

University of Nottingham

**The effects of mergers and
acquisitions on company's
operating performance**

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Abstract

This paper examines the effects of mergers and acquisitions on the firm's operating performances in UK from 2005-2008. The performances of acquiring firms are compared with the control group of non-merging firms by employing a fixed-effect model. Four performances measurements are employed including ROA, ROCE, profit margin and cash flow ratio. There is no significant evidence that mergers and acquisitions have impact on company's operating performance over the whole sample. However, significant positive effects of M&A are found in particular financial year and in certain industries.

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1. Introduction

1.1 Background of mergers and acquisitions

Mergers and acquisitions have been happening all the time over a century's time and they always come in waves. The first takeover wave occurred in the US in the 1900s and the UK had the first takeover wave in the 1960s. It has been tested that takeover waves are always influenced by external business environment changes such as economic recessions and recovery, regulatory changes and technical innovations. Scholars have been interested in whether M&A activities will bring benefits to firms for decades and developed several theories to explain why firms get involved in M&A activities. Stigler (1950) suggested the motive behind the merger wave in the 1900s is that large firms are looking for monopoly power to enhance their strength in competitions. In addition, companies are also intended to achieve economies of scale by merging. Mergers and acquisitions in the 1950s were driven by firms' intention to be more diversified and enter into new markets unrelated to their primary business. Academic literature suggested the takeovers that occurred in the US around the 1980s are due to the recovery from the economic recession and deregulation of the financial services sectors (Martynova and Renneboog, 2008). In more recent periods of the 1990s and recent years, globalization creates a more competitive international business environment which stimulates cross-border M&A activities.

Mergers and acquisitions are generally categorized into three types. Firstly, horizontal mergers occur most commonly and are defined as "the combinations of two firms in the same line of business" (Brealey et al, 2011). The second type is the vertical merger which contains companies at different stages of production. For instance, a company expands back toward the output of the raw material and acquires its suppliers directly to reduce

purchasing costs of materials. At last, a conglomerate merger involves companies in totally unrelated businesses. Conglomerate mergers used to happen most frequently around 1960s and 1970s in the US. However, this type of mergers is less popular now.

The motivations of different types of mergers and acquisitions are developed into several theories. To achieve economies of scale is argued as the natural goal of horizontal mergers. Companies will take advantages of sharing resources and reducing fixed costs through mergers. Vertical mergers are motivated to get an expansion of vertical integration, which facilitates coordination and administration (Brealey et al, 2011). Other motives such as enhance market shares, improvement of management efficiency and to achieve diversifications also influence the takeovers.

Moreover, there are a lot of previous literatures investigating whether M&A is a value-added activity to firms through two approaches. The first one examines the effects of M&A on shareholders wealth through discovering the cumulative average abnormal returns around the announcement date. Most studies testing the short-term wealth effects have found significant positive increase of targets' share prices. But the impact of M&A on the performances of bidder firms is blurred. This approach is employed to examine long-term wealth effects and the empirical results showed reduced firm values after mergers. Another approach is to test the companies' post-merger operating performances by analyzing their accounting information. The empirical results vary from different methodologies applied, time period under investigation, accounting measurements and other factors such as the payment methods of mergers.

1.2 Objectives and methodology of the dissertation

The purpose of this study is to examine the impact of mergers and

acquisitions (M&A) on company's operating performances in UK for a period between 2005 and 2008. A large panel of British listed firms is examined across a four-year time period, including merged firms and non-merged firms. Three profitability ratios (Return on Assets, Return on Capital employed and Profit Margin) and one cash flows measurement are used as the performance indicators. A fixed-effect regression model is initially built by introducing M&A as dummy variables. Other factors which are widely tested also having impact on company's performance are included in the model as independent variables. The advantage of using fixed-effect model is that it controls the differences between individual firms and controls the time-specific factors as well. In addition, effects of M&A are also examined in specific financial years considering the impact of M&A may vary in specific economic environment. Furthermore, the model is extended by analyzing M&A effects on different industries respectively and some significant M&A effects are found in different industries by using alternative performance measurements.

1.3 Organization of the dissertation

This paper is divided into four parts. The first part is an overview of the previous literatures on the motives of mergers and acquisitions, and the empirical evidences of M&A effects on company's performances by applying either "event study" or accounting measurements. The advantages and drawbacks of using the two methodologies are also discussed. In this paper, the second approach of using accounting information to examine the performance is employed. The next part describes how the sample data are collected and the designs of the empirical study. For the third part, the empirical results are represented, interpreted and discussed for using different accounting measurements and in different industries. Finally, there are no significant results indicating that mergers and acquisitions attribute

to the firms' performance improvements overall but significant effects are found in different industries.

2. Literature Review

2.1 Motives for mergers and acquisitions

The motives for mergers and acquisitions are being studied and investigated by many previous studies. (Andrade et al. 2001) summarized the reasons of a company get involved in a takeover activity as follows, "efficiency-related reasons that often involve economies of scale or other synergies; attempts to create market power, perhaps by forming monopolies or oligopolies; market discipline, as in the case of the removal of incompetent target management; self-serving attempts by acquirer management to over-expand and other agency costs; and to take advantage of opportunities for diversification, like by exploiting internal capital markets and managing risk for undiversified managers". Furthermore, hubris theory developed by Roll (1986) and cash flow theory also explained the reasons of mergers in different perspectives.

2.1.1 The Synergy Theory

The synergy theory suggests the value of the combined firms is greater than the sum of the values of two individual firms (Bradley et al., 1988; Sech, 1990). And the takeovers only happen when the shareholders of both target and acquirer gained values (Berkovitch and Narayanan, 1993). Empirical studies also provided evidence of gains on values of target firm, bidding firm and the total value of the combined firm (Berkovitch & Narayanan, 1993; Gondhalekar & Bhagwat 2000; Bradley et al., 1983). In general, firms can obtain synergies from the achievement of economies of scale, operating synergy and financial synergy.

Economies of scale and scope

The economies of scale help firms achieve operating efficiency through size (Sharma and Ho, 2002). And efficiencies from economies of scope help firms

improving operating performances by reducing production costs. For example, firm A may have better management skills on working capitals than firm B. The acquisition then can improve the efficiency of working capital management of firm B.

Operating synergy

The operating synergy can be achieved by either enhancing the revenue or by reducing costs (Gaughan, 1999). The combined firm generates resources such as cash flows and revenues which are much bigger than those of individual firm itself. The costs reduction can be achieved by sharing fixed costs through larger economic of scale. And the combined firm will generate more efficiency through using a more efficient production line employed by one of the individual firm.

Financial synergy

Firms can also gain financial benefits through mergers by deducting the costs of capital. It will be cheaper for the new combined firm to access capital market (Levy and Sarnat, 1970) According to the theory of Lewellen (1971), the combined firm's debt capacity is higher because a bidding firm with larger debt capacity can ship its maximum debt amount to the target that is highly leveraged or likely to be bankruptcy. Generally, target firms' leverage levels are much higher than those of bidding firms (Bruner, 1988). Debt capacity is defined as the maximum amount that a firm is able to borrow. Empirical evidence support this theory that "the post-merger actual debt ratios are significantly higher than the potential theoretical ratios" Rathinasamy et al (1991). The combined firm can also generate benefit from the declining tax fees. Firms can use operating losses to reduce tax fees. In addition, firms can benefit from saving transaction costs and using internal funds instead of using out sources.

2.1.2 Increase of Market Share

Mergers and acquisitions are also motivated by firm's willingness to grow, expand its market share and obtain more market power. Firms tend to enhance its market power by gaining monopoly and monopsony power (Porter, 1980). Monopoly is a situation in which the firm dominant a certain market and is capable to control the prices of the product or service. Because the firm has the power of controlling prices, it can increase the price to very high and force customers to accept the prices. If a firm gained its monopoly power, it then can obtain more revenues due to high prices. Monopsony power refers to the firm's ability to lower the prices that suppliers offer (Sharma and Ho, 2002). The firms then can deduct the costs of purchasing materials and hence increase its profit margin.

Horizontal mergers help firms gain competitive advantages through acquiring rivals in the same industry. However, it is found that not only the bidding firms benefit from the merger, all the firms' returns enhanced from it. Eckbo (1983) examined a large number of firms in mining and manufacturing industries and found that competitors earned significant abnormal return around the announcement date. Therefore, the mergers benefit the merging firms and their competitors at the same time.

Furthermore, firms have a better way generating unique and specialized resources through mergers and acquisitions and reduced the costs to enter a new market (Seth et al., 2002). Merging is a more efficient way for a company willing to enter a new market instead of establishing a new one. Since the target firm already has certain knowledge about the new market and has particular techniques as well as established relationship with suppliers and customers, the acquirer firm will get into the market in a cheaper way.

2.1.3 Improved Management

Jensen (1984), have argued that “the large premia received by corporate shareholders derive from the improved management and increased efficiency brought about by restructuring” .The improvement of managerial efficiency can be approached in two perspectives. On one hand, target’s management efficiency will be improved since the acquirer firm generally operates better. This is inconsistent with the fact that the acquirer is usually larger than the target firm and operates in a more sophisticated business environment. Managers of a well-performed acquirer have more successful experiences on running the business and managing resources. For instance, a target firm’s negative operating performance may due to poor management. A greater degree of managerial skills from acquirer will help improve the target’s performance. On the other hand, managers from acquirer firms are monitored by potential bidders (Jenson & Ruback, 1983). The managers of acquirer will then try to improve operating efficiency and to avoid of dismissal after M & A and minimize non-value maximizing behavior (Manne, 1965).

2.1.4 Diversification

Firms also merge for the purpose of achieving a higher level of diversification (Levy and Sarnat, 1970) exhibited that diversification of unrelated business can reduce the systematic risk which represents the sensitivity of a firm’s returns to the aggregate returns of the market place. Chatterjee (1990) concluded conglomerate mergers are motivated by diversification between firms whose businesses are essentially unrelated. Firms with a purpose of entering a new market tend to take a vertical takeover for the benefits of diversification.

2.1.5 The Agency Theory

Berkovitch and Narayanan(1993) claimed that mergers and acquisitions are

likely to be a result of agency problem. Some of the mergers are taken places because acquirer's managers pursue their own welfare rather than the interest of the company as a whole. Therefore, the managers may prefer taking acquisitions despite of the decrease of firm's total value. If the shareholders capture the motives of acquires' management, they gained the bargaining power and can use it to obtain more values. The higher the agency problem is, the more value target shareholders will gain. However, the agency problem decreases the firm's total value. This explains the reason mergers and acquisitions have a negative impact on the post-merger performances. However, Sharma and Ho (2002) suggest the agency problem may lead to positive post-merger performance. Their arguments based on Jensen's (1986) theory that managers tend to invest free cash flow in negative net present value projects. They suggest takeovers paid by cash have better post-merger performance because the reduction of cash limits the possibility that managers misuse free cash flows.

2.1.6 Hubris Theory

Hubris hypothesis describes a situation where an the bidding firm paid much more than the target's actual economic value due to the over-optimistic estimation of the target firm's value by the bidding firms' managers. In other words, the bidding firm made an overpayment in the takeover. Roll (1986) assumed that if there were no synergy gains in the takeover and there were no value in the takeover. The increase of a target firm's share price is simply transferred from the bidding firm. And the takeover premium is extra value bidding firm paid than the real economic value of corporate combination.

Academic studies have been examining the impact of mergers and acquisitions on the performances of firms for decades and the results are mixed. There are two main approaches to examine the effects of takeovers, through analyzing stock market returns and examining companies'

long-term financial performances.

2.2 Empirical evidence

2.2.1 Empirical evidence based on event study

The most widely used approach is to evaluate M&A's impact on shareholders' wealth and it is considered as the "event study". The basic theory behind event study is that it assumes the announcements of M&A will have an impact on an efficient stock market because it reveals some new information to the market (Fama et al. 1969; Martynova and Renneboog, 2008). An abnormal return, calculated as the differences between realized return and an expected return, will occur due to investors' expectations about the firm's prospects. Event study can not only be used on testing the short-term shareholders' wealth but also on long-term shareholders' wealth. This method has some drawbacks especially when using it as a long-term shareholders examination. First of all, it relies on the assumption that the capital market is efficient. Healey et al. (1992) argued the gained equity value could be the result of either real economic gains or the capital market's inefficiencies. The bidders may overestimate the target's value and pay a higher premium due to the market's misleading. And the investors may also tend to overestimate the potential increase of the merged firms. Second, the effect of takeovers will be diluted by a number of other factors such as changing of financial market, developing strategies and management etc (Martynova and Renneboog, 2008). Finally, problems of using different asset pricing models and statistical problems will occur (Barner and Lyon, 1997).

The results from short-term wealth effects indicate that most targets' shareholders are benefited from takeovers. Cumulative average abnormal

returns (CAARs) around are found increased significantly on the announcement day and subsequent day (Eckbo and Langohr, 1989). Some studies extend the period around the announcement date to twenty days and also found significant higher abnormal returns (Bradley, 1980; Bradley and Jarrell, 1980; Asquith et al., 1983; Chatterjee, 1992; Franks and Mayer, 1996 et al.) However, on the contrary, shareholders' returns of bidding firms are very small or even negative (Asquith, 1983; Eckbo, 1983; Morck et al, 1990 e; Raj and Uddin, 2012 et al). Studies using different time windows and examining mergers in different time periods have different conclusions. Therefore, there are no conclusion that shareholders of the bidding companies earn a significant positive CAARs prior to and at the announcement of a takeover.

The evidence of M&A's effects on long-term shareholders wealth is contrast to the results of short-terms. In general, studies found M&A will damage shareholders wealth. Martynova and Renneboog (2008) compared different studies on long-term wealth effects and summarized that studies applying different estimation techniques result in different findings. For instance, significantly negative cumulative average abnormal returns over three years after announcement are found if using market model. Jensen and Ruback (1983) suggested the reason results of long-term wealth effects are different from those of short-term may due to methodological problems. Considering there are a lot other factors affecting shareholders' wealth in a long-term period except the takeovers impact and the market efficiency assumption, another branch of studies investigate the operating performances after merging in a relatively long period to avoid the shortcomings of event study.

2.2.2 Empirical Evidence based on operating performance

Scherer (1988) suggested that it is better to test the effect of acquisition

through analyzing company's probability directly. The advantage of using accounting data is that "it allows us to test directly the hypothesis in which we are interested" (Dickerson et al, 1997). However, the accounting distortions such as changes in accounting regulations (Martynova and Renneboog, 2008) will affect the measurement. In addition, testing the operating performance also suffers from the choices of accounting measurements which can be affected by managerial decisions (Healey et al, 1992; Ramaswamy and Waegelein, 2003).

Previous studies used different performance measures to investigate firms' financial performances and they lead to different conclusions. The most commonly used performance measurements are the accrual accounting treatments and cash flow adjusted measurements.

Ravenscraft and Scherer (1987) studied the performances of 471 firms who involved in mergers and acquisitions from 1950 to 1977 in US, using Line of Business data supplied by the Federal Trade Commission. The data was collected by business segments. They use three different accounting measurements to examine firms' performances, including the ratios of operating income to the end year assets, operating income to sales and cash flows to sales. The M&A activity is measured by a merger variable which is calculated as the original value of assets divided by the end of merger year assets and another two dummy variables of mergers. Other variables are held in consistence and it further controls the impact of industry, market share and accounting method choices. The results showed that the target firms have negative performance improvements after acquisitions and on average the acquisitions did not generate synergy or improve the performance of acquired firms neither. However, the results are questioned because of the mismatch of the examined performance accounting years and merger years.

In UK, Chatterjee and Meeks (1996) have tested the impact of alternative accounting treatments on the post-merger performance when using the accounting evaluation. They examined the post-merger performances of British companies during 1977 to 1990. In year 1984, the accounting regime was introduced. The results showed that there were no significant performance improvement before year 1984 but positive performance improvements were found after 1984.

Dickerson et al. (1997) also studied the impact of M&A as well as the effects of internal growth on company's operating performances of British firms. They generated a large panel data of British M&A deals over the period 1948 to 1977 and by comparing the post-merger performances between merged firms and non-merged firms. The fixed effect model is employed. M&A is introduced as a dummy variable and time-series and cross-section dimensions are controlled by the model. The main advantage of using fixed model is that it controls the individual-specific effects among a large amount of firms. They concluded that mergers and acquisitions do not have a positive impact on companies' performances but destroy the value of the firm. They also suggested the internal growth would bring more benefit to the company rather than mergers and acquisitions.

Gugler et al (2003) analyzed the effects of mergers around the world from 1981 to 1998. They examined the performances using profit and sales as the measurements and choosing non-merged firms from the same industry as the benchmark group. Their results show the average profitability of merged firms is significantly higher than that of non-merged firms. While, the average sales of M&A firms is lower comparing with the benchmark group. The increased profits for merged firms are suggested due to increasing of market power and operating efficiency. This result is consistent with Mueller's (1997) finding that merged firms in the manufacturing industry

decreased in market share and enhances market power.

Healey et. al.(1992) had a totally opposite conclusion of improved argued that using accounting data has drawbacks that they can be affected by applying different accounting methods and be influenced by the managerial decisions. The cash flows measurements, otherwise, will represent the actual economic benefits better. This is because cash flows will not be affected by factors such as depreciation, goodwill, interest expense and income taxes etc. Therefore, they used cash flow measurements to examine 50 largest U.S. mergers between 1979 and mid-1984 and concluded that mergers lead to higher operating cash flow returns and had significant positive impact on firms' performance.

There are a few studies following Healey's study using cash flows as operating performance measurements. Most of the following studies adopting operating cash flows measurement found performance improvements after acquisitions. In UK, Mason et al (2000) studied 44 takeovers in the period of 1985 to 1987. They used the cash flow based measures and found the operating performance increased after takeovers. In US, both Linn and Switzer (2001) and Ramaswamy and Waegelein (2003) following the study of Healey et al (1992), using industry-adjusted operating cash flows divided by the market value of assets as the performance measurement and a cross-sectional regression model. Both of them found significant evidence for positive post-acquisition performance improvements. Moreover, Linn and Switzer (2001) found transactions paid by cash generally performed better than those paid by stock. Other factors such as the size of combining firms, long-term performance plans are also tested being associated with post-merger performances by Ramaswamy and Waegelein (2003). But they did not find significant evidence for the impact of transactions' payment types.

Nevertheless, not all the studies using cash flows measurement have positive results. Ghosh (2001) studied 315 firms' post-acquisition performances in the US between 1981 and 1995. Operating performance measurement such as cash flow returns divided by assets, cash flow margins are used. However, by using firms matched on performance and size as a benchmark, he didn't find positive performance improvements after takeovers and he also found that "the cash flows increase significantly following acquisitions that are made with cash, but decline for stock acquisitions".

The impact of methodological improvements and the selection of appropriate benchmarks are concerned would influence the results of post-merger operating performances. Two common methodologies are employed to test the performance improvements by previous studies. The first one used by Healey et. al.(1992) is the regression-based methodology and the second one is developed by Ghosh (2001), who argued the regression-based model might be biased because the negligence of acquirer firms' superior pre-merger performances. Ghosh(2001) uses a change model, comparing post-merger performance with some pro forma combined target and acquirer pre-performance measure.

Another issue the scholars concerned is how to choose the benchmark. Gregor et. al.(2001) argue that it is crucial to choose the appropriate expected performance benchmark. They state "simply using the same firm's pre-merger performance will be unsatisfying if the merger transaction comes in response to an industry shock that changes the prospects for a meaningful fraction of the firms in the industry." Healey et.al. (1992) choose the industry-based benchmark can overcome the problems caused by industry shocks. The abnormal industry-adjusted performance they used is

measured as the intercept of a cross-sectional regression of post-merger industry-adjusted cash flow returns corresponding to premerger returns. But Gregor et. al. (2001) also claimed controlling for industry may not be sufficient to account for all cross-sectional correlation. In addition, Ghosh argued the industry-median adjusted performance measurement could be biased because the acquiring firms are normally larger in size and perform better than the industry average and their performances tend to be outstanding during the takeover periods (Franks and Harris, 1989 and Morck et al, 1990).

However, the result from Ghosh(2001) that using benchmark controlling for size and pre-merger performances will be more appropriate than using the industry-adjusted benchmark employed by Healey et. al. (1992) is difficult to be approved because Ghosh (2001) does not use a regression model as Healey et. al. (1992) used. For a further study, Powell and Stark (2004) examined this issue by investigating 191 takeovers in UK between 1985 and 1993. By using alternative operating performance measurements, deflator choices, performance benchmarks and methodologies, they concluded that firstly, the post-merger performances are affected by different methodologies adapted. Higher improvements are found by using regression-based model than using a change model. Second, using accruals operating performance measures lead to better post-merger performances compared to using a pure operating cash flow measure. Third, there is no significant difference between the results by using the industry-adjusted benchmark and by a benchmark that controls firms' size and pre-performances. Fourth, the deflator used has an impact on the results, especially when the regression-based methodology is used. And finally, they found little consistent evidence that merger's payment type and firm size have effects on the performance after acquisition.

A lot of studies also have more widely tests on other factors that may affect M&A firms' performances including the method of payment, type of acquisitions, the purposes of mergers and the time period under investigation. It is generally found that using cash flows as performance measurement will result in positive effects on M&A firms' performance rather than using accrual accounting indicators (Healey et al, 1992; Linn and Switzer,2001). Ravenscraft and Scherer (1988) found acquisitions among related business have significant improvements in their performances than horizontal mergers and horizontal mergers have better performance than vertical ones. On the contrary, Ramaswamy and Waegelein (2003) concluded acquiring firms in dissimilar industries are more profitable after merger. Similar results are also found in the branch of event study. Mueller (1985) also found mergers in non-related industries (conglomerate mergers) bare a loss of market shares. The payment types of takeovers are also considered affect the M&A activities. Most of studies found takeovers paid by cash have significant better performances than those acquired totally by equity (Ghosh, 2001; Carline et al, 2002). Moreover, hostile mergers are found bring damage on shareholders wealth due to the payment of a higher premium through event study branch (Franks and Mayer, 1996).

3. Data and Empirical design

3.1 Data

The empirical research is designed to analysis mergers and acquisitions in Britain using the financial analysis method. Due to the limited resources of financial data available, the research period is narrowed down to 4 years from year 2005 to year 2008.

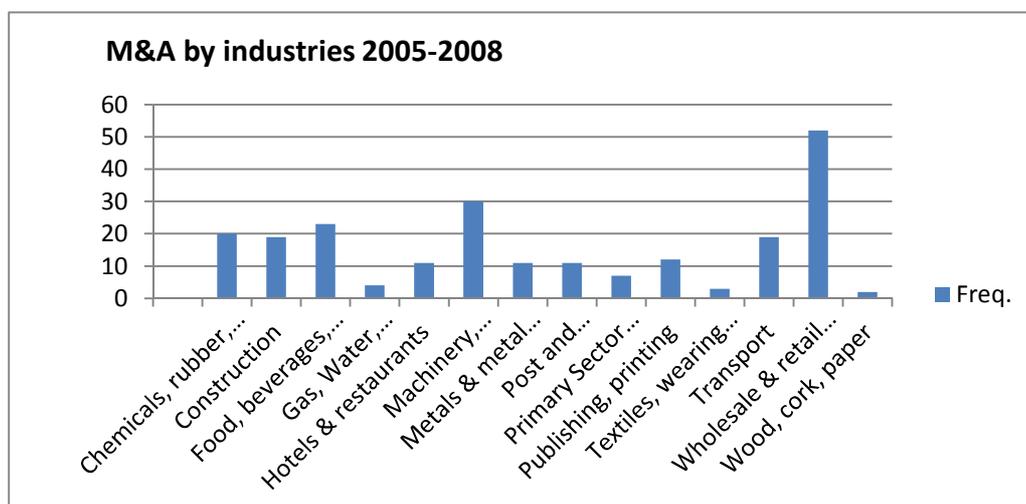
The first database collected is the balance sheet data of British firms. It is obtained from FAME, which is produced by Bureau van Dijk (BvD), contains comprehensive financial information on companies in the UK and Ireland. I chose the firms from the major industries and exclude firms in financial sectors, public administrations, health and education sectors due to their special accounting and regulatory requirements which make them difficult to compare from other firms. I then filtered the data to relatively large firms whose turnovers in those five years are larger than 10,000 th GBP. A total number of 23,794 firms are generated. The required financial information used for calculating ROA and the size of firms such as the fixed assets, current assets, earnings before interest and tax and a variety of financial ratios in the period 2005-2008 are collected. Because there is a lagged value of profitability in the regression model, statement of 2004 is also obtained. The balance sheet data for all firms in FAME are available from year 2004. Thus, research period is narrowed.

The second database is the mergers and acquisitions (M&As) database of British firms over the period 1997-2008 from Zephyr which is also produced by Bureau van Dijk (BvD). It contains comprehensive information on M&A, IPO, private equity and venture capital deals all over the world. Compared to other financial database such as Thompson One, Bloomberg, it is more

convenient to merge with the first database by same firms' BvD ID numbers. The criterion of selecting a merger is that the acquiring firm acquired more than 50% of the equity of a target firm. It includes the names of acquiring and targets firms, the ID numbers, the countries and year in which mergers completed. Because of the limited firm financial information, the time period of M&A is narrowed down to 2005-2008. After omitting the duplicates by the Deal Number, there are 1447 merger deals during this time period. A few firms acquired more than once in an accounting year. Considering the pervious successful merger makes the acquiring firm more likely to get involved in a chain of mergers and hence the results will be biased (Ramaswamy and Waegelein, 2003) Therefore, I only take a firm's first merger in the accounting year into the data.

I then combined the balance sheet database of 15,170 firms with the M&A database of 1,447 firms together by firms' BvD ID Number. Out of 1,447 acquiring firms there are 224 firms matched with the balance sheet data. A large number of firms in M&A database are not matched because a large portion of mergers is among financial institutions. Also, smaller mergers are also excluded. The non-merged 14,946 firms from FAME database is then used as the control sample.

Graph 1 Summary of M&A by industries 2005-2008



Graph 1 exhibits mergers activities in the main industries from 2005 to 2008 in different industries. M&A activities in the wholesale and retail sector are the most actively. There are about 50 firms in this industry are get involved in M&A during 4 years and they take around 20% of the total numbers of mergers. Machinery and equipment sector is the second largest industry that M&A occurred where 30 mergers take places. The following four industries where M&A occurred frequently are the chemical industry, construction, food and beverage and transport sector. These four industries have similar number of mergers. Table I presents more detailed information of M&A in different industries each year. It is shown that the six industries where M&A occurred most frequently have a total number of mergers of 163 and takes 73% of the whole mergers sample in the four years. For each given year, there are 70 mergers in 2005, 61 in 2006, 67 in 2007 and 26 in 2008. (See Table I in Appendix)

Table 3.1 Summary statistics Panel A: Profitability of M&A firms 2005-2008

	ROA		ROE		PM	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
t-1	0.141632	0.733948	0.264510	0.582689	0.053152	0.102712
t	0.081016	0.117825	0.257589	0.770693	0.045601	0.110585
t+1	0.080699	0.128630	0.200211	0.674418	0.043173	0.111810
t+2	0.068885	0.135258	0.131635	0.934772	0.032930	0.123624
t+3	0.078530	0.168462	0.173419	0.542294	0.048442	0.125723

*t is the year in which M&A occurs

Table 3.1 summarizes three ratios of profitability for the 224 mergers and acquisitions occurred between 2005 and 2008. While t is the year that mergers happened, the table presents the mean of ROA, ROE, and PM ratios from pre-merger year to three years after the merger. From the column of ROA we can see, the average number of ROA the year before mergers is around 14% and the standard deviation is 0.733948. By the following three

years including the merger year, the profitability ratio declines continually. The standard deviations of the post-merger years also become smaller which reflect the change of profitability of these firms are not as fluctuate as before. But at the third year after merger, the profitability starts rising by around 14% from 0.068885 to 0.078530. The mean of these firms' ROE also has a falling trend after the merger. On the merger year, the mean of ROE drops slightly and keep dropping for the following two years. But the ratio also rises in the last year. The profit margins also follow similar trend. Generally, the profit margins decrease in the first two post-merger years and go up in the last year. The standard deviations are relatively small compared to those of ROE and ROA and the ratios of PM for the firms are more stable.

Table3.2 Summary statistics Panel B: Profitability of non-merged firms 2005-2008

	ROA		ROE		PM	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
t-1	0.224968	0.224496	0.084834	0.168262	0.014599	0.031448
t	0.282922	0.280592	0.075517	0.166251	0.013778	0.031728
t+1	0.263583	0.275223	0.067424	0.161231	0.012968	0.031094
t+2	0.250174	0.277144	0.062361	0.158896	0.012876	0.031287
t+3	0.237627	0.275173	0.041048	0.132310	0.008898	0.025351

Table 3.2 presents the profitability of the panel data of non-merged firms in the same time range as merged firms. Some extreme big values of these ratios are excluded hence the number of non-merged firms are reduced to 12,981 firms. The extreme values are defines as ratios bigger than 1 and smaller than -1. The average ROA of non-merged firms increased in the year of merger from 22.5% to 28.3%, which is contrast to the trend of merged firms. The ratio then falls down in the following three years. While the ROE ratios and profit margins of the non-merged firms in these years also decrease. Because the profitability of both the merged firms and non-merged firms decline, it is hard to tell if the decrease of merged-firms'

profitability is related to the takeovers activities. The regression is then taken to examine whether M&A will affect the profitability of merged-firms.

3.2 Empirical Design

3.2.1 Operating performance measurements

Generally speaking there are two main approaches to the evaluation of post-merger performance evaluation in the previous literature, the event study on stock market and the accounting information based evaluation. A lot of studies using the stock market approach have shown the results that there are positive effects of acquisitions on both the acquiring and target firms' stock prices (Bradley, 1980; Bradley and Jarrell, 1980; Franks and Mayer, 1996 et al). However, it is argued that the increases of the combined firms' share prices may not only due to the economic gains of the takeover activity, but also affected by the market inefficiencies such as undervaluation and overvaluation of the combined firms by the investors (Shiller, 1989; Healy et al. 1992). In this study, the second approach is used by evaluating the post-merger performance using accounting data. This approach also has its drawbacks. For example the use of creative accounting techniques may affect the true and fair view of the published accounts (Dickerson, 1997) or be influenced by managerial decisions (Healy, 1992). Compare the empirical results using different performance indicators are necessary because the choice of a merger accounting method can affect both numerator and denominator.

Return on assets (ROA)

Return on assets is almost the most common ratio to measure the profitability of a firm. It indicates how much profit a firm earned in relative to its total assets. It reflects how efficient a firm generates profit by using its assets. The ROA ratio is calculates as follows,

Return is measured by the earnings before interest and tax (EBIT), as it avoids the effects of using different accounting methods for depreciation and amortization and tax calculation. Thus it eliminates the problem of comparison across firms (Bertrand and Betschinger, 2012). The value of total assets is calculated as the sum of fixed assets and current assets. Healy et. al. (1992) used market values of total assets rather than the book values and they argued that the market values represent the opportunity cost of the assets and they reduced the inter-temporal and cross-sectional effects on firms. However, the market value of the acquiring firms may be affected positively or negatively due to the reaction of market towards the mergers activities. An increase or reduction of the market value will then affect ROA measurement (Sharma and Ho, 2002). In addition, since there is a large amount of control firms, the market values of firms are limited. Hence, the book values of total assets are used to calculate ROA.

Return on Capital Employed (ROCE)

ROCE is another useful measurement for comparison of firm's profitability. It reflects a firm's ability to generate the earnings on all of the capital it employs. A higher ROCE indicates that a firm has more profit to reinvest into the company and helps increase earnings-per-share growth. A firm with high ROCE is also considered as a successful growth company. By using ROCE ratio as the profitability measurement help analyze whether M&A activity will affect the company's growth and its ability to generate earnings in the future.

Profit Margin

This profitability ratio measures the dollar amount of the sales that a company actually retains in earnings. It reflects the efficiency of a firm's operating performance and how well a firm controls its costs. A problem of using profit margin is that this ratio is more useful when comparing firms in the same industry.

Cash Flows Measurement

Since a lot of previous studies have found using operating cash flows measurement will more likely lead to positive post-merger performances (Healey et al, 1992; Mason et al, 2000; Linn and Switzer, 2001; Ramaswamy and Waegelein , 2003). Cash Flow performance indicator is also used as the independent variable in the regression model. However, operating cash flows information in firms tends to easily missing because firms may not bother report zero cash flows or for some other reasons. Therefore, this measurement may be biased due to lack of enough financial information.

3.2.2 Hypothesis Testing

According to previous empirical studies, M&A activities are very likely to have an impact on the company's operating performances. To examine whether firms' performances will change due to the influence of M&A, I am going to use t-test to examine whether there are differences between the mean values of merged firms and non-merged ones by applying a Two-Group Mean Comparison Test. The hypothesizes are set up as follows,

Null hypothesis H_0 : There are no differences for the mean values between merged firms and non-merged ones

Alternative hypothesis H_1 : Merged firms mean values are different from the ones of non-merged firms

The confidence interval is set at 95% and the significant level is 5% which is the figure for deciding whether to reject the null or not. In other words, if the p-value in the output table is less than 2.5%, reject the null hypothesis; if p-value is above 2.5%, accept the null.

The hypothesis tests are applied on the four performance indicators which are ROA, ROCE, Profit Margin and Cash Flows Ratios. T-test results are as

follows,

Table 3.3 Two-Group Mean Comparison Test for Merged firms and Non-merged firms

Performance Measurements	M&A firms (mean)	Non-MA firms (mean)	Difference	T-statistics	Pr(T>t)
Return on Assets	0.0965247	0.1041682	-0.0076435	-0.0647	0.5258
Return on Capital Employed	0.2794656	0.227568	-0.0518976	-1.5574	0.9403
Profit Margin	0.0447948	0.0402551	-0.0045397	-0.8144	0.7923
Cash Flow Ratio	0.0798361	0.2502503	0.1704143	0.1137	0.4547

As it is shown in the table, the p-values of the four financial ratios are larger than 2.5%. This result suggests that the null hypothesis cannot be rejected. Therefore, there is no conclusion that the profitability between merged firms and non-merged firms is different.

For a more depth test on M&A impact on firm's operating performance, regression model is built to investigate the relationship between M&A and corporate performance.

3.2.3 Independent variables

The operating performance of a firm is driven by plenty of factors. The following factors are always considered highly related with a firm's operating performance and are used as the explanatory variables in the regression model.

Leverage

The relationship between the leverage level and performance of a firm has been widely tested (Kinsman and Newman, 1999; Rajan and Zingales, 1995; Amarjit et al, 2001; Manohar and Sheri, 2005 et.al.) Most of the studies concluded that leverage is connected with the company's performance either positively or negatively. Therefore, the firm's leverage level is considered as a factor that influences firm's operating performance. The Gearing Ratio is used as the measure of leverage.

Size of a firm

Firm size has been empirically found to be highly related with its profitability (Dickerson et al 1997; Ramaswamy and Waegelein 2003). They are corresponded with the theory of economies of scale and scope, which indicates that a large company will in general be more profitable than a smaller one. There are different ways to measure a firm's size. In this article, a firm's size is measured as the logarithm of the firm's total assets.

Mergers & Acquisitions

The impact of mergers and acquisitions on the operating performance of a firm is estimated by introducing M&A as dummy variables. The sample is then divided by two groups: the M&A firms and non-merger firms. Firms involved in mergers and acquisitions activities are set to have values of 1, therefore $MA=1$; Non-merged firms have values of 0, $MA=0$.

Furthermore, the previous profitability is also considered have impact on the current year's profitability. If the previous year's profit is high, it reflects the company is running well and this year's earnings are more likely to be high. However, including lagged independent variable will cause autocorrelation in the fixed model (Arellano and Bond, 1991; Guglar and Yurtoglu, 2004; Bertrand and Betschinger, 2012). Therefore, lagged independent variables of profitability are not included in this regression model.

The formulas of financial calculations are shown in Table 3.4

Table 3.4 Formulas of key Financial Ratios

variables	Formula
Return on Assets (ROA)	ROA= (Earnings before Interest and Tax)/Total Assets
Return on Capital Employed (ROCE)	ROCE= Earnings before interest and Tax (EBIT)/ (Total assets –Current Liability)
Profit Margin (PM)	PM= Profit before tax/Turnover
Cash Flow Ratio	CFR= Cash flow/Total assets
Net Asset Turnover (NAT)	NAT= Turnover/(Total assets-current liabilities)
Gearing Ratio	Gearing= (short term liabilities+ long-term liabilities)/shareholders' funds
lnSize	ln (Total Assets)

The summary of the variables is presented in Table II. The panel data includes 60,680 observations from 5,170 firms observed across a period of four years. The variable's variance in a panel data is composed by two parts, the within variance and between variance. Within variance captures the characters of time series variation and between variance refers to the cross-sectional variation. One of the two components will dominate the overall variance. For variable ROA, the overall variance is 6.870354 (2.621136^2), of which the between variance 3.910360 (1.977463^2). The between variance is about 57% of the overall variance, which dominate the overall variance. For ROE ratio, the two components' proportions of overall variance are similar. The effects of the cross-sectional and time-series factors on the overall variance are almost the same. In general, most of the variables including size of the firm, net asset turnover, solvency ratio and the gearing level are dominated by the between variables due to the differences across firms. In contrast, the cash flows positions are more reliable on within

variable which reflects the variation of cash flows through years.

3.2.3 Regression models

The basic regression model estimated reflects the relationship between M&A activity and company's operating performance is,

$$Y_{it} = \alpha_i + \beta_1 \ln \text{Size}_{it} + \beta_2 \text{Leverage}_{it} + \beta_3 \text{M\&A}_{it} + \gamma_t D_t + \varepsilon_{it} \quad (1)$$

Where $\text{M\&A}_{it}=1$ if the firm is get involved in mergers and acquisitions and $\text{M\&A}_{it}=0$ if takeovers are not undertaken. Y_{it} is the operating performance measurements which are presented by four measurements ROA, ROCE, Profit Margin and Cash Flows Ratio. α_i controls the firm specific effect and captures the unobserved company heterogeneity. D_t are a set of time dummies to account for time-specific factors. Since observations in the sample are crossed years from 2005 to 2008, the business environment had a dramatic change through years due to the financial crisis. Hence it is necessary to control the business cycle effect through years.

For a further test on how the previous years' M&A activities affect company's performances, equation one is extended by introducing a lagged M&A factor M\&A_{it-1} as independent variable.

$$Y_{it} = \alpha_i + \beta_1 \ln \text{Size}_{it} + \beta_2 \text{Leverage}_{it} + \beta_3 \text{M\&A}_{it} + \beta_4 \text{M\&A}_{it-1} + \gamma_t D_t + \varepsilon_{it} \quad (2)$$

Apart from the effects of M&A on companies' performances, the time dummies reflect the companies' performances in specific years are varied. For the next step, I am going to test the impact of M&A activities on firms' performances in particular financial years by using interactive dummy variables. Four interactive dummy variables are generated by multiplying M&A dummy with the time dummies.

$$Y_{it} = \alpha_i + \beta_1 \ln \text{Size}_{it} + \beta_2 \text{Leverage}_{it} + \beta_3 \text{M\&A}_{it} + \gamma_1 (\text{M\&A}_{2005} * D_{2005}) + \gamma_2$$

$$(M\&A_{2006} * D_{2006}) + \gamma_3 (M\&A_{2007} * D_{2007}) + \gamma_4 (M\&A_{2008} * D_{2008}) + \epsilon_{it}$$

Where $M\&A_{2005}=1$ if takeovers occurred in year 2005 and $M\&A_{2005}=0$ if takeovers were not undertaken. Time dummies $D_t = 1$ if it is in financial year t and $D_t=0$ otherwise. The four interactive dummies are then referring to mergers and acquisitions happened in specific financial years.

Furthermore, Geroski(1988) and Geroski et al.(1991) argued that profitability in UK companies is persistence by controlling for industry and time effects. Brush, Bromiley, and Hendrick (1999) find that both corporation and industry influence business unit profitability. In addition, the M&A effects on company performance in specific industries are assumed to be varied. Gugler (2003) has found dramatic differences between mergers in manufacturing and service sectors. As analyzed in the data, six industries have the most frequent mergers among the fourteen industries. Hence, it is interesting to examine M&A effects on the six industries specifically. $(M\&A_{it} \times IND_d)$ are introduced as the interaction of M&A dummies and industrial dummies which reflect the differences of company's performance between industries. The six industries are wholesale & retail, machinery, chemical, construction, food & beverage and transport sectors.

$$Y_{it} = \alpha + \beta_1 \ln Size_{it} + \beta_2 Leverage_{it} + \beta_3 M\&A_{it} + \delta_1 (M\&A_{it} * Wholesale) + \delta_2 (M\&A_{it} * Machinery) + \delta_3 (M\&A_{it} * Chemical) + \delta_4 (M\&A_{it} * Construction) + \delta_5 (M\&A_{it} * Food) + \delta_6 (M\&A_{it} * Transport) + \epsilon_{it} \quad (5)$$

The coefficients before the interactive dummies δ then captures the differences of the M&A effects on companies' performances between firms in a specific industry and other normal firms.

The reasons to adopt the fixed effect models are as follows,

Firstly, the dataset for the empirical analysis comprises both the time series (5 years) and cross-sectional elements (different firms). This kind of dataset is known as the panel data. Since the dataset including cross-sectional data, which involve observations on economic units of varying size, heteroskedasticity will occur. The variance of the error will no longer be constant. In addition, the variable of profitability is autocorrelated because the profitability in the past may affect the profitability in the next term. Under both heteroscedasticity and autocorrelation the usual OLS estimators are no longer minimum variance among all linear unbiased estimators. They are not best linear unbiased estimator (BLUE) anymore (Gujarati, 2003).

There are two most commonly used models for the panel data which are the fixed effects model and the random effects model. Although both the models have taken the individual specific effects to the regression into consideration, the random effects model is under the assumption that the individual specific effects are uncorrelated with the explanatory variables while the fixed effects model assumes individual specific effects are correlated with the explanatory variables.

Two tests are applied to test which model should be used in the regression. Breusch-Pagan Lagrange Multiplier is used to investigate whether the individual effects exist. In the result p-value is zero (See Figure 1 in Appendix), it means the data is heteroskedastic and there are individual effects.

I also use Hausman test to examine if the individual effects are uncorrelated with the regressors or correlated with the regressors. The result of the test suggests the individual firm effects are correlated with the variables due to a zero p-value. Hence a fixed effects model should be used. The results of the tests are corresponded with the prediction that the effects of individual

firms such as management style, corporate culture are related to the industry and size of firms. The Hausman test shows significant differences between the coefficients for fixed effects and random effects model. Therefore, fixed effects model is used.

The fixed effects model can be used to control both the individual-specific and time-invariant characteristics and solve the problem caused by the omitted variable bias due to latent or unobserved variables (Kumar et al. 2012). The main advantages of using it is that it is assumed that all individual differences are captured by differences in the intercept parameters (Hill et al. 2012). It exploits within-group variation over time and controlling for the average differences across firms in any observable or unobservable predictors. The unobservable predictors across firms are varied from different management quality, corporate governance to different level of sophistication. There are two ways to estimate fixed effects model. One is the least squares dummy variable estimator which estimates the model by introducing an intercept dummy variable to for each individual. Because the number of the firms is relatively large, it is difficult to apply it. Another way to approach it is using fixed effects estimator or the within-group estimator. In this method, the average values of both the dependent variable and explanatory variables are calculated and then subtracted from each original variable value, term by term. The regression model is then formed by variables in the deviation from the mean forms. By using this method, the coefficient estimates depend only on the variation of the dependent and explanatory variables within individuals and thus eliminates the impacts of different individuals (Hill et al. 2012).

However, limitations of using fixed effects model are as follows,

1. There would be endogenous variables
2. The firm specific effects may correlated with the explanatory variables
3. The presence of the lagged dependent variable causes autocorrelation

(Dickerson, 1997)

4. It does not address the simultaneity problem (Gujarati, 2003; Kumar, 2012; Gugler, 2004).

4. Empirical Results

Table 4.1 M&A impact on the operating performances controlling time effects

	ROA b/se	ROCE b/se	PM b/se	Cash Flow Ratio b/se
lnSize	0.448*** (0.033)	0.018* (0.011)	0.018*** (0.001)	-0.006 (0.004)
M&A	0.018 (0.156)	0.024 (0.050)	0.002 (0.007)	0.004 (0.013)
NetAssetTurnover	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)
Gearing	-0.015* (0.008)	0.008*** (0.003)	-0.001** (0.000)	-0.009*** (0.001)
Year ₂₀₀₆	-0.026 (0.023)	0.016** (0.007)	0.003*** (0.001)	0.002 (0.002)
Year ₂₀₀₇	-0.086*** (0.024)	0.002 (0.008)	0.004*** (0.001)	-0.001 (0.002)
Year ₂₀₀₈	-0.106*** (0.024)	-0.079*** (0.008)	-0.009*** (0.001)	-0.002 (0.002)
_cons	-4.196*** (0.319)	0.062 (0.102)	-0.133*** (0.014)	0.157*** (0.036)
N	60680	60680	60680	30747
rho	.5319585	.3779054	.5288856	.4166133

Note: *, **, * correspond to 10%, 5% and 1% significance levels respectively**

The regression results from Table 4.1 reflect how M&A impact the firms' operating performances measured by ROA, ROCE, Profit Margin and Cash Flow Ratio respectively. The coefficients of variable M&A represent the difference in average of the financial ratios between merged firms and non-merged firms. For ROA as the dependent variable, the coefficient of M&A is 0.018, controlling for other factors. It indicates that the average profitability of M&A firms is higher than non-merged firms by 0.018. However, the result is not significant as the p-value is very high. The coefficients of other profitability measurements, return on capital employed and profit margin are also positive, but none of them show significant evidences as well. The average M&A cash flow ratio is 0.004 higher the one of non-merged firms which shows an increasing trend, but the result is

statistical insignificant. Rho is the proportion of variation due to individual due to individual specific term. Large proportions are explained by individual specific terms in ROA, Profit Margin and Cash flow ratios.

Table 4.2 M&A impact on the operating performances with previous M&A activities

	(1) ROA b/se	(2) ROCE b/se	(3) Profit Margin b/se	(4) Cash Flow Ratio b/se
lnSize	0.45112*** (0.03353)	0.01641 (0.01071)	1.75192*** (0.14975)	-0.00581 (0.00394)
M&A at t	0.02265 (0.16526)	0.02648 (0.05279)	0.04613 (0.73807)	0.00944 (0.01455)
Gearing	-0.01482* (0.00803)	0.00866*** (0.00257)	-0.06247* (0.03586)	-0.00885*** (0.00092)
M&A at (t-1)	0.00302 (0.15566)	-0.01210 (0.04973)	1.13877 (0.69519)	0.00136 (0.01362)
year ₂₀₀₆	-0.02276 (0.15538)	0.00499 (0.04964)	1.47583** (0.69397)	0.00309 (0.01359)
year ₂₀₀₇	-0.08402 (0.15629)	-0.00928 (0.04993)	1.59383** (0.69802)	0.00065 (0.01369)
year ₂₀₀₈	-0.10332 (0.15713)	-0.09038* (0.05020)	0.21955 (0.70178)	-0.00047 (0.01378)
_cons	-4.21730*** (0.35554)	0.08649 (0.11359)	-14.03371*** (1.58792)	0.15363*** (0.03876)
N	60280.000	60280.000	60280.000	30445.000
rho	.5313866	.3777687	.5288366	.4148667

Note: *, **, * correspond to 10%, 5% and 1% significance levels respectively**

The coefficients of M&A (t) show similar influence on mergers activities as Table4.1. Takeovers still show positive impact on the three profitability measurements ROA, ROCE, profit margin and negative effects on cash flow ratios by controlling the lagged M&A variable. For the variable lagged M&A, the coefficient of it using ROA as profit indicator shows a very small increase of profitability. Applying ROCE as the indicator, on the other hand, the coefficient drops by 0.01210, controlling other factors. M&A activities also show positive effects on both the profit margin and cash flows ratios. However, none of these results are significant. Hence the influence of

mergers activities on company's performance is still not obvious.

Table4.3 M&A impact on firm's operating performances in each year from 2005-2008

	ROA b/se	ROCE b/se	PM b/se	Cash Flow Ratio b/se
lnSize	0.449*** (0.033)	0.018* (0.011)	0.018*** (0.001)	-0.006* (0.004)
NetAssetTurnover	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)
Gearing	-0.015* (0.008)	0.008*** (0.003)	-0.001** (0.000)	-0.009*** (0.001)
MA2005*year2005	-0.020 (0.274)	0.026 (0.088)	-0.016 (0.012)	0.026 (0.024)
MA2006*year2006	-0.016 (0.294)	0.183* (0.094)	0.017 (0.013)	-0.005 (0.024)
MA2007*year2007	0.003 (0.280)	-0.085 (0.090)	-0.002 (0.013)	0.005 (0.025)
MA2008*year2008	-0.301 (0.450)	-0.111 (0.144)	0.010 (0.020)	0.075* (0.039)
year ₂₀₀₆	-0.026 (0.023)	0.016** (0.007)	0.003*** (0.001)	0.002 (0.002)
year ₂₀₀₇	-0.087*** (0.024)	0.002 (0.008)	0.004*** (0.001)	-0.000 (0.002)
year ₂₀₀₈	-0.106*** (0.024)	-0.079*** (0.008)	-0.009*** (0.001)	-0.002 (0.002)
_cons	-4.202*** (0.320)	0.061 (0.102)	-0.133*** (0.014)	0.160*** (0.036)
N	60680	60680	60680	30747
rho	.532004	.377958	.528892	.416848

Note: *, **, * correspond to 10%, 5% and 1% significance levels respectively**

Table4.3 represents the impact of M&A activities on the performances of companies in each financial year from 2005 to 2008, where MA2005 takes value 1 if takeovers are undertaken in year 2005 and takes value 0 if there were no mergers in 2005; year2005 takes value 1 if the financial year is 2005 and 0 for other financial years. Then the coefficients of the four interactive dummies M&A(t)*year(t) represent the effects of takeovers on the performances in year2005-2008 respectively.

A significant improvement of profitability of M&A companies, measured by return on capital employed is found in year 2006. On average, companies involved in M&A have a higher ROCE of 0.183 than that of normal companies, *ceteris paribus*. Although the other performance indicators such as ROA and Cash Flow Ratio suggest M&A activities destroy company's performance, the evidences are not statistically significant. The significant increase of ROCE among M&A companies may due to a relative large rise in profit and a decrease or relative small increase in the capital employed, which is measured by the subtraction of total assets and current liabilities. The reduce of capital employed can be explained by an increasing of company's current liabilities which contain the short-term debts, account payables, accrued liabilities and so on. Banks lending always depend on the credit rankings. Large corporations with higher credit rankings will benefit from larger borrowing capacity. Therefore, merged firms with higher level of economic scale can help smaller firms reach a higher level of debt capacity and consistent with Lewellen's (1971) study. In year 2006, the UK economy performed well. BBC news (Jan, 2007) has reported "the UK economy grew at its fastest pace in two-and-half years during the last three months of 2006". In a boom period of economy, the predictions of its future growth are optimistic. Banks tend to lower their borrowings level and expand their lending scale due to the positive view for company's development and debt-paying ability. Therefore, the well performed economic environment in 2006 and higher level of current liabilities gained from takeovers will enhance the ROCE ratios of M&A firms.

It is also interesting to see a positive significant increase on the average of Cash Flow Ratios after M&A in 2008. Since the financial crisis in 2007-2008 has driven the global economy into a deep recession, the number of mergers and acquisitions fell sharply from a peak time in 2007. Theoretically, M&A activities have high possibilities not creating values to the firms but

destroying their values. On one hand, the results in the table present negative impacts of M&A on both ROA and ROCE ratios but they are not significant shown. On the other hand, the performances measured by cash flows ratios are improved. It is also noticed that M&A in 2008 are mostly merged by cash. From the National Statistical Report (2011), 3491 out of 4545 takeovers were paid by cash, occupied 77% proportion of the total sample. A lot of previous literatures have tested the influences of payment type of takeovers on company's value and most of them concluded mergers paid by cash are more profitable than the ones merged by all-equity (Ghosh, 2001; Andrade et al, 2001, and Goergen and Renneboog, 2004). And the finding of increased cash flows performance may highly affected by takeovers paid by cash.

Table4.4 M&A impact on firm's operating performances in specific industries

	(1)	(2)	(3)	(4)
	ROA	ROCE	PM	Cash Flow Ratio
	b/se	b/se	b/se	b/se
lnSize	-0.05052*** (0.00719)	-0.00969*** (0.00203)	0.01541*** (0.00033)	-0.00135** (0.00064)
M&A	0.09117 (0.23490)	-0.00303 (0.06621)	-0.03568*** (0.01089)	-0.04523*** (0.01663)
Gearing	-0.00473 (0.00674)	0.01405*** (0.00190)	-0.00339*** (0.00031)	-0.00583*** (0.00059)
M&A*Wholesale	-0.04762 (0.33491)	0.17648* (0.09440)	0.01832 (0.01553)	0.03315 (0.02317)
M&A*Machinery	-0.00603 (0.40488)	0.05889 (0.11412)	0.06728*** (0.01878)	0.07800*** (0.02790)
M&A*Chemicals	-0.03563 (0.43241)	-0.01535 (0.12188)	0.04988** (0.02005)	0.04235 (0.03318)
M&A*Construction	-0.01509 (0.45188)	-0.06858 (0.12737)	0.03514* (0.02096)	0.02091 (0.03142)
M&A*Food	-0.03497 (0.44497)	0.04501 (0.12542)	0.00916 (0.02063)	0.06775* (0.03484)
M&A*Transport	-0.03170 (0.46328)	0.01873 (0.13058)	-0.00283 (0.02148)	0.04356 (0.04837)
year06	0.01657 (0.03010)	0.01896** (0.00848)	0.00349** (0.00140)	0.00009 (0.00232)

year07	0.00812 (0.03014)	0.00739 (0.00850)	0.00462*** (0.00140)	-0.00384* (0.00232)
year08	0.01938 (0.03019)	-0.07194*** (0.00851)	-0.00913*** (0.00140)	-0.00538** (0.00233)
_cons	0.58149*** (0.07167)	0.31848*** (0.02020)	-0.10572*** (0.00332)	0.11256*** (0.00615)
N	60680	60680	60680	30747

Note: *, **, * correspond to 10%, 5% and 1% significance levels respectively**

As it is shown in Table4.4, there are some significant effects of M&A on company's performance measuring by different financial indicators in some specific industries. The results are interpreted by analyzing results from the six industries and comparing results from using different measurements.

Wholesale and Retail sector

Overall speaking, M&A activities have a negative impact on the average of company's ROA ratio and positive impacts on all other three financial ratios, return on capital employed, profit margin and cash flows ratio. Apart from the significant effect on M&A average ROCE, M&A impact on other financial ratios are insignificant. The coefficient of variable M&A*Wholesale reflects the difference between M&A firm's profitability in wholesale industry and that of other normal firms, which is a positive 0.17648, *ceteris paribus*.

Compared to the other three measurements, return on capital employed is more suitable for the wholesale and retail industry. ROCE is calculated as earnings before interests and taxes divided by the subtraction of total assets and current liability. One of the characteristics of the firms in retail industry is that they have relatively larger current liabilities. A high level of trade payables is remained especially when the customers paying by credit cards. Due to this character, firms in wholesale and retail industry are more sensitive to the change of ROCE rather than ROA.

The outperformance of M&A firms in wholesale and retail industry is

correspondence with companies' motives of gaining larger economic scale. In this industry with the largest amount of M&A activities, small retailers have been difficult to survive during a depressed business environment and relatively larger firms seek for growth and expand as well as new ways to do the business.

Machinery, Chemicals and Construction sectors

Machinery, chemicals and construction industries are closely connected and they share some similar characteristics. The construction industry is one of the major markets of both chemicals and machinery industries. Compared to the retail and wholesale industry, these industries have relatively high fixed costs in respect of large amount of fixed assets. For example, the more buildings and machines the company has the higher depreciations it will produce. Larger fixed costs will then reduce total profits.

As it is shown in Table 4.4, significant positive effects of M&A are found in machinery, chemical sector as well as the construction industry. For firms in machinery industry, the average profit margin of M&A companies is 0.06728 higher than that of normal companies in the base group, controlling for other factors. At the same time, the increase of average cash flow ratio of M&A firms is bigger in comparison with the profit margin significantly.

In sum, M&A activities impact company's profit margin in machinery, chemicals and construction sectors positively. The profit margin is calculated as earnings before interest and tax (EBIT) divided by the turnovers. EBIT here equals to the total revenue deducted by the sum of cost of good sales, operating expenses and depreciation. The positive effects of M&A are corresponding to the synergy theory that M&A activities help companies reduce costs. Gugler's (2003) findings also show that the profits of merging firms are higher while their sales are decreased.

Delaney and Wamuziri (2001) also investigated mergers and acquisitions activities in the construction industry in UK for a 5-year period from 1995 to 1999. They suggested that M&A firms in construction industry are benefit from enhancing the economic scale and reduced the costs. Other factors also stimulate mergers in construction industry such as a more and more restrict control of credit management and lending in bank industry and a lack of market interest in constructors. Small firms are struggling to survive in a more difficult environment due to these factors. This leads them to sell to obtain more capital and borrowing capacities.

Chemical industry has relatively large amount of M&A deals and the M&A firms outperformed other firms. According to the OECD (2012), annual global chemical sales have doubled over the period from 2000 to 2009, the demand of chemical products are constantly growing. Moreover, with more concerns about the global warming, there is a higher demand of environment friendly materials and innovative technologies are required to develop in chemistry industry. Chemical companies can obtain new technologies by acquiring innovative firms who have not enough capitals to growth.

Food and Beverage sector

It is also found the M&A companies have better performance measuring by cash flows ratio than the non-merged ones. The increase of average cash flows is 0.06775 between merged firms and non-merged firms, *ceteris paribus*. This result is consistent with the findings of previous literatures where use the cash flow ratios as the performance indicator (Healey et al 1992; Mason et al, 2000; Ghosh, 2001).

5. Conclusion, limitations and further recommendations

5.1 Conclusion

This study examined the impact of mergers and acquisitions on company's operating performances for British listed firms from 2005 to 2008. A large panel data of 15,170 companies in UK are used as the sample and 224 companies were involved in mergers. The fixed-effects regression model is employed to test differences of operating performances among the merged and non-merged firms by controlling firm-specified effects and time-specific factors. Operating performance indicators return on total assets, return on capital employed, profit margins and cash flows ratios are employed as the dependent variables in the models. The original fixed-effect model is extended to test how M&A activities affect the operating performances in particular years and in certain industries and the findings are mixed.

The results from previous studies are also mixed. Studies investigate company's post-merger performances in different countries using various performances and methodologies. Some studies in the US found M&A destroy company's performance significantly. Mueller (1980) employed ROE, ROA as performance measurements and found negative impact of M&A on company's performance. Similar results are found by Ravenscraft and Scherer (1987) in US and Dickerson et al (1997) in UK. However, this study's finding of overall impact of M&A on company's performance is inconsistent with them. The result in this paper suggests that M&A activities do not make big differences to companies significantly and it consistent with the study of Sharma and Ho (2002). In addition, significant improvements of post-merger performances were found in certain industries such as the wholesale and retail industry, machinery and construction industry. The inconsistency of results may due to the use of various accounting

measurements.

Healey et al (1992) and some other previous studies found significant improvements of cash flows ratios of M&A firms. However, in this paper there is no evidence that mergers have a significant positive impact on cash flows. But in a particular year 2008 the cash flow ratios increased dramatically. The reason behind this obvious change may be because that most of the deals are paid by cash. In addition, in food and beverage industry, there is a significant improvement of cash flow ratios. However, the results are always varied in respect of using different performance measurements.

5.2 Limitations and further recommendations

First of all, the data of this study is limited to a time range of four years because of the availability of financial data. There are a lot smaller or private mergers deals dropped for when merge the financial dataset and mergers dataset together. This study is only limited to examine the performances of acquiring firms.

Secondly, the choices of account measurements will affect the results of post-merger performances. As previous studies shown, using accrual accounting performance measurements such as ROA, ROE can get negative results of post-merger performance while using cash flows measurements may have positive ones. Also, there can be different definitions for one accounting measurement for certain terms. For instance, the return on capital employed can be defined as the total assets or as the subtraction of total assets minus current liabilities. The existence of different interpretations for an accounting term makes it hard to compare the results using alternative terms. Moreover, company's performances are affected by

so many other factors rather than the limited factors defined in this study, as the management style, employee's satisfaction and so on.

Furthermore, using fixe-effect model has some drawbacks. It cannot avoid endogenous variables and if the lagged profitability is involved there will be autocorrelation. The GMM model developed by Arellano and Bond (1991) can fix some of the drawbacks. Gular and Yurtoglu (2004) claimed the advantages of using GMM estimator, as "this estimator eliminates firm effects by first-differencing as well as controls for possible endogeneity of current explanatory variables. Endogenous variables lagged two or more periods will be valid instruments provided there is no second-order autocorrelation in the first-differenced idiosyncratic error terms."

Further studies can also investigate other factors which will influence the post-merger performances such as the types of mergers, whether it is horizontal, vertical or conglomerate merger; whether it is merged bay cash, stock or mixed of the two and so on. The time period under investigation can also be extended and more merger deals can be included to test post-merger performances.

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Appendix

Table I. Sample composition: number of mergers from 2005 to 2008

Industries	Year in which M&A was completed				Total
	2005	2006	2007	2008	
Chemicals, rubber, plastics, non-mental	4	3	10	3	20
Construction	4	4	10	1	19
Food, beverages, tobacco	11	2	7	3	23
Gas, Water, Electricity	1	2	1	0	4
Hotels & restaurants	5	4	1	1	11
Machinery, equipment, furniture	11	8	8	3	30
Metals & metal products	6	2	2	1	11
Post and telecommunication	0	5	4	2	11
Primary Sector (agriculture, mining etc.)	3	2	1	1	7
Publishing, printing	2	7	3	0	12
Textiles, wearing apparel leather	2	0	1	0	3
Transport	4	8	5	2	19
Wholesale & retail trade	16	13	14	9	52
Wood, cork, paper	1	1	0	0	2
Total	70	61	67	26	224

Table II. Summary of variables

Variable	variance	Mean	Std. Dev.	Min	Max	Observations
ROA	overall	0.096587	2.621136	-436	254	N = 60680
	between		1.977463	-108.7687	202.5	n = 15170
	within		1.720520	-327.1347	109.832	T = 4
ROE	overall	0.227993	0.739842	-9.969	9.8938	N = 60680
	between		0.493706	-3.35265	6.217925	n = 15170
	within		0.551028	-8.025457	7.672443	T = 4
Profit Margin	overall	0.040292	0.123756	-0.9983	1	N = 60680
	between		0.096661	-0.618625	0.87745	n = 15170
	within		0.077284	-1.020858	0.9388922	T = 4
Cash Flow Ratio	overall	0.12632	17.81893	-76.74689	4379	N = 60680
	between		8.909733	-19.19104	1094.796	n = 15170
	within		15.43162	-1094.67	3284.33	T = 4
InSize	overall	9.72927	1.496932	0	18.86649	N = 60680
	between		1.474051	0	18.62614	n = 15170
	within		0.260932	3.386466	14.47518	T = 4
Net Asset Turnover	overall	6.953479	26.29905	0	982.35	N = 60680
	between		19.42065	0	831.6275	n = 15170
	within		17.73407	-391.714	739.7635	T = 4
Gearing	overall	1.057348	1.590419	0	9.9865	N = 60680
	between		1.225550	0	9.35805	n = 15170
	within		1.013673	-5.982827	8.542723	T = 4

Figure1. Breusch and Pagan Tests

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of ROA

chi2(1) = 1.18e+06
 Prob > chi2 = 0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of roce

chi2(1) = 31244.73
 Prob > chi2 = 0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of PM

chi2(1) = 13260.24
 Prob > chi2 = 0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of CashFlow

chi2(1) = 804886.04
 Prob > chi2 = 0.0000

Figure 2. Hausman Test

. hausman fixed

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) .		
lnsize	.3882957	-.0139707	.4022664	.0292215
MA	.0814227	.0122036	.0692191	.0897012
NetAssetTurn	.0000554	-.0001104	.0001658	.0002173
gearing	-.0124017	-.0060219	-.0063799	.0041073

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 190.29
 Prob>chi2 = 0.0000