ความเกี่ยวเนื่องกับมูลค่าของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์ในการควบรวมกิจการ

นางสาว กอบพร กุลสุรกิจ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2551

VALUE RELEVANCE OF EVA IN MERGERS AND ACQUISITIONS

Miss Kobporn Kulsurakit

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Finance
Department of Banking and Finance
Faculty of Commerce and Accountancy
Chulalongkorn University
Academic Year 2008

Thesis Title	VALUE RELEVANCE OF EVA IN MERGERS AND ACQUISITIONS
By	Miss Kobporn Kulsurakit
Field of Study	Finance
Advisor	Manapol Ekkayokkaya, Ph.D.

Accepted by the Faculty of Commerce and Accountancy, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of the Faculty of Commerce and Accountancy
(Associate Professor Annop Tanlamai, Ph.D.)

THESIS COMMITTEE

.....Chairman
(Ruttachai Seelajaroen, Ph.D.)

.....Advisor
(Manapol Ekkayokkaya, Ph.D.)

.....External Examiner
(Associate Professor Sumalee Unahanandh)

กอบพร กุลสุรกิจ: ความเกี่ยวเนื่องกับมูลค่าของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์ในการควบรวมกิจการ. (VALUE RELEVANCE OF EVA IN MERGERS AND ACQUISITIONS) อ. ที่ปรึกษาวิทยานิพนธ์หลัก: ดร.มนพล เอกโยคยะ, 88 หน้า.

วิทยานิพนธ์ฉบับนี้จัดทำขึ้นเพื่อศึกษาความเกี่ยวเนื่องกับมูลค่าของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์ในแง่มุมที่ว่าตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์มีความเกี่ยวเนื่องมากกว่าตัววัดทางบัญชีอื่นหรือไม่โดยใช้ข้อมูลการควบรวมกิจการ การทดสอบข้อมูลแบบสัมพัทธ์และการทดสอบข้อมูลส่วนเพิ่ม (Relative and Incremental information content test) ถูกกำหนดขึ้นเพื่อทดสอบความสัมพันธ์ระหว่างตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์กับผลตอบแทนส่วนเกินราคาควบรวม ผลตอบแทนส่วนที่เกินปกติของผู้ควบรวมกิจการ และผลตอบแทนรวมระหว่างผลตอบแทนส่วนที่เกินปกติของผู้ควบรวมกิจการและผู้ถูกควบรวมกิจการ ว่ามีความสัมพันธ์มากกว่าตัววัดทางบัญชีอื่นหรือไม่และส่วนประกอบใดบ้างของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์ที่มีส่วนต่อความสัมพันธ์นี้ ผลของการทดสอบข้อมูลแบบสัมพัทธ์พบว่ากระแสเงินสดจากการดำเนินงานมีความสัมพันธ์กับผลตอบแทนส่วนเกินราคาควบรวมและผลตอบแทนรวมระหว่างส่วนที่เกินปกติของผู้ควบรวมกิจการและผู้ถูกควบรวมกิจการมากที่สุด แต่พบว่าตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์มีความสัมพันธ์กับผลตอบแทนส่วนที่เกินปกติของผู้ควบรวมกิจการมากที่สุด อย่างไรก็ตามความแตกต่างของระดับความสัมพันธ์ในการอธิบายผลตอบแทนต่างๆของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์และตัววัดทางบัญชีอื่นไม่มีนัยสำคัญ สำหรับผลของการทดสอบข้อมูลส่วนเพิ่ม พบว่าส่วนประกอบต่างๆของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์สามารถใช้ในการอธิบายผลตอบแทนต่างๆได้เพียงเล็กน้อย (มีเพียงแค่กระแสเงินสดจากการดำเนินงานและต้นทุนของเงินทุนซึ่งไม่ใช่ส่วนประกอบหลักของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์) เมื่อนำมาพิจารณาประกอบกันทั้งสองการทดสอบ จึงสามารถสรุปได้ว่าไม่มีหลักฐานสนับสนุนที่เพียงพอที่จะกล่าวอ้างถึงความสามารถของตัววัดมูลค่าเพิ่มทางเศรษฐศาสตร์ที่มีมากกว่าตัววัดทางบัญชีอื่นในกรณีการควบรวมกิจการ

ภาควิชา การธนาคารและการเงิน ลายมือชื่อนิสิต กอบพร กุลสุรกิจ
สาขาวิชา การเงิน ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก
ปีการศึกษา 2551

508 21270 26: MAJOR FINANCE
KEYWORDS: EVA/ MERGERS AND ACQUISITIONS
KOBPORN KULSURAKIT: VALUE RELEVANCE OF EVA IN MERGERS AND ACQUISITIONS. ADVISOR: MANAPOL EKKAYOKKAYA, Ph.D., 88 pp.

This study investigates the value-relevance of the EVA (Economic Value Added) in the aspect that the EVA can outperform other accounting measures using mergers and acquisitions data. Relative and incremental information content tests are conducted to investigate whether EVA is more highly correlated with the takeover premium, acquirer excess return and combined return than other traditional accounting measures (CFO, EBEI, RI), and examine which components of EVA, if any, contribute to these association. Relative information content tests show that CFO is more highly correlated with the target premium and combined return while EVA can best describe the variation in acquirer abnormal return. However, these differences in explanatory power are not significant. For the incremental information content test, the results show that EVA components add only marginally to the information content (only CFO and Capital Charge (CapChg) which is not the unique component of EVA). Considered together, there is no enough evidence to claim that EVA outperforms other accounting measures in mergers and acquisitions.

Department: Banking and Finance Student's Signature: Kobporn Kulsurakit
Field of Study: Finance Advisor's Signature:
Academic Year: 2008

ACKNOWLEDGEMENTS

I am indebted to many who have given me help and support throughout the course of this thesis. First of all, I would like to express my sincere appreciation to Dr. Manapol Ekkayokkaya, my thesis advisor for his invaluable advice, guidance and encouragement through the completion of this thesis. I am also thankful to Dr. Ruttachai Seelajaroen (the thesis Chairman) and Associate Professor Sumalee Unahanandh, (the External Examiner) for their valuable suggestions. Especially, I am gratefully indebted to Professor Gary Biddle for his kind help on methodology and SAS programming.

In addition, I would like to give a special thank to my friends at MSF program; to Thun Kotchasarnseree for technical and program assistance; Jaturachet Niltawat for helpful suggestions; Suwipa Phansatan, Saengchai Chotchatchawal and Punnipa Charoensriwattanakul for their friendship and cheerfulness. Finally, I would like to give my deepest gratitude to my family for their unconditional love, care and dedicated supports to me throughout my study.

CONTENTS

Page

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION

1.1 Background and Problem Review

There are many ways to measure the performance of firms in generating profit and subsequently creating the value for shareholders such as discounted cash flow, net present value, Return on Equity (ROE), Return on Assets (ROA), earnings per share and etc. For many years, the idea to measure whether the company is really earning genuine profits is first developed by Alfred Marshall[1]. He proposes that the company could create the wealth for shareholders only if its revenues are sufficient to cover the operating costs and cost of capital. That can be referred to economic income or economic profit (EP) and consequently the earliest mention of residual income (RI). Moreover, it can be implied that the company that shows profitability in terms of accounting measure may be distorted the value creation to shareholders because it fails to cover the cost of capital.

Based upon the abovementioned economic profit, Stern Stewart & Company introduces the concept of Economic value added (EVA®) as their trademark performance measurement. EVA[2] has the similar concept of residual income [3] but differs in the way that EVA adds some adjustments to operating profits and capital. EVA is simply the net dollar return to shareholders. A positive EVA indicates the value created to shareholders; a negative EVA shows the destruction in shareholders

---

[1] See Mäkeläinen (1998) and Kyriazis and Anastassis (2007)

[2] EVA can be defined as the net operating profits after tax (NOPAT) + Adjustment from Stern stewart – k*(Capital+ Adjustment from Stern stewart)

[3] Residual income can be defined as NOPAT- k*(Capital)

value. According to Stern et al. (1996), EVA is defined as an integrated financial management system for evaluating and rewarding the periodic performance of the managerial level that encourages the decentralized decision-making. Moreover, EVA model focuses on capital efficiency and ownership incentives in such a way that the company ties the management compensation according to the EVA improvement in each year. As a result, it encourages the manager to behave like the owner of the company and act in the ways that increase the value of firm. This would implicitly help in solving the agency problem by tying managers EVA bonuses to a performance measure that is highly correlated with shareholder value, thus aligning managers interest with shareholders, in other words, with aligned interest, the common interest is to maximize shareholder's wealth.

Young (1997) proposes that managers can use EVA for all three purposes instead of using; earnings per share for the capital markets, net present value for capital budgeting and the target return for net assets. That creates the financial management breakthrough for managers that easily communicate with the common performance measurement language. Several companies have adopted EVA in the early 1990s. For example, Coca Cola co. has adopted it in early 1980s, AT&T corp. in 1994, IBM in 1999, and Herman Miller Inc. in late 1990s. According to Kyriazis and Anastassis (2007), several EVA-adopted US companies have experienced a significant increase in shareholders' wealth. According to the Stern Stewart's study[4], it is found that companies that implemented EVA in the 1990s outperformed their peers by an average of 8.3% per annum over the five years following the adoption and created total abnormal shareholder wealth of $116 billion. According to Biddle et al.

[4] See Stewart et al. (2002) in EVAluation

(1997), EVA receives much attention both in academic and practitioner publications. For example, citations of EVA in the business press have grown exponentially, rising from one in 1989 to 294 in 1996[5]. Some papers find that EVA technique has subsequently obtained high abnormal returns. For example, O'Byrne (1997) observes positive and significant correlation between EVA and shareholder returns. Walbert (1994) claims that EVA offers the excellent link to the creation of shareholder value.

When comparing the EVA approach with the traditional approach (except RI) which is merely based on simple notions of accounting profits, such as earnings and the relevant ratios derived from them, such as the Return on Equity (ROE) and the Return on Assets (ROA), it can be observed that the traditional measurement does not consider the cost of invested capital (equity and debt) in order to generate profits made by a company.

Most of the papers have shown interest in the superiority performance of EVA approach compare with the traditional accounting approach. Most relevant empirical researches examine EVA in US market for explaining the unexpected or abnormal stock returns of companies. For example, Biddle et al. (1997) find that earnings outperform EVA in association with abnormal stock returns. Chen and Dodd (1996) find that EVA account for approximately 20.2 percent of the variation in abnormal stock returns comparing with the traditional RI, which explains 19.4 percent. However, there is no significant difference between EVA and RI and in fact; ROA (24.5) is more closely correlated with abnormal stock returns than EVA is. Moreover, Kyriazis and Anastassis (2007) also test the superiority in EVA's ability to explain

[5] Source: "Lexis/Nexis "allnews" library

abnormal stock returns the same way like Biddle et al. (1997) but test with the emerging market (Athens Stock Exchange) and find that EVA does not appear to be the most value relevant income measure with respect to Greek's firm abnormal stock returns.

After reviewing many papers related to EVA, most papers cast doubt on the superiority of EVA in explaining the stock performance. Because the above empirical researches test the value-relevance of EVA associated with abnormal stock returns, the main motivation in this study is to examine the relative and incremental information content or value-relevance of EVA in explaining the premium received in mergers and acquisitions in UK market. The motivation that we test EVA using mergers and acquisitions data is that the managers should possess more sophisticated information than investors do in mergers and acquisitions. The managers usually know more about news or events in any decision-making in the main corporate transactions of the company than outsiders do. This shows interesting evidence in finding out the value-relevance or efficiency of EVA model in measuring these merging firms. Therefore, the takeover premium[6] that is determined by the manager of target firms can be observed to reflect the value-relevance of EVA in mergers and acquisitions. If EVA has value-relevance in mergers and acquisitions, the results should show the positive relationship between EVA and the premium received.

By examining takeover premium as the main dependent variable, this paper also analyzes acquirer side on acquirer abnormal return and combined return[7] of target and

[6] Takeover premium has the same meaning as target premium. we will use it interchangeably.

[7] Combined return is the weighting between the target abnormal return and acquirer abnormal return.

bidding firms. If EVA has greater value-relevance than other traditional accounting measures, then there should be some relationship between EVA and the premium received in mergers and acquisitions. First, the target premium is analyzed as dependent variable. We expect that if EVA of target firm has greater correlation with the target premium than other accounting measures, a target firm with high EVA will receive higher premium from a bidding firm following the higher performance of the target firm. Second, acquirer abnormal return[8] is analyzed as dependent variable. If EVA of bidding firm has significant positively correlation with acquirer abnormal return, it means that the bidding firm with high EVA will make better decision in acquisition which result in obtaining high abnormal return. Lastly, combined return is analyzed as dependent variable. If EVA of both target and bidding firms has positive correlation with combined return, the high EVA of both target and bidding firms should end up with the wealth of the shareholders of the firms engaged in mergers activity that eventually will be reflected in combined return. In conclusion, the main investigation is to test the relationship between the premium received and EVA comparing with other traditional accounting measures in order to make an inference about the value-relevance of EVA from evidence in mergers and acquisitions.

1.2 Statement of problem/Research question

This study attempts to answer the question “Is there any correlation between a firm’s EVA and the premium received in takeover event over traditional accounting measures?”. In other words, does EVA beat other accounting measures in explaining the variation in the premium received in takeover event? This paper examines whether

[8] Acquirer abnormal return is measured during the period of event study between 20 days prior to and after the announcement date.

EVA will have greater value-relevance in terms of information content than other accounting measures in mergers and acquisitions.

1.3 Objectives of study

3.1 The objective of this proposed thesis is to examine the value-relevance of EVA in comparison to the traditional accounting measures.

1.4 Scope of the study

This empirical research examines the value-relevance of EVA in relative and incremental information content. We will investigate and focus on whether EVA has explanatory power in performance measurement of the company over traditional accounting measures by using the mergers and acquisitions data in UK during 1991-2007.

1.5 Contribution

This research provides empirical evidence on the value-relevance of EVA in mergers and acquisitions. That creates the additional aspect in testing the superiority performance of EVA in comparison to the traditional accounting measurements (Cash Flow from Operation (CFO), Residual Income (RI), and Earnings Before Extraordinary Item (EBEI)). These findings will demonstrate and will serve as the new evidence in reaching the conclusion about the superior performance or value-relevance of EVA in the major corporate transactions such as mergers and acquisitions. Moreover, this thesis will give the new and important aspect of EVA

metric as a desirable management tool in creating shareholders value by evaluating the value of firm engaged in mergers and acquisitions.

1.6 Organization of the study

The remaining of this paper is organized as follows: Chapter 2 provides the relevant literature reviews and some theoretical backgrounds. Chapter 3 describes data and discusses the methodology adopted in this study. Chapter 4 presents the empirical results and discussions. The final chapter provides the conclusion as well as discussion of areas for future research.

CHAPTER II

LITERATURE REVIEW

2.1 What is EVA?

By the definition of EVA, EVA[9] measures the difference between the return on a company's capital and the cost of that capital. In other words, EVA represents a company's profit net of the cost of both debt and equity capital. Stern et al. (1996) assess that EVA can be calculated without the costs of high leverage or excessive risk-bearing by making the cost of capital explicit to find the rate of return to compensate all of the firm's investors.

The EVA concept is often used and named in different way such as Economic Profit (EP), economic income and residual income in order to avoid problems caused by the trademark. However, Mäkeläinen (1998) proposes that the name EVA is so popular and well known up to the point that all residual income concepts are often called EVA even though they do not include even the main elements defined by Stern Stewart & Company.

EVA is originally created by Stern Stewart & Company, which proposes that the main aim of creating EVA model is to help the top management to evaluate the performance and reward their employees. EVA is not a new concept but it is developed from residual income by making some accounting adjustments of Stern Stewart. Those accounting adjustments help to prevent the managers in manipulating

[9] EVA can be compute as the product of the return spread or abnormal return on an investment (ROC minus cost of capital) and capital invested.

the profit numbers following Generally Accepted Accounting Principles (GAAP).[10] The literatures relating to EVA begin with the publication of the book *The Quest for Value* by Stewart (1991)[11], in which the author tells you about the usefulness of EVA. Stewart claims that EVA serves as the centerpiece of a completely integrated framework of financial management and incentive compensation. For financial management, EVA acts as the new model of internal corporate governance controlling each strategic business unit or division for appraisal of their performance and invested capital. EVA helps to encourage the employees to work as if they are the owner of the company because EVA plays an important role as a benchmark for paying remuneration that follows the improvement of EVA in each year. Therefore, EVA can be viewed as a tool for monitoring managers without the need for the external control mechanism of the market such as investors or some regulatory organizations. In other words, EVA is designed to evaluate managers on their capacity to generate greater-than-expected economic value added. Evidence provided in Wallace (1997) suggests that managers compensated based on EVA (instead of earnings) take actions consistent with EVA-based incentives.

2.2 Prior Research about EVA

EVA receives widespread attention among practitioners and academics alike. Some agree with but some against EVA. Many researchers conduct studies to compare the performance of EVA with other valuation approaches. Chen and Dodd (2001) study on the value-relevance (information content) of three profitability

[10] EVA is not bound by GAAP. The EVA adopters are willing to make whatever adjustments needed to produce more economically valid numbers. See Young (1997)

[11] See Kyriasis and Anastassis (2007)

measures: operating income, residual income, and EVA by using Stern Stewart 1,000 database of U.S. companies. They find no evidence to support that EVA is the best measure for valuation purpose. Fernandez (2002) examines 28 largest Spanish companies to analyze the relationship between shareholder value creation and various parameters (Economic Profit, EVA) and their result find that only 4 and 2 companies for Economic Profit and EVA respectively that have the highest correlation with shareholder value creation. However, O'Byrne (1997) documents that EVA can significantly explain more of the variation in market value among companies than earnings (Net Operating Profit after Tax (NOPAT), Free Cash Flow (FCF)).

Several studies investigate about the correlation between EVA and MVA. According to Stern Stewart, they define another measure that is MVA[12] .MVA is asserted to have a closely related measure with EVA in such a way that MVA is the present value of all expected future EVA and can be thought of as the net present value of the firm. In contrast, some researches find different result from Stern Stewart. For example, Fernandez (2002) uses 582 American companies which data provided by Stern Stewart and finds that the correlation between the increase in MVA and EVA is lower than the correlation between the increase in MVA and NOPAT. Kyriazis and Anastassis (2007) find that EVA does not have a significantly greater correlation with MVA than the other variables (net income, operating income, residual income, and EVA). The abovementioned papers raise the criticism about the efficiency of EVA proposed by Stern Stewart.

[12] MVA (Market Value Added) can be viewed as total market value of firm and capital invested for listed companies.

Many recent papers suggest contrasting results from EVA in various aspects. There are a few papers that support the superiority of EVA approach. For instance, Ferguson et al. (2005) examine 65 firms that became Stern Stewart clients from July 1983 to March 1988 period and find some evidence that EVA adopters experience an increase in profitability performance relative to their peers after the adoption. However, several studies offer the results arguing against the superior informational content of the EVA. Tortella and Brusco (2003) do not observe the significant market reaction to the adoption of EVA technique. Mir and Seboui (2006) collect 247 firms for the period 1998-2004 from the list of EVA firms in Fortune site and examine the relationship between market value (approximated by created shareholder value) and book value (approximated by EVA) and find non-significant relationship. Tsuji (2006) tests the effectiveness of EVA in measuring the corporate market value compared with other valuations (cash flow, operating income, and profit after tax) on 561 listed companies in Tokyo Stock Exchange in Japan. The results reveal that corporate market value in both levels and changes have strong relationship with other valuations than EVA. Griffith (2004) examines the questions raised about whether analysts should use EVA to forecast stock performance. He uses data from Stern Stewart and finds that investors in firms that use EVA to forecast stock performance would have suffered significant losses. Griffith (2006) examines EVA in association with stock performance on Stern Stewart& Co.2004 U.S.1000 EVA/MVA Annual Ranking Database. His conclusion is that EVA is a poor indicator of performance (by using cumulative, average abnormal returns as proxy). Ismail (2006) analyzes the superiority of EVA on UK market compared with other accounting measures. The results show that net operating profit after tax and net income outperform EVA and residual income in explaining stock returns for relative information content test. It is

also found that accruals and operating cash flow have significant incremental information content, while the accounting adjustments of EVA proponents have significantly less contribution in explaining stock returns.

2.3 Main research

As many studies analyze and examine the efficiency of EVA and reach the conclusion with many different results. There are more papers disagreeing with the efficiency of EVA than those which support it. This paper will focus on analyzing EVA as a kind of information content. Several studies try to examine the EVA performance or value-relevance of EVA and finally they get the test results that argue against the superior informational content of EVA. First, Biddle et al. (1997) examine whether EVA will have higher association with stock returns and firm values than traditional accounting earnings. They separate their study into two tests: relative and incremental information content test. For the first test, they compare and rank the performance measures by EVA, RI, EBEI and CFO and find that earnings (EBEI) is significantly more highly associated with market-adjusted annual returns than RI and all three of these measures dominate CFO. For incremental test, they decompose EVA into components (cash from operations, operating accruals, after-tax interest expense, capital charge and accounting adjustments) and test the contribution of each component toward annual stock returns. They find that all variables are significant at the 0.05 level but only CFO and operating accruals make the largest incremental contributions to explaining market-adjusted returns. As a result, these contributions to the information content of EVA are not sufficient to claim and support that EVA dominates earnings in relative information content.

Kyriazis and Anastassis (2007) examine the relative explanatory power of EVA with respect to stock returns and firm values similar to Biddle et al. (1997) but testing on emerging market, namely Athens Stock Exchange in Greece. They also find that EVA does not appear to have stronger correlation with shareholder's value than other accounting variables (e.g. net income, operating income). Relative information content tests reveal that net and operating income appear to be more value relevant than EVA. For incremental information content test, EVA unique components (capital charge and Stern Stewart adjustments) do not appear to have statistical significance, thus they do not add greater value relevance to the EVA measure.

2.4 Summary

EVA introduced by Stern Stewart Company appears to be criticized by many researchers in term of its superior performance as a form of information content. From our observation, most papers have shown that EVA does not dominate other traditional accounting variables in the way it associates with abnormal stock returns in markets. The main motivation in this paper is to investigate the value-relevance of EVA in mergers and acquisitions. This paper will examine whether EVA has explanatory power to measure the firm's performance that reflect in the takeover premium instead of using generally abnormal stock returns as a proxy for testing EVA. According to the abovementioned of our motivation in this paper, we will test EVA in three aspects as shown in Research Hypotheses section.

2.5 Research Hypotheses

Assumptions

1. Buyers (Bidders) have incentives to study target firms.

2. Buyers (Bidders) conduct the due diligence in order to verify the target's asset.

These assumptions will help to ensure that bidding firms will do their best attempt and take this action seriously to acquire the target firms. Hence, EVA that is used to measure the performance of merging firms in M&As can reflect its true value-relevance. By assuming the above mentioned, the hypotheses are set following the research question. The relationship between EVA and the premium received in takeover event is separated into three hypotheses in the view of target, bidding and combined firm in order to test the value-relevance of EVA in information content in the mergers and acquisitions.

Hypothesis 1: EVA of target firm and target premium (takeover premium) (Target side)

This hypothesis states that the value-relevance of EVA in target firm side by investigating the correlation between the EVA of target firm and target premium. If EVA has the value-relevance, the EVA of target firm and target premium should show some relationship. We expect the EVA of target firm and target premium to have a positive relationship, it means that the target firms that have high EVA receive high target premium because they are the good quality firms so many potential bidders want to acquire it which eventually boost up the takeover premium. As a result, it shows that EVA has value-relevance in kind of information content on target side in mergers and acquisitions.

Hypothesis 2: EVA of bidding firm and acquirer abnormal return (Bidder side)

This hypothesis focuses on the bidding firm side by testing the relationship between the EVA of bidding firm and acquirer abnormal return. If EVA has the value-relevance, the EVA of bidding firm and acquirer abnormal return should demonstrate some relationship. EVA of bidding firm and acquirer abnormal return is expected to have a positive relationship. Thus, this relationship can imply that a firm that has high EVA can make better investment decision, in other words, it can make a better takeover deal which results in higher acquirer abnormal return. Consequently, this demonstrates that EVA has the value-relevance in form of information content in bidder side.

Hypothesis 3: Combined EVA (EVA of target and bidding firms) and combined return (target premium + acquirer abnormal return)

This hypothesis predicts the value-relevance of EVA in the view of combined firms (Combine EVA of target and bidding firms and the return of target and bidding firms by weighting their EVA and returns according to the firm size[13]). This hypothesis helps to support and check whether the result is consistent with hypotheses 1 and 2. Moreover, when the target and bidding firms are combined, there should have the effect of takeover on the value of firms or any value added to the wealth of the shareholders (analyze in short-term only) of the firms engaged in merger activity[14]. Hence, this combined effect can have an influence on the relationship

[13] The weighting in size get from the market capitalization of target and bidding firms calculated by using the data in five days prior to the announcement date. Evidence from Heron et al. (2002)

[14] Draper and Paudyal (1999) examine the combined value of target and bidding firms and their findings confirm that some value is added through the takeover process.

between combined EVA of target and bidding firms and the weighting return of target and bidding firms that finally affect the result about the value-relevance of EVA. If EVA has value-relevance in this hypothesis, there has to be some relationship between EVA of target and bidding firms and combined return. It means that if combined EVA is high, the total wealth of shareholders of the firm engaged in mergers activity must increase bringing about the conclusion of value-relevance of EVA in mergers and acquisitions evidence.

CHAPTER III

DATA AND METHODOLOGY

3.1 Data

Data used in this study include the data from financial statements of companies that engaged in mergers and acquisitions in UK market from 1991-2007. The mergers and acquisitions data are obtained from SDC. We use data from public target and bidding firms in UK. The initial sample of 1,082 deals (total 2,164 companies in target and bidding firms[15]) is reduced by 82 firms due to the lack of Datastream code. We refer to all firms engaged in mergers and acquisitions in UK market from 1991-2007 as an "Observation". We focus on observations satisfying the following general three standard conditions associated with the mergers and acquisitions data.

(1) Market value of bidding firms[16] must equal or exceed one million pound. This condition will illustrate the power and significant size of bidder engaged in takeover event.

(2) Deal value must equal or exceed 5% of the market value of bidder. This condition shows the value of target firms that are generally large and worth enough for bidder to acquire.

---

[15] Some bidders may have acquired more than one firm and some targets may have been taken over multiple times. However, we identify them as separated transactions. For instance, when several acquisitions were made by the same bidder, the bidder is counted separately for each acquisition.

[16] Market value of bidding firm is standardized by; first, divide the market value of bidder by the ratio of FTALLSH index in the year which the transaction occurred (year t) and year 1991 (the benchmark year). Then we select only bidders with standardized market value exceeding one million pound. The purpose of this standardize is to eliminate the effect of the inflation through each year that may have an effect on market value.

(3) Toehold interest[17]or the pre-merger equity ownership in the target held by a bidder must equal or less than 30%.Toehold interests are taken from offer documents of the bidding companies.

After selecting the data constraint with their criteria, the observations decrease to 670 firms (bidding + target firms). Then, we collect the data separated into dependent and independent variables. Accounting and market value data are available on Datastream.

3.2 Methodology

3.2.1 Literature review of premium received in mergers and acquisitions

This part illustrates the literature related to the takeover premium, abnormal return received by the firms that engaged in M&As activity. These subjects matter in and take a part of the hypothesis testing which are examined in the role of dependent variables. Unlike previous papers[18], this paper uses premium or abnormal gains received in mergers and acquisitions instead of using generally stock returns (as dependent variable) in the markets for testing the value-relevance of EVA. Thus, it is essential to study and take into account how to measure the premium received and the other effects considered as factors that affect the gain and loss of the return or the wealth of both target and bidding firms. As such, for the objective of testing EVA in

[17] See Franks and Harris (1989), they have partitioned toeholds at a 30% threshold, since the UK takeover panel requires a bid for the entire company when a bidder's toehold interest exceeds this figure. This rule was introduced in the early 1970s presumably because it was thought that toeholds greater than 30% conveyed a purchasing advantage.

[18] Biddle et al. (1997), Kyriazis and Anantassis (2007), Ismail (2006)

this paper, the results are mainly observable and analyzed from the takeover premium so it is vital to revise and introduce the M&As literature which link to the methodology as followed.

Many empirical researches study and examine the determinants of takeover premium together with the various aspects of research topics associated with it. For instance, Moeller et al. (2004) propose that size would affect the gains from acquisitions. Return for small acquiring firm shareholders is roughly two percentage points higher than large firms. Draper and Paudyal (1999) examine the impact of takeover bid announcement on the returns. The results appear that shareholders of target companies benefit from the takeover announcement but the shareholders of bidding firms suffer a loss. They also claim that the returns to the shareholders of target as well as bidding firms have the method of payment dependent. However, Heron et al. (2002) investigates the relationship between the method of payment in acquisitions and the operating performance of acquirer and find that the method of payment does not appear to provide information regarding the firms' future operating performance. Instead, they find that improvements in operating performance subsequent to acquisitions are significantly greater when firms with higher market-to-book ratios acquire firms with low market-to-book ratios. Moeller (2005) demonstrates the influence of control variables (firm size, leverage, industry) on takeover premium. Schwert (2000) examines about the characteristics of hostile takeover in various aspects, one of them is conducted based on accounting performance data such as ROE, market-to-book ratio, debt-to equity ratio etc.

Those papers mentioned above share the same common things about the various factors that may affect the takeover premium. For the robustness checks, the control variables are chosen from M&As literatures cited above specifying the performance characteristics (size, ROE, market-to-book ratio[19], leverage) of target and bidding firms and the deal characteristic (method of payment).

3.2.2 Definitions of dependent and independent variables

There are three dependent variables, which are target premium, acquirer abnormal return and combined return. For target premium, we can infer a target premium as a takeover premium because the gain from mergers transaction will transfer to the target firm according to the contract agreement. Therefore, we can use the word "target premium" or "takeover premium" interchangeably. We will follow Moeller (2005)[20] paper in measuring target premium.

$$\text{Takeover premium} = \frac{\text{Price per share offered by bidder}}{\text{Target's share price twenty days prior to announcement}} - 1$$

For price per share offered by bidder, we calculate through the deal value and use the multiple between the market value of target 20 days prior to the announcement date and % of share acquire as target's share price 20 days prior to the announcement date.

[19] Market to Book ratio is used in many literatures as criteria to control or act as sensitivity test of results. See Faccio et al. (2005), Martin (1996), Schwert (2000), Heron et al. (2002).

[20] For Moeller (2005), he uses target's share price six days prior to the announcement because he claimed that short window ensures that most of the return can be attributed to the mergers and acquisitions. However, we use twenty days prior to announcement in order to match with the event study applied in finding acquirer abnormal return by Draper and Paudyal (1999) which use UK data similar to this study.

For acquirer abnormal return, we measure the acquirer abnormal percentage return by examining market reaction from the bidder stock price. Following Draper and Paudyal (1999), acquirer abnormal returns (AR_{it}) are estimated by using Market Model adjusted for abnormal return shown by the regression equation below;

$$AR_{it} = R_{it} - \infty_i - \beta_i R_{mt}$$

where R_{it} is the continuously compounded return[21] to bidding firm i on trading day t . R_{mt} is the continuously compounded return of the UK market on day t (proxy by FT All Share index). In addition, the market model regression parameters, α_i and β_i are estimated from the following market model;

$$R_{it} = \infty_i + \beta_i R_{mt} + \varepsilon_{it} \qquad t = -520,\ldots\ldots,-21$$

For the event studies (Brown and Warner (1985)), the parameter estimation period[22] is taken as starting from 500 working days (approximately 2 years) and finishing at 21 days prior to the announcement (-20 to 20 days). This method of measuring bidder abnormal stock returns can be viewed as the prediction error from the market model. Last but not least, combined return is measured as the weighting in size of target and bidding firm between target abnormal return and acquirer abnormal return.

[21] Continuously compounded return is calculated by taking ln of Total Return Index (RI) of takeover year period (t) divided by the year before takeover year (t-1).

[22] Draper and Paudyal (1999) claimed that many event-studies use a shorter window of -10 to +10 days surrounding the event. However, the takeover process in the UK suggests that bidders may start building up their stake well before the announcement of bids and hence it is relevant to use a wider window (-20 to 20 days) that can cover the overall effect from takeover announcement, especially for the period prior to the announcement of bids.

For the independent variables, there is CFO, EBEI, RI and EVA (four variables of each accounting performance measure) is defined below;

CFO (Cash Flow from Operation)

Cash flow from operation is obtained from the statement of cash flows or the statement of changes in financial position, depending upon the year of the observation. I use net cash flow-operating activities (WC04860) from Datastream.

EBEI (Earnings Before Extraordinary Items)

EBEI is net income before extraordinary items. We collect EBEI from net income before extraordinary items (WC01551) in Datastream. It can be computed from the following equation.

EBEI = CFO + Accrual

where CFO = net cash flow provided by operating activities.

Accrual = total accruals related to operating (as opposed to investing or financing) activities, e.g., depreciation, amortization, Δnon-cash current assets, Δcurrent liabilities (other than notes payable and current portion of long-term debt), and Δnon-current portion of deferred taxes

RI (Residual Income)

Residual Income (RI) can be viewed as the original model that EVA is derived from. Residual income can be computed in many forms as followed;

RI = NOPAT[23] – (k*Capital) or

RI = (ROA*Capital) – (k*Capital) or

RI = NI – (Cost of equity capital*Book value of equity) or

RI = EBEI + ATInt – (k*Capital)

where ATInt = the after-tax equivalent of book interest expense

k = the firm's weighted average cost of capital[24]

Capital = Stern Stewart's definition of assets [25] (net of depreciation) invested in going-concern operating activities, or equivalently, contributed an retained debt and equity capital, at the beginning of the period.

EVA (Economic Value Added)

EVA is Stern Stewart's proprietary version of RI. Stern Stewart attempt to improve RI by adjusting NOPAT and Capital that they think could be distorted by accounting method for measuring performance. According to Kyriasis and Anastassis (2007), EVA can be estimated by the following relationship;

EVA = NI + OIADJ – CAPCHG + STSTEWADJ

where NI = Net Income for firm i

[23] Since NOPAT = EBEI + ATInt because NOPAT is the net operating profits after tax which separates operating activities from financing activities by adding back the after-tax effect of debt financing charges (interest expense) included in EBEI. NOPAT can alternatively be expressed as a rate of return on invested capital (i.e., return on assets, ROA) times capital.

[24] WACC can be calculated from the sum of weighting between the cost of debt and cost of equity. For the cost of debt, it is the sum of 3-month UK t-bill and the average five-year spread before the takeover year. The spread is the difference between the interest rate of the company debt (estimated from interest expense/total debt) and 3-month UK t-bill. For the cost of equity, it is derived from CAPM Model.

[25] We use total asset as capital.

OIADJ	=	Operating income adjustments (Operating income [26]- Net Income) for firm i
CAPCHG	=	k*Total assets
STSTEWADJ	=	Stern Stewart adjustments[27] (Adjustments to profits- k*Adjustment to invested capital) of firm i
Adjustments to profits	=	+ (-) increase (decrease) of provisions (if it exists) + depreciation of goodwill (if it exists) + increase in capitalized R&D expenses – interest tax shields (= tax rate*interest expense) + taxes in extraordinary income + (-) change in deferred tax
Adjustment to invested capital	=	+ provisions (if it exists) – accounts payable – accruals + depreciation of goodwill (if it exists) + capitalized R&D expenses

As an example of a common accounting adjustment, Stewart (1991) suggests the capitalization and amortization of research and development costs (R&D). This requires the adjustment of NOPAT (via $AcctAdj_{op}$) by adding back the period's R&D

[26] Operating income = Operating profits before taxes from balance sheet. Operating income represents the difference between sales and total operating expenses.

[27] For Stern Stewart adjustment, there are up to 164 adjustments in NOPAT and Capital Charge. According to Young (1999), most of the adjustments are in the form of what EVA's leading components (provisions, deferred taxes, and goodwill). The logic behind these adjustments is that when companies apply GAAP, certain items are charged to income, such as provisions, deferred taxes, and goodwill that artificially and misleadingly reduce stated capital. Young (1999) also concluded that in practice the simple implementation approach with limited adjustment outweigh the cost of increased complexity. Moreover, as claimed by Weaver (2001) which conducts the survey on the significance of adjustments and find that EVA adopters make only 19 adjustments on average. To conclude, we will make adjustments on EVA based on the availability of data provided in Datastream.

expense and deducting amortization of the R&D asset. And it also requires the adjustment of capital via $AcctAdj_c$ which reflect the cumulative effect on capital of the capitalization and amortization of the current and past R&D expenditures. In addition to R&D, a number of other adjustments[28] are often made for EVA calculation. We will clarify them in Appendix 1.

For incremental information content test of EVA, it requires the decomposition of EVA components as shown below.

$$EVA = CFO + Accrual + ATInt - CapChg + AcctAdj$$
$$= EBEI + ATInt - CapChg + AcctAdj$$
$$= NOPAT - CapChg + AcctAdj$$
$$= RI + AcctAdj$$

where CapChg = k*(Total asset)

AcctAdj = $AcctAdj_{op}$ [29] – (k*$AcctAdj_c$) = STSTEWADJ

Accrual = EBEI –CFO

ATInt = (Interest Expense)* (1-corporate tax rate)

3.2.3 Relative and Incremental information content tests

After setting the research hypotheses in section 2.5, this section will show the method in testing the value-relevance (information content) of EVA in statistical test. Following Biddle et al. (1997), we separate the information content test into two types: relative and incremental test. For relative information content, we make comparison and ranking of performance measures (EVA, CFO, EBEI, RI), in other

[28] For the adjustments, we will follow Young (1999) and Kyriasis and Anastassis (2007).

[29] $AcctAdj_{op}$ and $AcctAdj_c$ are adjustments in operating income and invested capital respectively.

words we compare which one of the measures is the most appropriate. In contrast, incremental information content test assesses whether the information content of one's component (EVA) measure provides value-relevant data beyond that provided by another measure**.**

Relative information content test

The relative information content test is assessed to compare the ability of two competing sets of independent variables to explain variation in dependent variable. This test asks which measure has greater information content, then making mutually exclusive choices among alternatives (other measures) or ranking them. To test whether EVA has more value-relevance than other accounting measures, we will conduct two-tail tests of the null hypotheses (comprise of six pairwise comparisons) that CFO, EBEI, RI and EVA have equal relative information content:

$H_{0:}$ The information content of measure x_1 is equal to that of x_2

where x_1 and x_2 represent pairwise combinations from the set of performance measures: CFO, EBEI, RI and EVA. Rejection of H_0 is viewed as evidence of a significant difference in relative information content. To test the hypotheses, we will use the following regression[30]:

---

[30] Equation 1 is developed from the original ordinary least square in Biddle et al. (1997): $D_{,t}=b_0 + b_1FE_{x,t}/ MVE_{,t} + e_{i,t}$ where D_t is the dependent variable, a measure of abnormal return for time period t, FE_{xt} / MVE_{t-1} is the unexpected realization (or forecast error) for a given accounting measure X (e.g., CFO,EBEI,RI ,EVA) scaled by the beginning-of-period market value of the firm's equity , MVE_{t-1} and e_t is a random disturbance term. The forecast error (FE_t) is the difference between the realized value of a firm performance measure and the market's expectation: $FE_t = X_{,t} – E(X_{,t})$.where $E(X_{i,t})=\delta + \Phi_1X_{t-1}+ \Phi_2X_{t-2}+....$ The final equation that can be derived from substituting $FE_{x,t}$ in the main equation is $D_{,t}=b_0 + b_1FE_{x,t}/ MVE_{t-1} + b_2FE_{x,t-1}/ MVE_{t-1} +e_t$ that was limited to one-lag version to solve the problem of possible structural change across time.

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{t-1} + e_{i,t} \quad (1)$$

where

takepre$_{it}$[31] is the dependent variable, a measure of takeover premium of firm i in period (year) t

$X_{i,t}$ is a given accounting measure X (e.g., CFO,EBEI,RI ,EVA) of firm i in period (year) t

BVA $_{i,t-1}$ [32] is the beginning-of-period book value of the firm's total assets

e $_{i,t}$ is a random disturbance term (under the usual assumption in OLS regression)

Equation 1 is the cross-sectional regression model. All three hypotheses are tested by comparing adjusted R^2 from four separate regressions (one regression for each performance measure). Then, we analyze p-values received from the result of two-tailed tests[33] of relative information content (R^2 comparison) in each pairwise

---

[31] We will change dependent variables following three hypotheses: takeover premium, acquirer abnormal return and combined return.

[32] In Biddle et al. (1997), they use MVE (Market Value of Equity) as a deflator to reduce heteroscadasticity in data but we use the book value of total assets instead in this paper. There are two main reasons why we choose to use book value of total assets following Powell and Stark (2005). First, the disadvantage of using market values is that they are a forward-looking measure, which incorporates the expectation view of investors on the company. Thus, market value may not be reflect the true value of the company in case of inefficient market. Second, Powell and Stark (2005) which do research in UK claimed that we could use book value of total assets as a deflator to solve the above problem because there is no goodwill included in book value of asset likes US. Hence, there is no need for adjustment in goodwill.

[33] Two-tailed p-values represent tests of null hypothesis that set to the meaning of no difference between pairwise comparisons of adjusted R-squares. We will compare R^2s and test the statistical significance of R^2 in each pairwise comparison of accounting measures. The hypothesis is set as the following:

H_o: $B_1' N_1' \left[I_n - M_1 \left(M_1' M_1 \right)^{-1} M_1' \right] N_1 B_1 = B_2' N_2' \left[I_n - M_2 \left(M_2' M_2 \right)^{-1} M_2' \right] N_2 B_2$

comparison. According to Biddle et al. (1995), [34] their study conduct the original fundamental of statistical test in relative information content by using a lack-of-fit measure defined as the average of the sum of squared residuals and the sum of squared prediction errors, a nonlinear null hypothesis is obtained that involves quadratic form of regression coefficients. By applying this method claimed by Biddle et al. (1995), the nonlinear hypothesis (null hypothesis) in quadratic forms of regression coefficients can be derived and then can be tested using Wald test[35].

Incremental information content test

The incremental information content test assess whether one measure provides value-relevant data beyond that provided by another measure and apply when assessing the information content of a supplemental disclosure or the information of a component measure (e.g., Bowen et al. (1987)). Thus, we will examine the incremental value-relevance of EVA components by testing the following null hypothesis:

H_0: Component x_1 does not provide information content beyond that provided by the remaining components x_2-x_5

---

where B is a k-vector of regression coefficients. To assess the relative information contents of subsets of predictor variables M_1 and M_2, define N_1 as the columns of M not in M_1 and N_2 as the columns of M not in M_2. Define B_1 as the subset of B for N_1 and B_2 as the subset of B for N_2.This null hypothesis used to compare the relative information content of two subsets of predictors, M_1 and M_2 . Moreover, this is nonlinear hypothesis in quadratic forms of regression coefficients. It can be tested using Wald test of estimated coefficients that we received the valuable supports from Professor Gary Biddle in SAS program for testing this comparisons of adjusted R-squares.

[34] Follow Biddle et al. (1995), this statistical test is claimed to be the favorably method for testing relative information content compared with alternative tests provided in Davidson and MacKinnon (1981) and Vuong (1989).

[35] Wald test is conducted by using SAS program shown in Appendix 3.

The incremental information content tests contain five components of EVA: CFO, operating accrual (Accrual), after-tax interest expense (ATInt), Capital Charge (CapChg) and accounting adjustments (AcctAdj). Rejection of H_0 is viewed as evidence of incremental information content.

Incremental information content is assessed by examining the statistical significance of regression slope coefficients [36] shown in Eq. (2). According to the one-lag specification in Eq. (1), we generalize it into two accounting performance measures X and Y[37]. Following standard methodology in Bowen et al. (1987), the incremental information content test is assessed by using t-tests [38] on individual coefficients. For example, a test of $b_1=0$ would be the test of incremental information content of that component's coefficient in addition to that contained in other components. Moreover, to the extent that the independent variables are correlated[39], F-tests [40] of the joint null hypotheses is conducted to test whether there is value-relevance data of one component beyond that provided by another component or not.

---

[36] For incremental information content, Biddle et al. (1997) refer to the standard methodology based on Bowen et al. (1987).

[37] For this incremental information test, the equation is generalized to five accounting measure (five components of EVA) but we show only two accounting measure for easy to understand.

[38] When considering a single explanatory variable, t-test is assessed to check whether the parameter is significant (t-test is a special case of F-test).

[39] If the independent variables in each pairwise are likely to be highly correlated, making interpretation of significance tests on individual coefficients difficult, F-tests that set the hypothesis that both coefficients on pairwise comparisons are equal to zero is conducted.

[40] We use F-tests (restrictions) to test the variety of model restrictions, usually testing for the joint significance of a group of variables, in other words, using F-test for testing joint or compound hypotheses: e.g., all slope coefficients are zero. The F-test is a device for testing differences in the sum of the squared residuals obtained by estimating the restricted model and unrestricted model. We defined "restricted model" as a model (in the form of $R\beta = r$) with linear restrictions on the elements of β relative to unrestricted model, $Y = x\beta + \varepsilon$ .Intuitively, under H_o, the restrictions are true and the two competing accounting measures (models) are the same.

If there is some relationship and incremental value-relevance, all slope coefficients will not be equal to zero and other components. To conclude, we use t-tests for testing the slope coefficient in an *individually* statistically significant and F-tests to test *the joint null hypothesis* that the coefficients are jointly zero. If F-test results are not significant, it means that there is no incremental value-relevance in those competing accounting components. The following null hypotheses are the example of each pairwise comparison.

H_{0X}: $b_1=b_2=0$

H_{0Y}: $b_3=b_4=0$[41]

where b_1,b_2,b_3 and b_4 are from Eq.(2) below:

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{i,t-1} + b_3 Y_{i,t} / BVA_{t-1} + b_4 Y_{i,t-1} / BVA_{t-1} + e_{i,t} \quad (2)$$

It is tested using the Wald test[42] (Kennedy, 1985) on estimated coefficients and their heteroskedasticity-adjusted variance-covariance matrix. To control for the potential effects of heteroskedastic errors, White (1980) correction is employed in both the relative and incremental information content tests.

[41] It means all X and Y variables don't belong in the model (i.e., all coefficients are all jointly zero).

[42] Wald test is a way of testing the significance of particular explanatory variables in a statistical model to test whether the parameters associated with the group of explanatory variables are zero. If the Wald test is not significant then these explanatory variables can be omitted from the model. This Wald test is conducted in Eview program and not the same as the Wald test in relative information content test (in SAS).

To conclude, the research hypotheses set above in section 2.5 can be showed in the following methodology practice.

Hypothesis 1: Tests for target premium

1.1 Relative information content test

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{t-1} + e_{i,t}$$

$H_{0:}$ The information content of measure x_1 is equal to that of x_2

$H_{1:}$ The information content of measure x_1 is not equal to that of x_2

1.2 Incremental information content test

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{i,t-1} + b_3 Y_{i,t} / BVA_{t-1} + b_4 Y_{i,t-1} / BVA_{t-1} + e_{i,t}$$

H_0: $b_1=b_2=0$, $b_3=b_4=0$

H_1: Otherwise

Hypothesis 2: Tests for acquirer abnormal return

2.1 Relative information content test

$$acquirer_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{t-1} + e_{i,t}$$

$H_{0:}$ The information content of measure x_1 is equal to that of x_2

$H_{1:}$ The information content of measure x_1 is not equal to that of x_2

where $acquirer_{it}$ = Acquirer abnormal return of firm i at period t

2.2 Incremental information content test

$$acquirer_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{i,t-1} + b_3 Y_{i,t} / BVA_{t-1} + b_4 Y_{i,t-1} / BVA_{t-1} + e_{i,t}$$

H_0: $b_1=b_2=0$, $b_3=b_4=0$

H_1: Otherwise

Hypothesis 3: Tests for combined return

3.1 Relative information content test

$$combined_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{t-1} + e_{i,t}$$

H_0: The information content of measure x_1 is equal to that of x_2

H_1: The information content of measure x_1 is not equal to that of x_2

where combined $_{it}$ = Combined return (Target abnormal return + Acquirer abnormal return) of firm i at period t

3.2 Incremental information content test

$$combined_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{i,t-1} + b_3 Y_{i,t} / BVA_{t-1} + b_4 Y_{i,t-1} / BVA_{t-1} + e_{i,t}$$

H_0: $b_1=b_2=0$, $b_3=b_4=0$

H_1: Otherwise

3.3 Robustness Checks

For the robustness checks on our results, we separate it into two tests: control variables and industrial factors.

3.3.1 Control variables

For control variable, we choose these control variables from reviewing numbers of literatures relating to the factors or determinants of premium received in M&As (most of them considered the firm's characteristics in both bidding and target firms) that affect the returns which firm gained from acquisitions. The reason behind this modification is to examine the results, which may change from the initial model after adding the control variables (the robustness check of results). The control variables include size, ROE, leverage, market-to-book ratio (M/B), the method of payment and industrial sectors. We add them to the initial regression equation (Eq.1 and Eq.2[43]) for the relative and incremental information content test respectively as followed;

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{t-1} + b_3 C_{i,t} + e_{i,t} \quad (3)$$

$$takepre_{it} = b_0 + b_1 X_{i,t} / BVA_{i,t-1} + b_2 X_{i,t-1} / BVA_{i,t-1} + b_3 Y_{i,t} / BVA_{t-1} + b_4 Y_{i,t-1} / BVA_{t-1} + b_5 C_{i,t} + e_{i,t} \quad (4)$$

where $C_{i,t}$ is the control variables (Size ,ROE ,Leverage ,M/B, the method of payment) of firm i at period t

[43] We follow the method in adding the control variables in regression in order to conduct the robustness checks in Faccio et al. (2005).

The definitions about each control variable are defined as followed;

Size

We measure size by using the market capitalization (price of stock* Share outstanding)[44] of target and bidding firms by using the period three months before the M&As announcement[45]. For combined return, size is proxy by weighting it the same as combined return. We expect that small bidding firms will experience significant shareholder wealth gain more than large bidding firms[46]. For target's size, target shareholder gain less when their firm is larger[47].

Return on equity (ROE)

ROE is measured as the ratio of earnings to average equity for the fiscal year prior to the M&As announcement. ROE is the profitability ratio that shows the performance of target and bidding firms before the takeover bid. High ROE of bidder would result in better acquisition and consequently achieving higher return. For target side, like bidder side, high ROE of target firm can give it a negotiation leverage with acquirer and end up with higher takeover premium. Therefore, this should be a factor in explaining the premium received which may reduce the explanatory power of accounting measure. Moreover, this can have an effect on the relationship between EVA and the premium received.

---

[44] This would be MV (Market Value) from Datastream.

[45] See Schwert (2000)

[46] Evidence from Moeller et al.(2004)

[47] Palepu (1986) investigates the characteristics of target firms that are likely to be acquired and claims that when size of the target increases, the "transaction costs" associated with acquiring firm also increases. That means the number of potential bidders will decrease, in other words, there are less competition in M&As. Thus, target firms will likely receive lower return when their firm is larger. Bargeron et al. (2007) also have the same expectation.

Leverage

Leverage is measured as the ratio of book value of debt to the sum of the book value of debt and the market value of equity i.e. $\frac{D}{(D+E)}$ for the fiscal year prior to the M&As announcement. We expect that more highly leveraged target firms will have a weaker bargaining position since they do not have the option to recapitalize to defend against the takeover attempt. Therefore, the takeover premium may reduce according to their higher leverage. High leverage bidding firms may receive lower abnormal return in M&As activity because of their lower capacity for using more debt financing.

Market-to-book ratio (M/B)

M/B is measured as the ratio of the year-end market value of common stock to the book value of equity for the fiscal year prior to the M&As announcement. It measures bidder's investment in growth opportunities and M/B is extended to be a proxy for "well-managed" firms. High-growth bidders will have more power in negotiation and capacity in using debt financing that can result in higher abnormal return. High market to book ratio of target firms represents their bright future and bidding firms may pay high premium in acquiring this firms. Hence, target firm will expect to receive higher premium.

The method of payment

Common forms of payment to the shareholders of target firms by bidding firms include cash, shares, or a combination of both. Cash payments may be expected to generate relatively higher returns to the shareholders of target firms since the receipt of cash is less risky than the receipt of an equity offering by an exchange of shares[48]. Payment by shares will affect the value of bidding firms and consequently in general bidding firms face a loss in share price dropping. This situation can be explained from the evidence of Heron et al. (2002)[49] which propose that acquiring firms prefer to pay for their acquisitions with stock when it is overvalued by the market because managers have an incentive to issue stock when they perceive it to be overvalued. Thus, the average market reaction to the announcement of equity offerings is negative resulting in bidder's stock price dropping.

3.3.2 Industrial factors

Due to the varying degree of intangibility[50], the correlation between EVA and premium may vary across industries. Therefore, we conduct this factor to test the sensitivity of EVA across industries. Industries that have high number of intangible assets on their balance sheet will have to make large adjustments on EVA. It creates the possibility that the result from using the evaluation tool as EVA will significantly vary from using the traditional measures. This will have an effect on the superiority of EVA over traditional measures and may change the initial findings. As a result, we

---

[48] See Heron et al. (2002)

[49] It is consistent with Draper and Paudyal (1999), Hansen (1987) and Faccio et al. (2005) which find the negative average announcement returns to acquirers when the method of payment is stock rather than cash.

[50] The main and common adjustment of Stern Stewart is to deal with the problem in intangible asset (R&D, Goodwill) that can distort the invested capital and operating income.

will take an industry effect into account and consider whether the results are sensitive and vary across industries. We will illustrate and compare tests for relative and incremental information content across industries. Hence, the M&A data[51] used in this paper will be separated into two industry groups (high intensity [52] R&D expenditure and non-high intensity R&D expenditure industry) based on R&D intensity as criteria because R&D act as the main driver of EVA and play an important role in the large part of Stern Stewart's adjustment[53]. According to UK industry research[54], the sectors[55] with typically high R&D intensity are the following five sectors: pharmaceuticals & biotechnology, aerospace & defence, software, & computer services, fixed line telecommunications and automobiles & parts, which together accounted for almost two thirds of R&D[56].

---

[51] M&As data used in this thesis comes from UK data. According to R&D scoreboard website, it uses 850 UK companies that invest the most in R&D expenditure and then conclude them in the way that separating those companies into sectors. Therefore, we use its criteria to separate our sample firms into two groups (high intensity (five sectors) and non-high intensity R&D expenditure industry) based on the information given in this website. (Source: http://www.innovation.gov.uk/rd_scoreboard/). The R&D data was collected from the audited annual report of each UK companies.

[52] Intensity=R&D Expenditure/ Sales (Source: R&D Scoreboard).

[53] Hatfield (2002) examines the effect of R&D on EVA accounting and suggest ways in which R&D can be used to drive EVA growth. Since R&D has a relatively large cost, the managers might be tempted to cut R&D to boost up the net operating profit, which is the main component in EVA calculation.

[54] See the 17th annual edition of the R&D Scoreboard, which is published jointly by the department for innovation, Universities& Skills (DIUS) and the department for Business, Enterprise& Regulatory Reform (BERR) or http://www.innovation.gov.uk/rd_scoreboard.

[55] For sectoral classifications, we use FTSE (Financial Times Stock Exchange Index) for classification.

[56] Source: 2007 R&D Scoreboard (an investigation of financial performance of the top UK and global corporate investors in R&D and the data comes from the audited company accounts). The scoreboard is an international league table of the companies investing most in R&D. They summarize the 2006 data on investment in R&D and financial performance of the 850 most active UK companies (including foreign-owned companies whose R&D is conducted and reported in the UK)

CHAPTER IV

RESULTS

The main objective of this thesis is to investigate the value relevance of EVA in mergers and acquisitions. This section begins with the descriptive statistics of each dependent and independent variables. Section 2 and 3 present the result of relative and incremental information content test respectively. Section 4 shows the result of robustness checks.

4.1 Descriptive Statistics

We separate the result into 6 panels of Table 1 following the methodology and hypothesis testing. All independent variables are winsorized to 4 standard deviations from the median[57].Data presented in Panel A1 of Table 1 are data for testing hypothesis 1(Target side) in relative information content test. CFO has the lowest standard deviation and has the highest mean and median. RI has negative value. All correlations are positive and CFO has the highest significantly positive correlation with target premium (TP).Target abnormal return (Return) has been created to consistently compare with acquire abnormal return. The correlations between each accounting measure and target abnormal return are insignificantly positive.

Data presented in Panel A2 of Table1 are data for testing hypothesis 2(Bidder side) in relative information content test. CFO still has the lowest standard deviation among the four performance measures. CFO still has the largest mean and median followed by EBEI, EVA and RI that is consistent with the result of Biddle et al.

[57] The descriptive statistics tables (Not winsorized version) are shown in Appendix 2.

(1997). The residual income (RI) has the lowest mean and negative value the same as Kyriazis and Anastassis (2007) that reasoned this as because of the high positive values of the Stern Stewart adjustments in operating profits and invested capital. EVA has a positive mean value and the highest standard deviation .All correlations among these independent variables are all significantly positive. These findings can imply that EVA does not differ much from other accounting performance measures. On the other hand, the correlations between each accounting measure and acquirer abnormal return (AR) are insignificantly negative except EVA is insignificantly positive correlated with acquirer abnormal return (AR). According to our research hypotheses, the positive correlations between EVA and those three dependent variables are expected so as to conclude the additional value-relevance of EVA in M&As. However, this positive correlation between EVA and acquirer abnormal return shows weakly support to infer about the superior performance of EVA.

Data presented in Panel B1 of Table1 are data for testing hypothesis 1(Target side) in incremental information content test. Both mean and median of Accrual are negative[58]. Capchg has the largest mean and median. The negative correlation between CFO and Accrual is consistent with Accrual process as claimed by Biddle et al. (1997). ATInt and Accrual has significantly positive correlation with takeover premium (TP).

[58] Accruals are more likely to be negative (reflecting non-cash expenses such as depreciation and amortization).

Data presented in Panel B2 of Table1 are data for testing hypothesis 2(Bidder side) in incremental information content test. Their descriptive statistics are the same like target (Panel B1) but correlations are differ and not significant

Data presented in Panel C1 of Table1 are data for testing hypothesis 3 (combined side) in relative information content test. Combined CFO still has the largest mean and median the same as each bidder and target side but the lowest standard deviation. Combined EVA shows the significantly largest positive correlation with the combined return. In the last panel, data presented in Panel C2 of Table1 are data for testing hypothesis 3 (combined side) in incremental information content test. Combined Capchg has the highest mean and median. The correlations between each independent variable are consistent with the result of target and bidder separately.

In overall, these descriptive statistics table leave us many important points. Only RI and Accrual have negative values. This seems reasonable because RI may receive an effect from the adjustment part of EVA, which can be observed in change from the positive sign of EVA to negative sign in RI. As focused on the correlations, the correlations between each accounting measure are significantly positive. This can imply that the trend of explanatory power of each accounting measures seems to be in the same way. However, the correlations between each dependent variable and each independent variable show insignificantly relationships except the clearly significant positive relationship between CFO and target premium (TP).

Table 1 Panel A1

Descriptive statistics on the dependent and independent varible in relative information content tests for target [a]

	Dependent variable		Independent variable			
	TP_t (%)	$Return_t$ (%)	CFO_t	$EBEI_t$	EVA_t	RI_t
No. of Observation	465	588	247	303	196	270
Descriptive Statistics						
Mean	54.283	0.440	0.054	0.029	0.006	-0.024
Median	23.021	0.365	0.056	0.042	0.011	-0.007
Std Dev.	159.037	0.575	0.096	0.102	0.120	0.106
Correlations [b]						
CFO_t	.199**	0.026	1.000			
$EBEI_t$	0.101	0.016	.610***	1.000		
EVA_t	0.087	0.128	.286***	.393***	1.000	
RI_t	0.062	0.129	.424***	.607***	.812***	1.000

Table 1 Panel A2

Descriptive statistics on the dependent and independent variable in relative information content tests for bidder [a]

	Dependent variable	Independent variable			
	$Return_t$ (%)	CFO_t	$EBEI_t$	EVA_t	RI_t
No. of Observation	609	527	625	408	534
Descriptive Statistics					
Mean	0.000	0.050	0.025	0.005	-0.027
Median	-0.008	0.053	0.039	0.005	-0.013
Std Dev.	0.385	0.108	0.118	0.122	0.116
Correlations [b]					
CFO_t	-0.075	1.000			
$EBEI_t$	-0.065	.676***	1.000		
EVA_t	0.045	.404***	.413***	1.000	
RI_t	-0.005	.530***	.644***	.811***	1.000

Table 1 Panel B1

Descriptive statistics on the dependent and independent varible in incremental information content tests for target [a]

	Dependent variable		Independent variable				
	TP_t (%)	$Return_t$ (%)	$Accrual_t$	$AcctAdj_t$	$ATInt_t$	$CapChg_t$	CFO_t
No. of Observation	465	588	296	196	273	285	247
Descriptive Statistics							
Mean	54.283	0.440	-0.021	0.021	0.012	0.083	0.054
Median	23.021	0.365	-0.009	0.006	0.010	0.078	0.056
Std Dev.	159.037	0.575	0.121	0.086	0.009	0.051	0.096
Correlations [b]							
$Accrual_t$	-0.081	-0.027	1.000				
$AcctAdj_t$	-0.028	0.110	-0.043	1.000			
$ATInt_t$	0.104	0.025	-0.086	-0.176*	1.000		
$CapChg_t$	0.069	0.015	-0.007	0.17*	-0.151	1.000	
CFO_t	0.172*	0.017	-.485***	-0.151	0.014	.316***	1.000

Table 1 Panel B2

Descriptive statistics on the dependent and independent varible in incremental information content tests for bidder [a]

	Dependent variable	Independent variable				
	$Return_t$ (%)	$Accrual_t$	$AcctAdj_t$	$ATInt_t$	$CapChg_t$	CFO_t
No. of Observation	609	621	408	573	563	527
Descriptive Statistics						
Mean	0.000	-0.020	0.028	0.011	0.086	0.050
Median	-0.008	-0.010	0.014	0.009	0.076	0.053
Std Dev.	0.385	0.119	0.066	0.009	0.058	0.108
Correlations [b]						
$Accrual_t$	0.103*	1.000				
$AcctAdj_t$	0.059	-.179***	1.000			
$ATInt_t$	0.11*	-0.011	-.253***	1.000		
$CapChg_t$	-0.093	-0.054	0.092	-.150**	1.000	
CFO_t	-0.094	-.517***	-0.063	.117**	.333***	1.000

Table 1 Panel C1

Descriptive statistics on the dependent and independent varible in relative information content tests for combined (target + bidder)[a]

	Dependent variable	Independent variable			
	Combined $Return_t$ (%) (Return)	Combined CFO_t	Combined $EBEI_t$	Combined EVA_t	Combined RI_t
No. of Observation	544	231	283	156	232
Descriptive Statistics					
Mean	0.107	0.060	0.037	0.011	-0.015
Median	0.083	0.062	0.043	0.007	-0.008
Std Dev.	0.357	0.090	0.091	0.105	0.094
Correlations[b]					
Combined CFO_t	-0.069	1.000			
Combined $EBEI_t$	-0.092	.647***	1.000		
Combined EVA_t	.175**	.293***	.370***	1.000	
Combined RI_t	0.083	.452***	.580***	.805***	1.000

Table 1 Panel C 2

Descriptive statistics on the dependent and independent varible in incremental information content tests for combined (target + bidder)[a]

	Dependent variable	Independent variable				
	Combined $Return_t$ (%) (Return)	Combined $Accrual_t$	Combined $AcctAdj_t$	Combined $ATInt_t$	Combined $CapChg_t$	Combined CFO_t
No. of Observation	544	275	156	244	247	231
Descriptive Statistics						
Mean	0.107	-0.016	0.019	0.011	0.082	0.060
Median	0.083	-0.014	0.005	0.011	0.076	0.062
Std Dev.	0.357	0.098	0.007	0.007	0.049	0.090
Correlations[b]						
Combined $Accrual_t$	-0.004	1.000				
Combined $AcctAdj_t$	0.148	-.253***	1.000			
Combined $ATInt_t$	-0.001	-0.027	-.292***	1.000		
Combined $CapChg_t$	-0.156	-0.080	0.167*	-0.17*	1.000	
Combined CFO_t	-0.116	-.590***	-0.036	0.055	.433***	1.000

[a] All variables are winsorized +/- 4 standard deviation from the median. All independent variables are deflated by the book value of total asset at the takeover year t.

[b] All correlations are generated and tested by using Spearman test in SPSS.***,**,* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

[c] Combined return is conducted from the weighting by firm size between target abnormal return and acquirer abnormal return

4.2 Relative information content test

Relative information content is assessed by comparing adjusted R^2 from four separate regressions (CFO, EBEI, RI and EVA) and tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2. Panel A of Table 2 shows the results of adjusted R^2 of the regressions of target premium on each accounting measure under comparison. The highest R^2 is observed in the regression with CFO as the explanatory variable (R^2 = 3.55%), which is followed by EBEI (R^2 = 1.32%), while RI (R^2 = -0.36%) and EVA (R^2 = -1.89%[59]) appear to have the smallest explanatory power with respect to target premium. The results of the Wald test of Biddle et al. (1995) are presented on p-value in parentheses for each of the six possible pairwise comparisons. All p-value results in Panel A suggest that the explanatory power of each performance measure does not appear to outperform each other significantly. The results imply the less value-relevance of EVA compared with other traditional performance measure associated in takeover premium. This can be interpreted that the high performance target firm (high EVA) tend to receive low takeover premium. Therefore, EVA cannot act as the good indicator of measuring the target firm performance.

Panel B of Table 2 presents the results of adjusted R^2 of the regressions of acquirer abnormal return on each accounting measure under comparison. An examination of the R^2 reveals that EVA appears to have the greatest relative

[59] In the case of adjusted R^2, when it turns out to be negative in an application, its value is taken as zero. This result creates the implication that EVA has no explanatory power in the dependent variable and suggests that EVA quite has no value-relevance or less value-relevance in comparison to other accounting measures variables. See Gujarati (2003), P.218. Adjusted R^2 has taken into account the number of independent variables. The negative sign can occur and show that our model is worse than our expectation (or mean of our whole regression).

explanatory power (R^2 = 2.13%) over the other performance measure. EVA is followed by CFO (R^2 = 0.1%). EBEI comes third (R^2 = 0%), while RI seems to have the least explanatory power with respect to acquirer abnormal return (R^2 = 0 %). It is not surprise that EVA has the highest R^2 because it is consistent with the correlation between EVA and acquirer abnormal return in descriptive table (Panel A2). However, this difference in adjusted R^2 (shown by p-value between EVA, CFO, EBEI and RI) is not significant. Therefore, this result gives the weak support on the argument that EVA has greater information content or superior value-relevance than other accounting variables. In other words, this implies that bidder can best choose EVA to be the performance tool in measuring their firm.

Panel C of Table 2 shows the results from considering on combined return (Combined acquirer abnormal return with target abnormal return) aspect. Combined CFO gives the highest R^2 (R^2 = 4.82 %), followed by combined EBEI (R^2 = 2.03%), combined EVA (R^2 = 0%), combined RI (R^2 = -0.16%) respectively. This seems reasonable because combined CFO rather outperforms other accounting measure in bidder and target side. However, the tests in the significance difference between R^2 in each independent variable are not significant, suggesting that all independent variables are equally well associated with combined returns.

Panel D of Table 2 presents the additional result from matching the target premium as dependent variables with each accounting measure of bidder in order to observe the relationship between them. We expect that high EVA of bidder should pay low takeover premium that will consistent with our hypotheses 1 and 2. We get

the same rank order of R^2 as Panel A but very low R^2 compared with it. Moreover, the Wald test again shows the insignificant difference in R^2.

In summary, we find that in all results in terms of this relative information content except acquirer abnormal return, CFO appear to insignificantly outperforms EBEI,EBEI insignificantly outperforms RI and EVA. It demonstrates that EVA does not outperform the other traditional accounting measures in explaining takeover premium. That implies the less value-relevance of EVA in target premium and combined return. This result is contrast with the previous result of Biddle et al. (1997) which find that CFO has the lowest R^2 in correlation with stock returns but agree on the way that EVA is not the best performance measure. Similarly, Kyriazis and Anastassis (2007) reports that EVA appears to have the smallest explanatory power associated with stock returns. Surprisingly, EVA obtains the highest R^2 in acquirer abnormal return. Its rank in R^2 shows EVA to be the highest one and leave the other variables remain the same order. This situation is consistent with the signal shown about the significantly positive correlation between EVA and acquirer abnormal return. From the abovementioned results, we reach a conclusion that EVA is good with the bidder side in economic significance view. However, the conclusion in the difference between each accounting measure in information content with premium received in M&As is not significant. In other words, all four accounting measure have equal information content.

Table 2 Panel A

Tests of the relative information content of EVA,RI,EBEI and CFO;
Takeover Premium as Dependent variables^

	Relative information content						
No. of Observations	155		215		183		108
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.035		0.013		-0.004		-0.019
Prob(F-statistic)	(0.024)**		(0.091)*		(0.509)		(0.994)
p-value		(0.412)		(0.507)		(0.819)	
			(0.325)		(0.248)		
				(0.315)			

^ Underlying equation is $D_{it} = b_0 + b_1 X_{i,t}/BVA_{i,t-1} + b_2 X_{i,t-1}/BVA_{i,t-1} + e_{i,t}$ where D_{it} is the takeover premium , $X_{i,t}/ BVA_{i,t-1}$ is a given accounting measure X (e.g., CFO,EBEI,RI ,EVA) of target firm i in takeover year t scaled by the beginning-of-period book value of the firm's total assets. The first row of each panel shows the number of observations in each one of accounting measure as the independent variable. The second and third rows represent the rank order of R^2 from the highest (on the left) to lowest (on the right) and the value of R^2 for each regression. In the fourth row, the p-value of F-statistic test is presented to show the significance of R^2 in each regression (accounting measure). For the last row, p-value is obtained from two-tailed statistical tests of relative information content (Wald test) showed in parentheses for each of the six possible pairwise comparisons of adjusted R^2. P-value rows begin with the first row presented p-value for comparison between first and second ranked measures, second and third ranked measures and third and fourth ranked measures. The second row is the p-value for comparison between first and third ranked measures, second and fourth ranked measures. The last row is for first and fourth ranked measures. ***, **,* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

Table 2 Panel B

Tests of the relative information content of EVA,RI,EBEI and CFO;
Acquirer abnormal return as Dependent variables^

	Relative information content						
No. of Observations	309		608		569		483
Rank order of R^2	EVA	>	CFO	>	EBEI	>	RI
Adj.R^2	0.021		0.001		0		0
Prob(F-statistic)	(0.014)**		(0.295)		(0.347)		(0.379)
p-value		(0.454)		(0.978)		(0.998)	
			(0.841)		(0.966)		
				(0.432)			

^ The underlying equation is the same as Table 2 Panel A except the dependent variables changed to acquirer abnormal return and X is the accounting measure of bidding firms.

Table 2 Panel C

Tests of the relative information content of EVA,RI,EBEI and CFO;
Combined return as Dependent variables^

	Relative information content						
No. of Observations	184		256		117		213
Rank order of R^2	CFO	>	EBEI	>	EVA	>	RI
Adj.R^2	0.048		0.02		0		-0.002
Prob(F-statistic)	(0.004)***		(0.028)**		(0.367)		(0.437)
p-value		(0.819)		(0.85)		(0.793)	
			(0.38)		(0.882)		
				(0.548)			

^ The underlying equation is the same as Table 2 Panel A except the dependent variables changed to combined return and X is the combined accounting measure of target and bidding firms.

Table 2 Panel D

Tests of the relative information content of EVA,RI,EBEI and CFO;
Target Premium as Dependent variables and independent variables of bidding firms^

	Relative information content						
No. of Observations	337		426		345		217
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.006		-0.004		-0.005		-0.006
Prob(F-statistic)	(0.141)		(0.848)		(0.878)		(0.691)
p-value		(0.588)		(0.634)		(0.647)	
			(0.408)		(0.787)		
				(0.337)			

^The underlying equation is the same as Table 2 Panel A except the dependent variables changed to target premium and X is the accounting measure of bidding firms.

4.3 Incremental information content test

Table 3 presents results on the incremental information content of EVA components from regression (5)[60]:

$$D_t = b_0 + b_1(CFO_t \backslash BVA_{i,t-1}) + b_2(CFO_{t-1} \backslash BVA_{i,t-1}) + b_3(Accrual_t \backslash BVA_{i,t-1}) + b_4(Accrual_{t-1} \backslash BVA_{i,t-1}) + b_5(ATInt_t \backslash BVA_{i,t-1}) + b_6(ATInt_{t-1} \backslash BVA_{i,t-1}) + b_7(CapChg_t \backslash BVA_{i,t-1}) + b_8(CapChg_{t-1} \backslash BVA_{i,t-1}) + b_9(Acctadj_t \backslash BVA_{i,t-1}) + b_{10}(AcctAdj_{t-1} \backslash BVA_{i,t-1}) + e_t \quad (5)$$

The notion behind this regression 5 is; if each component of EVA shows high correlation with the dependent variables, it implies the superior performance of EVA since the strongly supplement support in each sub-component of EVA. This section investigates whether which components of EVA show high relationship with the dependent variables and also consider whether that those components are the unique components that further make EVA differ from other measures. For instance, if the results show that accounting adjustments (AcctAdj) component has high correlation with the dependent variables, it means EVA can beat other measures because AcctAdj is the unique component of EVA.

In Incremental information content test, Panel A of Table 3 depicts the estimated output of regressions of target premium on the components of EVA. The result reveals that the regression is statistically significant as shown by the value of the F-statistic at 99% confidence level. Examining on each coefficient of the regression, we observe that only the lag of CapChg is significant at 95% level. To test

[60] Regression 5 is extended from Eq.2 into five components of EVA.

for the incremental information content of EVA, Wald test or in other words, the pairwise F-tests on the coefficients of each variable in the regression 5 was carried out. The overall results of Wald test suggest that only CapChg is rejected at the 5% level at least. It means that CapChg has the incremental value-relevance. This result can be slightly implied that EVA has the additional value than CFO, Accrual, EBEI and NOPAT in the way that it considers the cost of capital but not with RI.

In Panel B of Table 3, it shows the estimated output of regressions of acquirer abnormal return on the components of EVA. For t-statistics on individual coefficient, none of them is significant. When considering the Wald test results on each variables, only CFO variable is rejected which means its coefficient statistically differs form zero in jointly F-test, in other words, implies the value-relevance in incremental test. The results of F-statistics on the whole regression cannot be rejected, suggesting that no variables of EVA component can explain the variation in acquirer abnormal return. These results are clearly and strongly suggest that EVA does not provide or add any incremental value beyond other variables (EBEI, NOPAT, RI and CFO).

In panel C, the result of regressions of combined return on the components of EVA is depicted. As you can see by looking at panel C, no variables in both individual and jointly coefficient test are statistically significant. Based on the results, EVA does not have any incremental information content.

Referring to the results of the regression estimation and the Wald test, we can conclude that the elements unique to EVA (both capital charge and the Stern Stewart

adjustments) add only slightly value-relevant information additional to which is already incorporated in the traditional accounting variables.

Table 3 Panel A

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment ; Takeover Premium as Dependent variables*

		Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
No. of Observations	68													
Coefficient		-1.069	1.698	-0.241	-0.035	-6.693	-35.252	68.192	-4.871	16.545	0.62	-3.032	2.9675	22.7002
t-stat		-2.037**	0.459	-0.05	-0.013	-1.313	-0.852	1.628	-0.714	2.536**	0.201	-0.491		
F-stat			0.1461		0.9684		1.9086		4.092		0.1219		(0.0045)***	
p-value			(0.8644)		(0.3858)		(0.1576)		(0.0218)**		(0.8854)			

*Underlying equation is $D_{it}= b_0 + b_1 (CFO_{it} /BVA_{i,t-1})+ (CFO_{it-1}/BVA_{i,t-1}) + b_3(Accrual_{it}/BVA_{i,t-1}) + b_4(Accrual_{it-1}/BVA_{i,t-1}) + b_5(ATInt_{it} /BVA_{i,t-1})+ b_6(ATInt_{it-1} /BVA_{i,t-1})+ b_7(CapChg_{it} /BVA_{i,t-1})+ b_8(CapChg_{it-1} /BVA_{i,t-1})+ b_9(Acctadj_{it} /BVA_{i,t-1})+ b_{10}(AcctAdj_{it-1}/BVA_{i,t-1}) +e_{it}$, where D_{it} is the takeover premium , CFO is the net operating cash flow, Accrual is total accrual related to operating activities (EBEI-CFO), ATInt is the after-tax interest(Interest expense*corporate tax rate), CapChg is the capital charge (k*total asset) and Acctadj are the Stern Stewart adjustments on operating profits and invested capital. All independent variables of target firms are scaled by the book value of total asset at the beginning of the year. The number of observations is 68 for panel A. The t-statistics is applied in testing the significance of each coefficient presented with ***, ** and * denoting statistical significance at the 0.01, 0.05 and 0.1 level respectively. Significance levels are computed for two-sided t-tests. F-statistics shown at the fourth row for each panel represents the result from jointly test of null hypothesis that each independent variable and its lagged term are equal to zero. P-values in parentheses shown in the last row represent the result of null hypothesis of no incremental information content in each component of EVA.

Table 3 Panel B

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment ; Acquirer abnormal return as Dependent variables*

	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
No. of Observations	202												
Coefficient	0	-0.007	0.008	-0.003	0.003	0.049	-0.002	-0.003	-0.003	0.005	0.003	1.5522	2.674
t-stat	-0.461	-2.052	2.172	-1.02	0.661	1.131	-0.037	-0.921	-0.461	1.13	0.657		
F-stat		2.7761		0.5401		1.6323		1.112		1.3321		(0.1238)	
p-value		(0.0648)*		(0.5836)		(0.1982)		(0.331)		(0.2664)			

* The underlying equation is the same as Table 3 Panel A except D_{it} is the acquirer abnormal return and all independent variables calculate from bidder side.

Table 3 Panel C

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment ; Combined return as Dependent variables*

	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
No. of Observations	70												
Coefficient	0.002	-0.001	-0.006	-0.005	0	0.127	-0.032	-0.007	-0.006	0.011	0	1.5909	4.4407
t-stat	1.205	-0.071	-0.481	-0.518	0.037	1.415	-0.312	-0.882	-0.456	1.27	-0.006		
F-stat		0.4056		0.1371		2.0516		1.1335		1.1555		(0)***	
p-value		(0.6684)		(0.8722)		(0.1376)		(0.3288)		(0.3219)			

* The underlying equation is the same as Table 3 Panel A except D_{it} is the combined return and all independent variables calculate in combined side (weighting in target and bidding firm size).

4.4 Robustness Checks

In this section, we perform the robustness check on our results by adding the control variables, which the result is shown in section 4.4.1, and partitioning our observations into two groups following high and non-high intensity R&D expenditure industry, in section 4.4.2.

4.4.1 Control variables

It is possible that when we add the control variables, the result will change because the control variables[61] (size, ROE, market-to-book ratio, leverage and the method of payment) have the opportunity in affecting the premium that firms gain from acquisitions (dependent variables). We add them into the original regression of relative and incremental information content (Equation 1 and 2). Results reported in table 4 are relative information content results including five-difference regression results in each panel for each five-control variables adding. And table 5 provides the result of the incremental information content test in partitioning by each control variables the same as table 4.

In Panel A of table 4, adjusted R^2 are largest for CFO in every control variables adding and followed by EBEI, RI and EVA respectively although EVA insignificantly and slightly outperform RI in market-to-book ratio. In incremental information content in table 5, the overall result of target premium is in the same direction. Only

[61] These control variables can be one of the factors in explaining the dependent variables (target premium, acquirer abnormal return and combined return) which may be automatically eliminate the effect from the initial independent variables.

the lag of Capchg is significant and there is no evidence for the incremental significance of remaining EVA components.

In panel B of table 4 , EVA seem to have highest R^2 in relative information content in acquirer abnormal return together with control variables that yield the same as the initial result. Nevertheless, the interesting thing is CFO, which used to have the highest R^2 for target premium and the second rank in the initial result has the least R^2 in ROE and the method of payment sessions. When ROE and the method of payment variables are added, they tend to increase the adjusted R^2 of all independent variables, with the lowest increase in the adjusted R^2 for CFO. For incremental test in panel B of table 5, only CFO is significant in t-test of every control variables adding and undoubtedly followed by the significance in jointly F-test, which show the incremental value-relevance of CFO. This creates no support evidence of incremental value-relevance of EVA from the unique component of EVA.

In panel C of table 4, CFO again beats other accounting measures with the highest of R^2 around 5%. The overall rank order of R^2 is almost the same as the previous one before adding control variables. However, none of the adjusted R^2 of the performance measures differs significantly in relative information content. In incremental information content test, only AcctAdj is significant in individual t-test of ROE session and CFO for jointly F-test in market-to-book ratio session.

Although EVA reaches the top rank in R^2 for acquirer abnormal return, Wald test for difference in R^2 shows no significance on them. Considering with incremental information content test, there is little evidence on the significance on the component

of EVA: only in CapChg on takeover premium and CFO on acquirer abnormal return. Taken together, there is no strongly evidence that EVA will create value-relevance more than other traditional accounting measures in mergers and acquisitions.

Table 4 Panel A

Tests of the relative information content of EVA, RI, EBEI,CFO and Control variables ; Takeover Premium as Dependent variables^

	Relative information content						
"Size"							
No. of Obs.	155		215		183		108
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.036		0.014		-0.002		-0.02
Prob(F-statistic)	(0.036)**		(0.11)		(0.448)		(0.816)
p-value		(0.615)		(0.962)		(0.863)	
			(0.394)		(0.537)		
				(0.962)			
"ROE"							
No. of Obs.	152		211		182		108
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.031		0.011		-0.009		-0.017
Prob(F-statistic)	(0.052)*		(0.151)		(0.725)		(0.753)
p-value		(0.63)		(0.451)		(0.844)	
			(0.533)		(0.426)		
				(0.442)			
"Leverage"							
No. of Obs.	155		215		183		108
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.034		0.016		-0.001		-0.02
Prob(F-statistic)	(0.043)**		(0.096)*		(0.434)		(0.831)
p-value		(0.74)		(0.73)		(0.858)	
			(0.374)		(0.58)		
				(0.445)			
"Market to book ratio"							
No. of Obs.	155		215		108		183
Rank order of R^2	CFO	>	EBEI	>	EVA	>	RI
Adj.R^2	0.03		0.009		-0.008		-0.008
Prob(F-statistic)	(0.054)*		(0.173)		(0.537)		(0.677)
p-value		(0.683)		(0.496)		(0.977)	
			(0.427)		(0.783)		
				(0.386)			
"Method of payment"							
No. of Obs.	153		213		182		107
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.044		0.008		-0.005		-0.028
Prob(F-statistic)	(0.031)**		(0.234)		(0.555)		(0.887)
p-value		(0.843)		(0.92)		(0.718)	
			(0.728)		(0.496)		
				(0.639)			

^This table shows the results of the relative information content test when adding the control variables. There are five sessions (one session for one control variable) in each panel. The underlying equation is adopted to $D_{it} = b_0 + b_1X_{i,t}/BVA_{i,t-1} + b_2X_{i,t-1}/BVA_{i,t-1} + b_3C_{i,t} + e_{i,t}$, where D_{it} is target premium, $C_{i,t}$ is the control variables (Size, ROE, Leverage, Market-to-book ratio and the method of payment). ***, **,* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

Table 4 Panel B

Tests of the relative information content of EVA, RI, EBEI,CFO and Control variables ;
Acquirer Abnormal Return as Dependent variables^

	Relative information content						
"Size"							
No. of Obs.	309		429		569		483
Rank order of R^2	EVA	>	CFO	>	EBEI	>	RI
Adj.R^2	0.018		-0.001		-0.002		-0.002
Prob(F-statistic)	(0.562)		(0.483)		(0.546)		(0.562)
p-value		(0.462)		(0.644)		(0.981)	
			(0.581)		(0.306)		
				(0.359)			
"ROE"							
No. of Obs.	303		474		556		421
Rank order of R^2	EVA	>	RI	>	EBEI	>	CFO
Adj.R^2	0.031		-0.001		-0.001		-0.004
Prob(F-statistic)	(0.006)***		(0.471)		(0.459)		(0.77)
p-value		(0.434)		(0.622)		(0.783)	
			(0.562)		(0.751)		
				(0.39)			
"Leverage"							
No. of Obs.	309		429		569		483
Rank order of R^2	EVA	>	CFO	>	EBEI	>	RI
Adj.R^2	0.018		0.006		0.003		-0.002
Prob(F-statistic)	(0.035)**		(0.144)		(0.187)		(0.576)
p-value		(0.456)		(0.619)		(0.934)	
			(0.598)		(0.297)		
				(0.361)			
"Market to book ratio"							
No. of Obs.	307		427		567		481
Rank order of R^2	EVA	>	CFO	>	EBEI	>	RI
Adj.R^2	0.018		-0.001		-0.001		-0.002
Prob(F-statistic)	(0.037)**		(0.483)		(0.535)		(0.575)
p-value		(0.537)		(0.615)		(0.979)	
			(0.529)		(0.302)		
				(0.36)			
"Method of payment"							
No. of Obs.	290		459		541		411
Rank order of R^2	EVA	>	RI	>	EBEI	>	CFO
Adj.R^2	0.047		0.018		0.014		0.008
Prob(F-statistic)	(0.001)***		(0.017)**		(0.021)**		(0.128)
p-value		(0.91)		(0.853)		(0.708)	
			(0.662)		(0.96)		
				(0.738)			

^This table shows the results of the relative information content test when adding the control variables. There are five sessions (one session for one control variable) in each panel. The underlying equation is adopted to $D_{it} = b_0 + b_1X_{i,t}/BVA_{i,t-1} + b_2X_{i,t-1}/BVA_{i,t-1} + b_3C_{i,t} + e_{i,t}$, where D_{it} is acquirer abnormal return and $C_{i,t}$ is the control variables (Size, ROE, Leverage, Market-to-book ratio and the method of payment). ***, **,* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

Table 4 Panel C
Tests of the relative information content of EVA, RI, EBEI,CFO and Control variables ;
Combined Return as Dependent variables^

	Relative information content						
"Size"							
No. of Obs.	184		256		213		117
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.049		0.022		0.007		0.001
Prob(F-statistic)	(0.007)***		(0.037)**		(0.226)		(0.384)
p-value		(0.675)		(0.278)		(0.296)	
			(0.902)		(0.629)		
				(0.548)			
"ROE"							
No. of Obs.	181		253		115		211
Rank order of R^2	CFO	>	EBEI	>	EVA	>	RI
Adj.R^2	0.05		0.025		0.025		0.005
Prob(F-statistic)	(0.007)***		(0.025)**		(0.122)		(0.267)
p-value		(0.628)		(0.984)		(0.531)	
			(0.233)		(0.386)		
				(0.646)			
"Leverage"							
No. of Obs.	184		256		213		117
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.053		0.022		-0.004		-0.006
Prob(F-statistic)	(0.005)***		(0.037)**		(0.546)		(0.562)
p-value		(0.683)		(0.285)		(0.297)	
			(0.715)		(0.63)		
				(0.643)			
"Market to book ratio"							
No. of Obs.	184		117		256		213
Rank order of R^2	CFO	>	EVA	>	EBEI	>	RI
Adj.R^2	0.047		0.023		0.017		-0.003
Prob(F-statistic)	(0.009)***		(0.131)		(0.062)*		(0.516)
p-value		(0.931)		(0.187)		(0.311)	
			(0.729)		(0.475)		
				(0.887)			
"Method of payment"							
No. of Obs.	184		256		213		117
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.04		0.018		0		-0.007
Prob(F-statistic)	(0.024)**		(0.074)*		(0.413)		(0.522)
p-value		(0.628)		(0.386)		(0.531)	
			(0.43)		(0.525)		
				(0.728)			

^ This table shows the results of the relative information content test when adding the control variables. There are five sessions (one session for one control variable) in each panel. The underlying equation is adopted to $D_{it} = b_0 + b_1X_{i,t}/BVA_{i,t-1} + b_2X_{i,t-1}/BVA_{i,t-1} + b_3C_{i,t} + e_{i,t}$, where D_{it} is combined return and $C_{i,t}$ is the control variables (Size, ROE, Leverage, Market-to-book ratio and the method of payment). ***, **,* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

Table 5 Panel A

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment; Takeover Premium as Dependent variables^

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
"Size"	68													
Coefficient		-0.962	1.863	0.088	0.307	-6.613	-32.304	64.436	-5.74	16.536	0.621	-3.31	2.703	21.8
t-stat		-1.73*	0.5	0.018	0.112	-1.29	-0.771	1.514	-0.819	2.52**	0.201	-0.532		
F-stat			0.201		0.878		1.706		3.783		0.144			
p-value			(0.819)		(0.421)		(0.191)		(0.029)**		(0.866)		(0.007)***	
"ROE"	68													
Coefficient		-1.149	-0.853	1.131	-2.71	-4.841	-35.528	70.813	-3.83	16.685	-0.746	-1.417	2.707	21.9
t-stat		-2.119**	-0.156	0.214	-0.545	-0.822	-0.854	1.674	-0.543	2.542**	-0.198	-0.212		
F-stat			0.023		1.089		2.042		4.25		0.103			
p-value			(0.977)		(0.344)		(0.139)		(0.019)**		(0.902)		(0.007)***	
"Leverage"	68													
Coefficient		-0.799	1.871	-0.016	0.008	-6.534	-32.389	70.805	-4.905	16.684	1.489	-4.287	2.687	21.7
t-stat		-1.071	0.501	-0.003	0.003	-1.271	-0.771	1.667	-0.714	2.538**	0.421	-0.642		
F-stat			0.191		0.898		2.001		4.099		0.208			
p-value			(0.826)		(0.413)		(0.145)		(0.022)**		(0.813)		(0.008)***	
"Market to book ratio"	68													
Coefficient		-0.575	3.895	1.382	1.681	-5.821	-37.201	61.965	-6.861	15.575	1.198	-0.331	2.942	24.2
t-stat		-0.925	0.983	0.283	0.579	-1.145	-0.907	1.486	-0.995	2.397**	0.39	-0.052		
F-stat			0.822		0.703		1.34		3.1		0.084			
p-value			(0.445)		(0.499)		(0.27)		(0.053)*		(0.919)		(0.004)***	
"Method of payment"	67													
Coefficient		-1.975	2.289	-1.131	0.354	-9.214	-44.629	77.492	-1.416	14.038	0.481	-4.178	2.744	24.1
t-stat		-2.595**	0.609	-0.235	0.131	-1.748*	-1.069	1.832*	-0.2	2.098**	0.156	-0.671		
F-stat			0.199		1.639		2.2		3.689		0.245			
p-value			(0.82)		(0.204)		(0.121)		(0.032)**		(0.784)		(0.006)***	

^Dependent variable = target premium for panel A ; the independent variables are components of EVA (CFO, Accrual, ATInt (after-tax interest expense) , CapChg (capital charge) and AcctAdj (accounting adjustments) and finally plus the control variables (size, ROE, leverage, market-to-book ratio and the method of payment) in each separate regression.***,**,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

Table 5 Panel B

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment; Acquirer Abnormal Return as Dependent variables^

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
"Size"	202													
Coefficient		-0.007	0.008	-0.003	0.003	0.05	-0.002	-0.003	-0.003	0.005	0.003	0	1.41	2.2
t-stat		-2.045**	2.131**	-1.012	0.652	1.136	-0.047	-0.914	-0.446	1.138	0.661	0.258		
F-stat			2.713		0.53		1.628		1.075		1.347			
p-value			(0.069)*		(0.59)		(0.199)		(0.343)		(0.263)		(0.171)	
"ROE"	197													
Coefficient		-0.008	0.008	-0.003	0.002	0.039	-0.001	-0.003	-0.005	0.005	0.002	0	1.469	2.6
t-stat		-2.025**	2.026**	-0.897	0.456	0.894	-0.025	-0.766	-0.705	1.091	0.428	-0.416		
F-stat			2.85		0.408		0.937		1.24		0.985			
p-value			(0.06)*		(0.666)		(0.394)		(0.292)		(0.375)		(0.146)	
"Leverage"	202													
Coefficient		-0.007	0.008	-0.003	0.003	0.05	-0.002	-0.003	-0.003	0.005	0.003	0	1.405	2.2
t-stat		-2.046**	2.142**	-1.005	0.668	1.131	-0.035	-0.923	-0.446	1.132	0.643	-0.109		
F-stat			2.715		0.532		1.565		1.111		1.331			
p-value			(0.069)*		(0.588)		(0.212)		(0.331)		(0.267)		(0.008)***	
"Market to book ratio"	200													
Coefficient		-0.007	0.008	-0.003	0.003	0.05	-0.003	-0.003	-0.003	0.005	0.003	0	1.393	2.1
t-stat		-2.042**	2.158**	-1.002	0.636	1.134	-0.057	-0.912	-0.423	1.134	0.649	-0.175		
F-stat			2.746		0.518		1.59		1.042		1.321			
p-value			(0.067)*		(0.597)		(0.207)		(0.355)		(0.269)		(0.179)	
"Method of payment"	191													
Coefficient		-0.006	0.008	-0.003	0.004	0.056	-0.018	-0.003	-0.003	0.005	0.004	0.001	1.278	1.7
t-stat		-1.348	1.938*	-0.903	0.904	1.172	-0.311	-0.715	-0.442	1.175	0.841	1.389		
F-stat			1.931		0.571		1.285		0.802		1.6			
p-value			(0.148)		(0.566)		(0.279)		(0.45)		(0.205)		(0.235)	

^ Dependent variable = acquirer abnormal return for panel B; the independent variables are components of EVA (CFO, Accrual, ATInt (after-tax interest expense), CapChg (capital charge) and AcctAdj (accounting adjustments) and finally plus the control variables (size, ROE, leverage, market-to-book ratio and the method of payment) in each separate regression. ***,**,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

Table 5 Panel C

Tests of incremental information content of EVA components: CFO, Accrual,After-tax interest, Capital charge and Accounting adjustment; Combined Return as Dependent variables^

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcctAdj_t$	$AcctAdj_{t-1}$	F	Adj. R^2 (%)
"Size"	202													
Coefficient		0.002	0	-0.006	-0.004	0	0.127	-0.034	-0.007	-0.007	0.011	0	1.19	2.9
t-stat		1.233	-0.015	-0.484	-0.473	0.027	1.408	-0.329	-0.902	-0.473	1.263	-0.022		
F-stat			0.329		0.115		1.979		1.161		1.128			
p-value			(0.721)		(0.891)		(0.147)		(0.32)		(0.331)		(0.314)	
"ROE"	197													
Coefficient		0.002	0.011	-0.008	0.007	-0.009	0.1	-0.027	-0.006	-0.015	0.024	-0.024	1.27	4.3
t-stat		1.697*	0.678	-0.666	0.547	-0.898	1.117	-0.25	-0.821	-1.003	1.87*	-1.005		
F-stat			0.259		0.424		1.056		1.925		1.855			
p-value			(0.773)		(0.657)		(0.355)		(0.155)		(0.166)		(0.265)	
"Leverage"	202													
Coefficient		0.003	0.002	-0.008	-0.003	-0.002	0.136	-0.03	-0.008	-0.005	0.014	-0.006	1.217	3.3
t-stat		1.137	0.166	-0.63	-0.272	-0.192	1.482	-0.292	-0.998	-0.347	1.381	-0.272		
F-stat			0.388		0.081		2.188		1.228		1.303			
p-value			(0.68)		(0.922)		(0.121)		(0.301)		(0.28)		(0.297)	
"Market to book ratio"	200													
Coefficient		0.001	-0.001	-0.002	-0.004	-0.002	0.115	0.004	-0.006	-0.011	0.013	-0.004	1.494	7.3
t-stat		1.161	-0.111	-0.147	-0.427	-0.223	1.303	0.036	-0.818	-0.796	1.423	-0.2		
F-stat			2.746		0.518		1.59		1.042		1.321			
p-value			(0.067)*		(0.597)		(0.207)		(0.355)		(0.269)		(0.159)	
"Method of payment"	191													
Coefficient		0.002	-0.002	-0.005	-0.007	0.001	0.11	-0.019	-0.008	-0.005	0.011	-0.001	1.208	3.5
t-stat		1.237	-0.193	-0.4	-0.69	0.103	1.14	-0.181	-1.099	-0.373	1.217	-0.063		
F-stat			0.419		0.239		1.545		1.376		1.008			
p-value			(0.66)		(0.788)		(0.222)		(0.261)		(0.372)		(0.3)	

^ Dependent variable = combined return for panel C; the independent variables are components of EVA (CFO, Accrual, ATInt (after-tax interest expense), CapChg (capital charge) and AcctAdj (accounting adjustments) and finally plus the control variables (size, ROE, leverage, market-to-book ratio and the method of payment) in each separate regression.***,**,* denote the significance level of 0.01, 0.05 and 0.1 respectively

4.4.2 Industry factor

According to the varying degree of intangible asset, calculation of EVA will receive effect from this problem because the main and common adjustments of Stern Stewart have to deal with it. Therefore, industries that have high number of intangible assets on their balance sheet will also have the large adjustments on EVA. In this section, we partition the data into two groups (high intensity R&D and non-high intensity R&D expenditure industry) based on R&D intensity as criteria because R&D acts as the main driver of EVA and play an important role in the large part of Stern Stewart's adjustment.

In table 6 reports the results of relative information content test classified by two groups of firms (high and non-high R&D intensity expenditure industries).Not surprisingly, EVA exhibits the high largest R^2 for the high R&D intensity part for target premium, which exceed CFO used to have highest R^2. However, none of the performance measures differs significantly in relative information content. The result of non-high R&D intensity group of takeover premium is the same as the initial result.

Surprisingly, RI has the highest R^2 in high R&D intensity session for acquirer abnormal return and EVA turns to have the less explanatory power variables. While CFO is not dominate other performance measures in this part, CFO still has the adjusted R^2 in second rank but it is not significantly differ from the first rank in overall result. For non-high R&D intensity for acquirer abnormal return, EBEI has the highest R^2 and there is no significance in the difference in R^2 in each pairwise comparison.

Table 7 reports tests of incremental information content for high and non-high R&D intensity industries. In one-tail t-tests of individual slope coefficient, only CapChg variable in non-high R&D intensity in takeover premium and CFO variable in high R&D intensity in acquirer abnormal return have the incremental value-relevance.

Considering jointly with the robustness checks of relative information content discussed in sections 4.4.1 and 4.4.2, there is no evidence to support that EVA has the superior performance than other traditional accounting measures. In only one case in acquirer abnormal return that EVA has the highest R^2 but this superior R^2 is not statistically significant compared to other measures. In contrast, adjusted R^2 is highest for CFO in the remaining comparisons although CFO insignificantly outperforms EVA. In terms of incremental information content, the analyses provide that only CapChg and CFO that add the incremental information content. This shows the weakly evidence to support the superiority of EVA performance.

Table 6 Panel A

Tests of the relative information content of EVA, RI, EBEI,CFO;
Partitioned by R&D intensity across industries and Takeover Premium as Dependent variables^

	Relative information content						
High R&D intensity							
No. of Observation	15		20		26		23
Rank order of R^2	EVA	>	CFO	>	EBEI	>	RI
Adj.R^2	0.277		0.25		0.125		0.071
Prob(F-statistic)	(0.057)*		(0.034)**		(0.082)*		(0.185)
p-value		(0.75)		(0.916)		(0.451)	
			(0.055)		(0.552)		
				(0.113)			
Non-high R&D intensity							
No. of Observation	144		199		169		101
Rank order of R^2	CFO	>	EBEI	>	RI	>	EVA
Adj.R^2	0.036		0.013		-0.006		-0.02
Prob(F-statistic)	(0.027)**		(0.037)**		(0.632)		(0.976)
p-value		(0.426)		(0.549)		(0.89)	
			(0.387)		(0.272)		
				(0.32)			

^ From the remaining 670 deals, which satisfy all criteria, there are 603 target firms and 693 bidding firms following industry data. In this number separated into 70 and 64 high R&D target and bidding firms respectively. High R&D intensity expenditure industries are composed of five sectors: pharmaceuticals & biotechnology, aerospace & defense, software & computer services, fixed line telecommunications and automobile & parts. ***, **,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

Table 6 Panel B

Tests of the relative information content of EVA, RI, EBEI,CFO;
Partitioned by R&D intensity across industries and Acquirer abnormal return as Dependent variables^

	Relative information content						
High R&D intensity							
No. of Observation	62		59		81		45
Rank order of R^2	RI	>	CFO	>	EBEI	>	EVA
Adj.R^2	0.153		0.15		0.091		0.082
Prob(F-statistic)	(0.003)***		(0.004)***		(0.009)***		(0.062)*
p-value		(0.543)		(0.5)		(0.098)	
			(0.544)		(0.415)		
				(0.136)			
Non-high R&D intensity							
No. of Observation	512		389		281		440
Rank order of R^2	EBEI	>	CFO	>	EVA	>	RI
Adj.R^2	0.016		0.007		0.006		0.005
Prob(F-statistic)	(0.006)***		(0.094)*		(0.158)		(0.135)
p-value		(0.596)		(0.977)		(0.402)	
			(0.952)		(0.642)		
				(0.371)			

^From the remaining 670 deals, which satisfy all criteria, there are 603 target firms and 693 bidding firms following industry data. In this number separated into 70 and 64 high R&D target and bidding firms respectively. High R&D intensity expenditure industries are composed of five sectors: pharmaceuticals & biotechnology, aerospace & defense, software & computer services, fixed line telecommunications and automobile & parts. ***, **,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

Table 7 Panel A

Tests of incremental information content on EVA components ; Partitioned by R&D intensity across industries
Takeover Premium as Dependent variables*

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcciAdj_t$	$AcciAdj_{t-1}$	F	Adj. R^2 (%)
High R&D intensity	12													
Coefficient		0.23	5.985	-2.017	13.126	-10.689	14.56	-8.554	2.681	-3.323	-0.769	2.879	3.065	65.2
t-stat		1.477	1.157	-0.252	2.069	-1.244	0.53	-0.249	0.953	-0.877	-0.77	0.572		
F-stat			1.042		2.381		0.169		0.455		0.318			
p-value			(0.569)		(0.417)		(0.865)		(0.724)		(0.782)		(0.42)	
Non-high R&D intensity	64													
Coefficient		-1.076	0.751	0.429	-0.809	-6.052	-41.21	71.579	-3.776	16.45	-1.208	-0.722	2.866	22.9
t-stat		-1.887*	0.185	0.081	-0.264	-1.105	-0.954	1.658	-0.469	2.268**	-0.195	-0.088		
F-stat			0.049		0.816		1.797		3.672		0.062			
p-value			(0.952)		(0.448)		(0.176)		(0.032)**		(0.94)		(0.006)***	

* From the remaining 670 deals, which satisfy all criteria, there are 603 target firms and 693 bidding firms following industry data. In this number separated into 70 and 64 high R&D target and bidding firms respectively. High R&D intensity expenditure industries are composed of five sectors: pharmaceuticals & biotechnology, aerospace & defense, software & computer services, fixed line telecommunications and automobile & parts. ***, **,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

Table 7 Panel B

Tests of incremental information content on EVA components ; Partitioned by R&D intensity across industries

Acquirer Abnormal Return as Dependent variables*

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AcciAdj_t$	$AcciAdj_{t-1}$	F	Adj. R^2 (%)
High R&D intensity	29													
Coefficient		0	-0.027	0.021	-0.006	-0.013	0.191	-0.113	-0.001	-0.013	0.004	-0.028	1.816	22.6
t-stat		0.157	-2.277**	1.829*	-1.036	-0.559	0.677	-0.431	-0.066	-0.332	0.398	-1.086		
F-stat			3.326		0.725		0.232		0.324		0.627			
p-value			(0.059)*		(0.498)		(0.796)		(0.727)		(0.546)		(0.13)	
Non-high R&D intensity	184													
Coefficient		0	-0.001	0	-0.002	-0.001	0.044	0.007	-0.003	-0.004	0.003	0.002	0.767	-1.3
t-stat		-0.25	-0.152	-0.031	-0.316	-0.286	0.984	0.135	-0.585	-0.438	0.55	0.452		
F-stat			0.041		0.219		1.62		0.609		0.412			
p-value			(0.96)		(0.804)		(0.201)		(0.545)		(0.663)		(0.661)	

* From the remaining 670 deals, which satisfy all criteria, there are 603 target firms and 693 bidding firms following industry data. In this number separated into 70 and 64 high R&D target and bidding firms respectively. High R&D intensity expenditure industries are composed of five sectors: pharmaceuticals & biotechnology, aerospace & defense, software & computer services, fixed line telecommunications and automobile & parts. ***, **,* denote the significance level of 0.01, 0.05 and 0.1 respectively.

CHAPTER V

CONCLUSIONS AND AREAS FOR FUTURE RESEARCH

5.1 Conclusion

This study investigates the value-relevance of EVA in mergers and acquisitions by answering the research question of "is there any correlation between a firm's EVA and the premium received in takeover event over traditional accounting measures". The empirical evidence shows that EVA does not outperform other accounting measures in terms of both relative and incremental information content. In relative information content test, EVA cannot outperform other accounting measures in explaining the variation in takeover premium and combined return. Although EVA appears to have the potential to do a better job in explaining acquirer abnormal return, its superior performance is not statistically significant. For incremental test, it suggests that EVA components slightly add information content beyond other traditional accounting measures. Considering all the test results, there is not enough evidence to conclude that EVA provides the superior performance compared to other traditional accounting performance measures in mergers and acquisitions. It seems that the unadjusted accounting measures are more closely correlated with premium received in M&As than EVA.

There are many possible explanations why EVA does not outperform other traditional accounting measures. First, the market may see through various accounting conventions differently than Stern Stewart does when it calculates EVA[62]. It also suggests that the market may place higher reliance on audited accounting earnings

[62] Evidence from Chen and Dodd (2001)

than the un-audited EVA metric. Second, our results are consistent with the existing literature, which find that accounting-based information explains little of variation in stocks returns between firms. Relatively low adjusted R^2 in our result suggests that 80- 90 % of the variation appears to be attributed to non-earnings-based information. This is consistent with our results where nearly 80% of the 670 companies' takeover premium cannot be accounted for by the EVA.

This evidence suggests that if firm desires to align the organizational performance (e.g. EVA, CFO, Earnings) with stock returns, companies may be disappointed and should find or develop the new performance measurement tool. Third, for many decades, the research on the stock market suggests the idea of no single determinant, which can be relied upon to profitably predict the market. Therefore, it easily implies that manager should consider many performance measurement tools together in any decision-making of the company instead of relying only on any particular tool. As for example in our result, EVA is neither the only performance measure to tie the stock returns on nor a completely integrated one.

5.2 Areas for future research

This study leaves several areas for future research. First, since we use takeover data from UK, it would be interesting to test on other markets to offer an out-of-sample test since there is surprisingly not many existing study on other markets. Second, it is possible that with the notion of "un-adjusted accounting measures myopia", in other words, the managers or market participants will get used to with the un-adjusted accounting measures will cause the bias in viewing EVA. We suggest that in future studies as more data become available, it possible to be able to assess

whether the market participants have come to appreciate EVA, which probably may reflect in beneficial situation that firms would choose to disclose EVA rather than un-adjusted accounting measures. In our study, we focus on all firms engaged in M&As in UK. It opens the new issue for future studies in assessing whether the manager (related to takeover event) or market participants have come to appreciate EVA so as to find the new evidence in the superior of EVA.

REFERENCES

Bargeron, L., Frederik P.Schlingemann, René M. Stulz, and Chad J. Zutter. 2007. Why do Private Acquirers pay so little compared to public acquirers?. European Corporate Governance Institute-Finance Working Paper 171: 1-41.

Biddle, G.C., Gim S. Seow, and Andrew F. Siegel. 1995. Relative versus Incremental Information Content. Contemporary Accounting Research 12: 1-23.

Biddle, G.C., Robert M. Bowen, and James S. Wallace. 1997. Does EVA® beat earnings? Evidence on associations with stock returns and firm values. Journal of Accounting and Economics 24: 301-336.

Bowen, R.M., David Burgstahler, and Lane A. Daley. 1987. The Incremental Information Content of Accrual Versus Cash Flows. The Accounting Review 62: 723-747.

Chen, S., and James L. Dodd. 1996. EVA: a new panacea?. Business and Economic Review 42: 26-28.

Chen, S., and James L. Dodd. 1998. Usefulness of operating income, residual income and EVA: a value-relevance perspective. Working Paper Clarion University and Drake University.

Chen, S., and James L. Dodd. 2001. Operating Income, Residual Income and EVA (TM): Which Metric Is More Value Relevant?. Journal of Managerial Issues 13: 65-86.

Draper, P., and Krishna Paudyal. 1999. Corporate Takeovers: Mode of Payment, Returns and Trading Activity. Journal of Business Finance and Accounting 26(5) & (6): 521-558.

Faccio, M., and Ronald W. Masulis. 2005. The Choice of Payment Method in European Mergers and Acquisitions. Journal of Finance 60: 1345-1388.

Ferguson, R., Joel Rentzler, and Susana Yu. 2005. Does Economic Value Added (EVA) Improve Stock Performance Profitability?. Journal of Applied finance 15: 101-113.

Fernandez, Pablo. 2002. EVA, economic profit and cash value added do not measure shareholder value creation. Working Paper University of Navarra.

Frank, J.R., and Robert S. Harris. 1989. Shareholder wealth effects of corporate takeovers The U.K. Experience 1955-1985. Journal of Financial Economics 23: 225-249.

Griffith, John M. 2004. The True Value of EVA®. Journal of Applied Finance 14: 25-29.

Griffith, John M. 2006. EVA® and Stock Performance. Journal of Investing Summer 2006 edition: 75-78.

Gujarati, Damodar N. 2003. Basic Econometrics. 4th ed. Singapore: McGraw-Hill Education (Asia).

Hansen, Robert G. 1987. A Theory for the Choice of Exchange Medium in Mergers and Acquisitions. Journal of Business 60: 75-95.

Hatfield, Galen R. 2002. R&D in an EVA world: as a valuable financial metric, economic value added reinforces the role. Research-Technology Management. 45: 41-47.

Heron, R., and Erik Lie. 2002. Operating Performance and the method of Payment in takeovers. Journal of Financial and Quantitative Analysis. 37: 137-155.

Ismail, A. 2006. Is economic value added more associated with stock return than accounting earnings?. The UK evidence. International Journal of Managerial Finance 2: 343-353.

Kramer, J.K., and Jonathan R. Peters. 2001. An Interindustry Analysis of Economic Value Added as a Proxy for Market Value Added. Journal of Applied Finance 11: 41-49.

Kyriazis, D., and Christos Anastassis. 2007. The Validity of the Economic Value Added Approach: an Empirical Application. European Financial Management 13: 71-100.

Mäkeläinen, E. 1998. Economic Value Added as a management tool. Working Paper Department of Accounting and Finance. Helsinki School of Economics and Business Administration.

Martin, K.J. 1996. The Method of Payment in Corporate Acquisitions, Investment Opportunities, and Management Ownership. Journal of Finance 51: 1227-1246.

Mir, A.E., and Souad Seboui. 2006. Corporate governance and earnings management and the relationship between economic value added and created shareholder value. Journal of Asset Management 7: 242-254.

Moeller, S.B., Frederik P. Schlingemann, and René M. Stulz. 2004. Firm size and the gains from acquisitions. Journal of Financial and Economics 73: 201-228.

Moeller, T. 2005. Let's make a deal! How shareholder control impacts merger payoffs. Journal of Financial and Economics 76: 167-190.

O'Byrne, S.F. 1997. EVA® and Shareholder Return. Financial Practice and Education 9: 50-54.

Palepu, K.G. 1986. Predicting takeover targets A Methodological and Empirical Analysis. Journal of Accounting and Economics 8: 3-35.

Powell, R.G, and Andrew W. Stark. 2005. Does operating performance increase post-takeover for UK takeovers?. A comparison of performance measures and benchmarks. Journal of Corporate Finance *11*: 293-317.

Schwert, G.W. 2000. Hostility in takeovers: In the Eyes of the Beholder?. Journal of Financial 55: 2599-2640.

Sorensen, D.E. 2000. Characteristics of Merging Firms. Journal of Economics and Business 52: 423-433.

Stern, J.M., G. Bennett Stewart III, and Donald H. Chew, Jr. 1996. EVA®: An integrated financial management system. European Financial Management 2: 223-245.

Stewart, G.B. III, Martin Ellis, and Daniel Budington. 2002. Stern Stewart's EVA® Clients Outperform the Market and Their Peers. EVAluation. Special report: 1-2.

Tortella, B.D, and Sandro Brusco. 2003. The Economic Value Added (EVA): An Analysis of Market Reaction. Advances in Accounting 20: 265-290.

Tsuji, C. 2006. Does EVA beat earnings and cash flow in Japan?. Applied Financial Economics 16: 1199-1216.

Walbert, L. 1994. The Stern Stewart performance 1000: Using EVA® to build market value. Journal of Applied Corporate Finance 6: 109-120.

Wallace, J. 1997. Adopting residual income-based compensation plans: Do you get what you pay for?. Journal of Accounting and Economics 24: 275-300.

Weaver, S.C. 2001. Measuring Economic Value Added: A Survey of the Practices of EVA® Proponents. Journal of Applied Finance 11: 50-60.

White, H. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. Econometrica 48: 817-838.

Young, D. 1997. Economic Value Added: A Primer for European Managers. European Management Journal 15: 335-343.

APPENDIX

Appendix 1

Definitions and Explanation of Stern Stewart adjustment variables used

Goodwill	In UK, Goodwill is permitted the immediate write-off to reserves. According to EVA, any reduction in goodwill understates capital or overstates EVA. Any amortization of goodwill is added back to capital and operating profit. If goodwill was written off at the time of acquisition for companies that are still owned, that goodwill must be restored. We find the amortization of goodwill by subtract the impairment of goodwill (WC18225) from the amortization and impairment of goodwill (WC18224).
Deferred tax	Deferred tax (WC03263) exists whenever companies have timing differences between their taxable income and the book income recognized under GAAP. The single biggest cause of deferred tax in most companies is depreciation in fix assets. Adjustment is made in EVA calculation by adding the change in deferred taxes for the year to operating profit; that is ,add an increase and subtract a decrease(when deferred tax is the net liability).
taxes in extraordinary income	Find from Extraordinary items (Pre tax) (WC01601) - Extraordinary items (Post tax) (WC01253-WC01254) on Datastream

Other adjustments that do not be applied in adjustments of EVA comprise of capitalization of operating lease, the conversion of LIFO to FIFO method, capitalization of marketing costs. This is because the relevant data are not reported in the financial statement provided in Datastream.

Appendix 2

Descriptive Statistics (Not Winsorized)

Table 8 Panel A1
Descriptive statistics on the dependent and independent variable in relative information content tests for target [a]

	Dependent variable		Independent variable			
	TP_t (%)	$Return_t$ (%)	CFO_t	$EBEI_t$	EVA_t	RI_t
No. of Observation	465	588	247	303	196	270
Descriptive Statistics						
Mean	70.888	4.108	0.051	0.025	0.003	-0.025
Median	23.021	0.409	0.056	0.042	0.011	-0.007
Std Dev.	449.595	86.588	0.109	0.144	0.160	0.113
Correlations [b]						
CFO_t	.199**	0.026	1.000			
$EBEI_t$	0.101	0.031	.610***	1.000		
EVA_t	0.087	.211***	.286***	.393***	1.000	
RI_t	0.062	.174**	.424***	.607***	.812***	1.000

Table 8 Panel A2
Descriptive statistics on the dependent and independent variable in relative information content tests for bidder [a]

	Dependent variable	Independent variable			
	$Return_t$ (%)	CFO_t	$EBEI_t$	EVA_t	RI_t
No. of Observation	609	527	625	408	534
Descriptive Statistics					
Mean	3.222	0.048	0.021	0.003	-0.027
Median	-0.011	0.053	0.039	0.005	-0.013
Std Dev.	79.620	0.120	0.143	0.141	0.116
Correlations [b]					
CFO_t	-0.024	1.000			
$EBEI_t$	-0.066	.676***	1.000		
EVA_t	0.040	.404***	.413***	1.000	
RI_t	-0.008	.530***	.644***	.811***	1.000

Table 8 Panel B1
Descriptive statistics on the dependent and independent variable in incremental information content tests for target [a]

	Dependent variable		Independent variable				
	TP_t (%)	$Return_t$ (%)	$Accrual_t$	$AcctAdj_t$	$ATInt_t$	$CapChg_t$	CFO_t
No. of Observation	465	588	296	196	273	285	247
Descriptive Statistics							
Mean	70.888	4.108	-0.019	0.019	0.012	0.084	0.051
Median	23.021	0.409	-0.009	0.006	0.010	0.078	0.056
Std Dev.	449.595	86.588	0.132	0.131	0.011	0.058	0.109
Correlations [b]							
$Accrual_t$	-0.081	-0.107	1.000				
$AcctAdj_t$	-0.028	.174**	-0.043	1.000			
$ATInt_t$	0.104	0.039	-0.086	-0.176	1.000		
$CapChg_t$	0.069	-0.031	-0.007	0.170	-0.151	1.000	
CFO_t	0.172	0.077	-.485***	-0.151	0.014	.316***	1.000

Table 8 Panel B2
Descriptive statistics on the dependent and independent variable in incremental information content tests for bidder [a]

	Dependent variable	Independent variable				
	$Return_t$ (%)	$Accrual_t$	$AcctAdj_t$	$ATInt_t$	$CapChg_t$	CFO_t
No. of Observation	609	621	408	573	563	527
Descriptive Statistics						
Mean	3.222	-0.019	0.028	0.011	0.088	0.048
Median	-0.011	-0.010	0.014	0.009	0.076	0.053
Std Dev.	79.620	0.123	0.104	0.009	0.066	0.120
Correlations [b]						
$Accrual_t$	0.034	1.000				
$AcctAdj_t$	0.057	-.179***	1.000			
$ATInt_t$	0.104	-0.011	-.253***	1.000		
$CapChg_t$	-0.096	-0.054	0.092	-.150**	1.000	
CFO_t	-0.033	-.517***	-0.063	.117**	.333***	1.000

Table 8 Panel C1
Descriptive statistics on the dependent and independent variable in relative information content tests for combined (target + bidder) [a]

	Dependent variable	Independent variable			
	Combined $Return_t$ (%) (Return)	Combined CFO_t	Combined $EBEI_t$	Combined EVA_t	Combined RI_t
No. of Observation	544	231	283	156	232
Descriptive Statistics					
Mean	3.834	0.059	0.035	0.005	-0.015
Median	0.109	0.062	0.043	0.007	-0.008
Std Dev.	86.441	0.094	0.106	0.153	0.095
Correlations [b]					
Combined CFO_t	-0.026	1.000			
Combined $EBEI_t$	-0.107	.644***	1.000		
Combined EVA_t	.250***	.292***	.370***	1.000	
Combined RI_t	0.095	.450***	.580***	.805***	1.000

Table 8 Panel C2
Descriptive statistics on the dependent and independent variable in incremental information content tests for combined (target + bidder) [a]

	Dependent variable	Independent variable				
	Combined $Return_t$ (%) (Return)	Combined $Accrual_t$	Combined $AcctAdj_t$	Combined $ATInt_t$	Combined $CapChg_t$	Combined CFO_t
No. of Observation	544	275	156	244	247	231
Descriptive Statistics						
Mean	3.834	-0.015	0.015	0.011	0.083	0.059
Median	0.109	-0.014	0.005	0.011	0.076	0.062
Std Dev.	86.441	0.101	0.128	0.008	0.056	0.094
Correlations [b]						
Combined $Accrual_t$	-0.044	1.000				
Combined $AcctAdj_t$	.193**	-.253***	1.000			
Combined $ATInt_t$	-0.083	-0.027	-.292***	1.000		
Combined $CapChg_t$	-0.174	-0.080	0.167	-0.170	1.000	
Combined CFO_t	-0.075	-.590***	-0.036	0.055	.433***	1.000

[a] All independent variables are deflated by the book value of total asset at the takeover year t.
[b] All correlations are generated and tested by using Spearman test in SPSS.***,** and* denote the statistical significance at the 0.01 0.05 and 0.1 level respectively.

Appendix 3

SAS Program in Relative information content test

We use the SAS programming to test the relative information content in comparing the difference in adjusted R^2 from pairwise comparison of each regression (four regressions for each accounting measure). This test is called “Wald test”. Since this test is not provided in standard software package, we have to thank Professor Gary Biddle and his statistical assistant, Fenny Cheng for helpfully support in SAS programming for testing the relative information content. The SAS procedure can be written as followed;

```
options nocenter ps=70 ls=90;

/* BSS Relative Info Test */
 data bss;
 infile 'f:\5_sas\3_Data_com_run\cfo ebei.csv' dlm=',' lrecl=256;
  input d1 v1 v1lag v2 v2lag;
run;
proc reg;
model d1=v1 v1lag;
model d1=v2 v2lag;
model d1=v1 v1lag v2 v2lag;
run;
/******* BSS Relative Info Test of v1 versus v2 begins here *******/
proc iml;
use bss;
read all;
close bss;
n = nrow(v1);
unit = j(n,1,1);
m1 = unit||v1||v1lag;
m2 = unit||v2||v2lag;
n1 = v2||v2lag;
n2 = v1||v1lag;
m = unit||v1||v1lag||v2||v2lag;
mtminv = inv(m`*m);
B = mtminv*m`*d1;       /* coefficient estimation */
print B;
e = d1-M*B;
So = m`*diag(e##2)*m;      /* White adjustment for heterscedasticity */
k = ncol(m);
In = I(n);
Q1 = n1`*(I(n)-m1*inv(m1`*m1)*m1`)*n1;
Q2 = n2`*(I(n)-m2*inv(m2`*m2)*m2`)*n2;
Q = j(k,k,0);
Q[2:3,2:3] = Q2;
Q[4:5,4:5] = -Q1;
T12 = B`*Q`*B;       /* hypothesis */
print T12;
var = mtminv*So*mtminv;          /* Asy.Est.Var(B) */
F12 = inv(B`*Q*var*Q*B);         /* inverse of variance of hypothesis */
Wald12 = 1/4#(T12*F12*T12`); /* Wald test statistic for relative info of x1  over x2*/
Print Wald12;
cdf12=probchi(wald12,1);
pvalue12=1-cdf12;
print pvalue12;
```

Appendix 4

SAS Program in Relative information content test

(Robustness Checks in control variables)

When adding control variables, SAS programming is little adapted by firstly running the residual of both dependent and independent variables against each control variable. The reason behind this method is about the technical problem to limit the size of matrix not too big for SAS programming in running. The SAS programming for running control variables regression is shown as followed;

```
*****************************************************************
**;
 *** This is more complicated regression, we try to compare the      ***;
 *** relative information of all the indep variables,v1 v1ng v2 v2ng.***;
 *** This equivalent to the test of v1 v1ng vs v2 v2ng controlled    ***;
 *** by size and tp is the dependent variable.              ***;
***;
*****************************************************************

 options nocenter ps=70 ls=90;


 *** BBW Relative Info Test **;

 data temp;
    infile 'f:\5_sas\5_Data_Control\ROE_tp\eva_ri.csv' dlm=',' lrecl=1000;
    input size tp v1 v1ng v2 v2ng v3 v3ng  v4 v4ng ;
 run;


 ************************************************;
 *** get residual of tp v1r v2r                **;
 *** using controlled variables size      **;
 ************************************************;
  proc reg ;
  model tp=size/noprint;
     output out=tpr r=tpr;                    ** get residual tpr **;
  print tpr;

  model v1 v1ng=size/noprint;
     output out=v1r r=v1r v1ngr;              ** get residuals v1r v1ngr **;

  model v2 v2ng=size/noprint ;
     output out=v2r r=v2r v2ngr;              ** get residuals v2r v2ngr **;
  run;
```

```
*********************************************;
 ***** merge all 2 files to get a dataset     ***;
 ***** containing tpr v1r v1ngr v2r v2ngr    ***;
 *********************************************;
 data tpr;
   set tpr;
 keep tp tpr;
 proc sort; by tp;

 data v1r;
  set v1r;
 keep tp v1r v1ngr;
 proc sort; by tp;

 data v2r;
  set v2r;
 keep tp v2r v2ngr;
 proc sort; by tp;

 data mergr;
  merge tpr v1r v2r; by tp;

 proc print data=mergr;
 run;



*****************************************************************;
 *** Do BBW Relative Info Test by                    ***;
 *** using tpr v1r v1ngr v2r v2ngr instead of tp v1 v1ng v2 v2ng***;
 *** This equivalent to the test of v1 v1ng vs v2 v2ng controlled ***;
 *** by size, tpr is the dependent variable          ***;

*****************************************************************;

 proc iml;

 data bbs;
 set mergr;    ** use the residuals for dep and indep variables **;

 v1=v1r;  v1ng=v1ngr;
 v2=v2r;  v2ng=v2ngr;
 d1=tp;
```

```
*****************************************************************;
        MATRIX CALCULATIONS to compare two models
*****************************************************************;
proc iml;

use bbs;
read all;
close bbs;

n = nrow(v1);
unit = j(n,1,1);
m1 = unit||v1||v1ng;
m2 = unit||v2||v2ng;

n1 = v2||v2ng;
n2 = v1||v1ng;

m = unit||v1||v1ng||v2||v2ng;
mtminv = inv(m`*m);
B = mtminv*m`*d1;          * coefficient estimation *;
print B;
e = d1-M*B;
So = m`*diag(e##2)*m;      * White adjustment for heterscedasticity *;
k = ncol(m);
In = I(n);

*** split Q1 Q2 equation into separate matrix, so that use less memory space **;
*Q1 = n1`*(I(n)-m1*inv(m1`*m1)*m1`)*n1;
*Q2 = n2`*(I(n)-m2*inv(m2`*m2)*m2`)*n2;

invm1=inv(m1`*m1);
invm2=inv(m2`*m2);
a1=n1`*n1;
a2=n2`*n2;
k1=n1`*m1;
k2=n2`*m2;
Q1=a1-k1*invm1*k1`;
Q2=a2-k2*invm2*k2`;
print q1 q2;
Q = j(k,k,0);
Q[2:3,2:3] = Q2;
Q[4:5,4:5] = -Q1;
T12 = B`*Q`*B;        * hypothesis *;
print T12;                  * the sign of T12 * ;
var = mtminv*So*mtminv;          * Asy.Est.Var(B) *;
F12 = inv(B`*Q*var*Q*B);         * inverse of variance of hypothesis *;
Wald12 = 1/4#(T12*F12*T12`); * Wald test statistic for relative informations;
Print Wald12;
cdf12=probchi(wald12,1);
pvalue12=1-cdf12;
print pvalue12;
```

BIOGRAPHY

Miss Kobporn Kulsurakit was born in January 6, 1986 in Bangkok, Thailand. At the secondary school, she graduated from Mater Dei School. At the undergraduate level, she graduated from the Faculty of Commerce and Accountancy, Chulalongkorn University in Mar 2007 with the Bachelor of Science in Statistics (1st Class Honours), majoring in Insurance. She joined the Master of Science in Finance Program, Chulalongkorn University in June 2007.