	0,00021	1,04896
6	-0,00031	1,28231	41	-0,00344	1,42433
7	0,00052	1,29733	42	-0,00007	0,96521
8	-0,00024	1,36844	43	0,00219	0,62711
9	0,00053	0,08726	44	0,00102	0,30238
10	0,00016	0,69701	45	-0,00066	0,68900
11	0,00190	1,14761	46	0,00510	1,17342
12	0,00158	1,21863	47	0,00160	1,26678
13	-0,00006	0,62715	48	-0,00077	1,11690
14	0,00053	0,96591	49	0,00070	1,06825
15	0,00085	1,02475	50	0,00034	0,95084
16	0,00012	0,69130	51	0,00015	1,52306
17	0,00042	1,03614	52	0,00101	0,56494
18	0,00018	1,90025	53	-0,00064	1,02611
19	0,00070	1,17727	54	0,00152	0,39940
20	0,00229	1,38458	55	0,00350	1,49816
21	0,00053	0,15012	56	0,00112	0,66167
22	0,00156	1,02009	57	0,00072	1,04196
23	-0,00076	0,88034	58	0,00022	1,47526
24	0,00034	0,86941	59	0,00086	0,72953
25	0,00227	1,24893	60	0,00150	1,00080
26	0,00019	0,54367	61	-0,00002	1,10482
27	0,00052	1,13435	62	0,00015	0,93151
28	-0,00109	0,25252	63	0,00094	0,74611
29	0,00112	1,27309	64	-0,00006	0,78348
30	0,00005	0,77570	65	-0,00024	0,85482
31	-0,00021	1,28688	66	-0,00167	1,02636
32	0,00141	1,47349	67	0,00074	0,79284
33	0,00325	1,33188	68	-0,00042	-0,06781
34	0,00057	1,19787	69	0,00008	0,20275
35	0,00008	0,54799	70	0,00818	0,65239

table continues

continued

71	0,00042	0,86140
72	0,00192	1,21562
73	0,00145	0,39946
74	0,00050	0,13977
75	0,00113	0,15050
76	0,00161	0,77888
77	-0,00006	0,88102
78	-0,00150	0,92611
79	0,00159	0,71469
80	0,00009	0,83882
81	-0,00052	0,90103
82	-0,00053	0,85583
83	0,00022	0,84651
84	-0,00142	1,00878

Appendix C: Variances of abnormal returns and cumulative abnormal returns for the full sample

Table 3. Variances of abnormal returns and cumulative abnormal returns for the full sample

Variances	Values
$var(\overline{AR})$	= 4,81014E-06
$var(\overline{CAR}\ (5-day\ event\ window))$	= 2,40507E-05
$var(\overline{CAR}\ (11-day\ event\ window))$	= 5,29115E-05
$var(\overline{CAR}\ (17-day\ event\ window))$	= 8,17723E-05
$var(\overline{CAR}\ (21-day\ event\ window))$	= 0,000101

Appendix D: Order of crisis and pre-crisis companies

Table 4. Order of crisis and pre-crisis companies

Pre-crisis companies	Crisis companies
3	1
4	2
5	6
7	8
9	13
10	14
11	15
12	19
16	21
17	22
18	26
20	28
23	32
24	34
25	38
27	39
29	40
30	43
31	44
33	50
35	52
36	54
37	57
41	58
42	59
45	60
46	61
47	65
48	66
49	68
51	69
53	70
55, 56	71, 72
62, 63, 64, 67, 75	73, 74, 76, 79
77, 78, 81, and 84	80, 82, and 83

Appendix E: Thesis summary in Slovenian language

Namen magistrske naloge je bil analizirati kratkoročni in dolgoročni naznanitveni učinek čezmejnega združevanja in prevzema na vrednost delnic za prevzemnike v kemijski industriji. Analiziran je bil vzorec 84 prevzemnikov najbogatejših združitev in prevzemov od leta 2003 do 2009. Ničelna hipoteza trdi, da bo prišlo do negativnega ali ničelnega abnormalnega učinka čezmejnega združevanja in prevzema v kemijski industriji. Celoten vzorec je razdeljen na predkrizno (2003-2006) in krizno (2007-2009) obdobje.

Za analiziranje naznanitvenega učinka je bila uporabljena metodologija, ki se imenuje študija dogodkov, s katero ugotovimo abnormalne donose za delničarje prevzemnikov v kratkoročnem in dolgoročnem obdobju. Kratkoročno obdobje je sestavljeno iz 5-, 11-, 17- in 21-dnevnih dogodkov, ki se nahajajo okoli naznanitve. Kratka obdobja so zbrana okoli naznanitve tako, da preprečimo vpliv kakršnega drugega dogodka na abnormalni donos, tako da na abnormalni donos vpliva samo naznanitev. Dolgoročno obdobje sledi enemu letu po naznanitvi, tako da vidimo kakšen je dolgoročni vpliv na naznanitev.

Analiza je pokazala, da je negativni kumulativni povprečni abnormalni donos za leto po naznanitvi od -10.661 % do -22.788 %. Ničelna hipoteza za naznanitveni učinek združevanja in prevzemov v kemijski industriji je potrjena za dolgoročni abnormalni donos. Prav tako lahko sklepamo, da je večina statistično pomembnih abnormalnih povprečnih donosov bila blizu dneva naznanitve, in sicer 3 dni pred do 3 dni po objavi. Dnevi v oknu opazovanja, ki so bolj oddaljeni od naznanitve običajno niso statistično značilni. Analiza kumulativnega povprečnega abnormalnega donosa kaže, da 17-dnevno obdobje dogodka prinaša najvišje kumulativne povprečne abnormalne donose, in tudi, da ožja (5 in 11) dnevna okna dogodka prinašajo nižjo kumulativno povprečno abnormalno donosnost kot 21-dnevna okna dogodka. Hipoteza za celoten vzorec, da so abnormalni donosi negativni ali ničelni v oknu dogodka, je zavrnjena. Hipoteza za podvzorec, da ima obdobje pred krizo nižje abnormalne donose kot krizno obdobje, je potrjena. Kumulativna povprečna abnormalna donosnost je višja za vsa statistično pomembna okna dogodkov.