

**DO TAKEOVERS CREATE VALUE?
A RESIDUAL INCOME APPROACH ON U.K. DATA**

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by

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Abstract

This paper develops and empirically tests a new methodology for evaluating the financial performance of takeovers. The existing accounting and event study methodologies do not adequately address the key issue of whether takeovers are a positive net present value investment for the acquiring company. Our methodology attempts this by employing the residual income approach to valuation, and comparing the present value of the acquirer's future earnings before the acquisition, with those that actually result following takeover. In contrast to existing methodologies, we explicitly take account of the cost of the acquisition, the acquirers cost of capital, and the earnings which are created beyond the sample period. The methodology is used for evaluating a comprehensive sample of U.K. acquisitions completed during 1985-96. Using the traditional accounting method, we find that acquisitions result in a significant improvement in profitability. However, the residual income approach reveals that on average, acquisitions destroy roughly 30 percent of the acquirer's pre-acquisition value.

JEL Codes: G12, G34, M4

Key words: takeovers; valuation; accounting studies; event studies; residual income.

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1. Introduction

Takeovers are important events. In 1999, global mergers and acquisitions accounted for 2 percent of world-wide GDP (UNCTAD 2000). The financial performance of corporate takeovers is one of the most researched areas in industrial economics and financial economics. Despite this, the question of whether takeovers improve corporate performance is controversial.

Accounting studies examine whether accounting performance improves after acquisition. This evidence is mixed with a small number of studies showing improvements in profitability, but the majority showing no improvement.¹ Event studies examine the stock market's short-term reaction to the takeover announcement. These event studies show significant gains for target shareholders, and no gains or losses for acquiring shareholders, but significant gains overall. The much smaller number of event studies, which examine the long run share returns following acquisition find evidence of significantly negative losses. The interpretation of these stylised facts varies considerably. Some authors claim that the methodology used to measure long run share returns is not reliable and that takeovers create value both in terms of profits and short run share price gains (Andrade, Mitchell and Stafford 2001). In contrast, others argue that the long run negative share returns reflect overvaluation of takeovers at the time of announcement, which ultimately do not improve profits and destroy shareholder value (Tichy 2002).

From the perspective of financial theory, a key question is whether the present value of the financial benefits from acquisition are greater than the present value of the costs, including the initial investment. What is at issue here is whether the marginal return from acquisition is greater than the marginal cost. However, neither the event study nor accounting study approaches are designed to address this key issue. The stock market reaction to a takeover bid reflects many factors, and not just the marginal impact of acquisition. The accounting studies on the other hand do not explicitly account for the cost of the acquisition, the time value of money, or profits earned beyond a limited post-acquisition period.

During the last decade, accounting research has re-explored fundamental approaches to corporate valuation. In this spirit, models based on residual income have been developed (see e.g. Feltham and Ohlson 1995), and attained a widespread use in practical valuation settings (Penman 2000). In this paper we use the residual income approach to develop a metric for empirical evaluation of the financial performance of takeovers that is consistent with fundamental valuation theory and that hence overcomes some of the deficiencies of the event and accounting performance studies. In particular, we estimate the fundamental valuation of the bidder before the acquisition and compare this valuation with

the fundamental valuation following the acquisition. If takeovers create fundamental value, then the latter should be greater than the former.

We apply this methodology to a comprehensive sample of domestic U.K. acquisitions involving public companies, completed between 1985 and 1996, and compare the results with those using the traditional accounting measure. We find that, when using the traditional accounting method, acquisitions result in a significant improvement in return on equity. However, when using the residual income approach, acquisitions result in a significantly lower fundamental value of the acquiring company than existed prior to acquisition. Our conclusion is that acquisitions actually destroy fundamental value.

The paper is organised as follows: Section 2 discusses why the traditional approaches fail to measure the marginal impact of acquisition. Section 3 reviews the residual income approach to valuation, and develops a model based on this approach to measure takeover performance. Section 4 describes the data and sample statistics. Section 5 reports the results from the empirical analysis. Section 6 concludes.

2. Why Event and Accounting Studies do not Measure the Impact of Takeover on Fundamental Valuation

2.1 Event studies

There are several reasons why stock market reaction at the time of the announcement of an acquisition may not reflect whether the acquisition has a positive impact on fundamental valuation or not.

An acquisition announcement provides a bundle of signals all of which generate information,

that is reflected in the security price of the acquiring company. These signals give information on the event itself, the identity of the acquirer, and the method of payment, among others. For example, studies have shown that acquirers using stock as the method of payment experience lower returns than those using cash. One explanation for this empirical finding is that acquirers offer stock when they are overvalued by the stock market (Myers and Majluf 1984).

Alternatively, when a firm takes on any new project with a positive net present value, the market value of the firm will be affected, depending on whether the NPV meets expectations. If a firm is expected to take on high positive NPV projects, then this expectation will be built into value. Even if the new projects taken on by the firm have a positive NPV, there may be a drop in value if the NPV does not meet the high expectations of the stock market.

To disentangle the impact on stock prices of these signals and thereby evaluate whether the marginal benefit of the acquisition is greater than the cost is very difficult.

2.2 Accounting studies

There are several reasons why the accounting studies do not measure the impact of an acquisition on fundamental value.

The methodology typically used addresses the question of whether the post-merger performance of the merging firms differs from the pre-merger performance. Such accounting indicators are not clearly related to whether the acquisition is a net NPV positive investment for the acquirer or not. Firstly, the appropriate consideration is the marginal return brought by the acquisition compared to the acquirer's cost of capital. The pre-merger performance of the acquired company is of no relevance here.

Some studies have alternatively considered the difference between the post-bid performance of the acquirer with the pre-bid performance of the acquirer only (Dickerson, Gibson, and Tsakalotos 1997): Healy, Palepu and Ruback 1997). However, whether acquirer performance improves or deteriorates does not tell us whether fundamental value is created. This requires estimation of whether the additional profit returns brought about by the acquisition are greater than the cost of capital. In other words the profitability of the acquirer could be lower following acquisition, but the marginal profitability may be higher than the cost of capital, or vice versa.

It is therefore important to compare the marginal profitability associated with the acquisition to the acquirers cost of capital. Furthermore, studies tend to give equal weight to each post-takeover year. However, if the timing of profits is of crucial importance in establishing whether acquisitions improve fundamental valuation. It is therefore important to weight future profits by the cost of capital to represent the higher value accorded to profits which occur sooner rather than later. Since acquisitions have important effects on capital structure and hence the cost of capital (Ghosh and Jain 2000), it is the post-acquisition cost of capital which is relevant here.

Furthermore, in both the above types of studies, the profitability measure is adjusted for factors such as industry and size. Takeovers are classified as successful if they outperform the expected performance of similar size and/or industry counterfactuals. However, this adjustment says nothing about whether the relative performance is sufficient in absolute terms. A return that is worse

than that of the control firms can still be satisfactory compared to the cost of capital and vice versa.

Another serious drawback of the existent literature is the treatment of goodwill. Since their objective is to compare the post-acquisition performance of the merged firms with the pre-acquisition of the merged firms, the inclusion of purchased goodwill on the merged firms books following the acquisition produces a downward bias on profitability change.² Studies have typically therefore subtracted goodwill from the merged firms' assets and added back amortisation to the profitability measure.³ The studies have effectively converted the profitability effect into that that would occur with the pooling method.⁴ As a result, the cost of the acquisition is not incorporated into the performance measure. Acquiring firms can pay a higher premium and therefore reduce the fundamental valuation of the acquisition, but this will not be reflected in the accounting performance measurement.

Most profit studies ignore the profitability beyond an initial (usually 3-5 years) post-acquisition period.⁵ However, the returns beyond this period are crucial to understanding the fundamental valuation of the acquisition.

Our methodology attempts to overcome the above shortcomings by taking into account only the performance of the acquiring company, by comparing profit returns with the cost of capital, by taking into account performance beyond the initial post-acquisition period and by explicitly allowing for the cost of goodwill.

3. Methodology

3.1 Traditional accounting performance methodology

The first method we employ to examine the impact of merger is the traditional accounting performance technique using a return on equity profit measure. The performance data of the bidder and target firms before the takeover is aggregated to obtain the pro forma pre-takeover performance of the combined firms. Comparing the post-takeover performance of the bidder with this pre-takeover benchmark provides a measure of the change in performance.

To correct for the effects of size and industry, we calculate profit returns relative to non-merging control firms selected on the basis of industry and size, as suggested by Barber and Lyon (1996). The control firms are selected from firms listed on Datastream, which neither made, nor received, a takeover offer for a public company during the five years before and after the acquisition. The control firms are selected by first matching each sample firm to all non-merging

firms in the same Datastream FTSE Actuaries industrial classification level 5.6 Secondly, to match on size, we select the firm in the same industrial code with the book value of assets closest to sample firms' asset size in the year prior to takeover.

The relative profit returns are the differences between values for the combined firms and values for the weighted-average control firms. In the pre-takeover period the weights for the control firms are the relative book equity size of bidders and targets estimated at the beginning of each year, whilst in the post-takeover period the weights are the relative equity sizes of bidders and targets in year -1. We focus our analysis on the four years before the takeover and the four years following the takeover. Consistent with previous studies, but inconsistent with our proposed residual income approach, we exclude year 0 from the analysis.⁷

The proper post-takeover benchmark must take account of any above average high or low pre-takeover performance, otherwise some of the difference between pre- and post-takeover performance could be due to mean reversions that have been documented in prior studies (see e.g., Fama and French 2000).⁸ In order to allow for mean reversion, we adopt the methodology employed by Healy, Palepu and Ruback (1992), where the effect of takeover is measured as the intercept of a cross sectional regression of post-takeover relative profit returns on the corresponding pre-takeover returns as follows;

$$ROE_{POST} = \alpha + \beta ROE_{PRE} + \varepsilon_i$$

Eq. 1

where ROE_{POST} is the median annual relative ROE for the combined firm from the post-takeover years and ROE_{PRE} is the pre-takeover relative median for the same combined firm. Our measure of the effect of takeover on profit returns is the intercept α from Eq. (1). The slope coefficient β captures any systematic relation in profit returns between the pre and post-takeover years so that βROE_{PRE} measures the effect of the pre-takeover performance on post-takeover returns. The intercept is therefore independent of pre-takeover return.

3.2 Model development based on the residual income model

3.2.1 The basic residual income model

The valuation method we use in this study is a discounted residual income approach sometimes referred to as the Edwards-Bell-Ohlson valuation technique.⁹ In this section, we present the basic residual income model and briefly develop the intuition behind the model.

A stock's fundamental value is typically defined as the present value of expected future dividends based on all currently available information. Notationally,

$$V_t \equiv \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r_e)^i} \quad \text{Eq. 2}$$

V_t is the stock's fundamental valuation at time t , $E_t(D_{t+i})$ is the expected future dividends for period $t+i$ conditional on information available at time t , and r_e is the cost of equity capital based on the information set at time t . This definition assumes a flat term-structure of interest rates.

Ohlson (1990, 1995) demonstrates that, as long as a firm's earnings and book value are forecast in a manner consistent with "clean surplus" accounting,¹⁰ the intrinsic value defined in Eq. (1) can be rewritten as the reported book value, plus an infinite sum of discounted residual income:

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[(NI_{t+i} - (r_e B_{t+i-1}))]}{(1+r_e)^i} \quad \text{Eq. 3}$$

$$= B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i} \quad \text{Eq. 4}$$

where B_t = book value at time t , $E_t[\cdot]$ = expectation based on information available at time t , NI = Net Income for period $t+i$, r_e = cost of equity capital, and ROE_{t+i} = the after-tax return on book equity for period $t+i$.

This equation is identical to a dividend discount model, but expresses firm value in terms of accounting numbers. It therefore relies on the same theory and is subject to the same theoretical limitations as the dividend discount model. However, the model provides a framework for analysing the relation between accounting numbers and firm value.

Eq.(4) offers several important insights for equity valuation. First, it splits firm valuation into two components – a measure of the capital invested (B_t) and a measure of the present value of all future residual income. If a firm always earns income at a rate exactly equal to its cost of equity capital, then this term is zero and $V_t = B_t$. However, firms whose expected ROEs are higher (lower) than r_e have firm values greater (lesser) than their book values.¹¹

Several recent studies evaluate this model's ability to explain cross-sectional prices and expected returns. Frankel and Lee (1998) find that the V measure (estimated using forecasts) explains close to 70 percent of cross-sectional stock prices in the U.S. and that the V/P ratio is a better predictor of cross-sectional returns than B/P . Frankel and Lee (1997) employ the model in an international context and find similar results in cross-border valuations.

3.22 Applying the residual Income Model to estimate takeover performance

The fundamental valuation model in Eq. (4) can be used for evaluating takeover performance. We use the residual income approach to examine whether the fundamental valuation of the acquiring company is greater after the acquisition than it is before. Unlike either the accounting or event studies, this method allows for the time value of money, acquisition benefits beyond the sample period, and the goodwill expenditure on the acquisition. The difference in valuations, or what we term value creation (VC), is the marginal change in residual income as follows:

$$VC = \sum_{i=1}^{\infty} \frac{(ROE_t - r_e)B_{t-1}}{(1+r_e)^t} - \sum_{i=1}^{\infty} \frac{E_t(ROE_t - r_e)B_{t-1}}{(1+r_e)^t} \quad \text{Eq. 5}$$

The left-hand term is based on actual ROEs, whereas, the right hand term is based on expected ROEs. VC must exceed zero for the takeover to create value. Two important measurement problems are apparent. Firstly, it is not empirically possible to measure residual income for an infinite period following acquisition. Because most previous takeover studies cover a time period of 5 years following acquisition, we select a post-takeover period equal to five years to measure actual residual income. We therefore require an estimate of future value creation beyond this 5-year period for the acquirer. Secondly, it is not possible to measure residual income for the buyer as if no acquisition took place. One possible way to measure both these variables is with market values. One can argue that the pre-acquisition market value minus equity book value is a reasonable proxy for expected future value creation of the acquiring firm as a

stand-alone company. One can further argue that the market value minus equity book value at the end of the 5-year post-acquisition period is a reasonable proxy for the remaining value creation of the acquirer.¹² We therefore propose the following evaluation procedure to measure value creation:

$$VC = \sum_{i=0}^4 \frac{(ROE_t - r_e)B_{t-1}}{(1+r_e)^t} + \frac{[M(B_4) - B_4]}{(1+r_e)^4} - [M(B_0) - B_0]$$

Eq. 6

where $M(B)$ is the market value of shareholders equity. The first component indicates the actual value creation for post-acquisition years zero through four. The second component reflects the expected marginal value creation beyond year four. The third component is the pre-acquisition value premium, which expresses the amount of value generation that was expected before the takeover. In order to compare the value creation measure across acquirers of different size, we divide each component of Eq. (6) by the pre-bid market value of the acquiring firm.

In order to control for general stock market and industry factors, which may affect the change in valuation and residual income of acquirers in the post-takeover period, we employ a control firm technique. For each acquirer we select a non-acquiring control firm matched on size and industry, and estimate Eq.(6) (after dividing each component by the pre-bid market value) for the control firm as well as the acquirer. Value creation is the difference between the value creation measure for the acquirers and the control firms.

3.23 Adjusting the residual income model for violations of clean surplus accounting

The model described above rests crucially on the assumption of clean surplus accounting. However, the accounting methods used by acquiring companies can involve violations of this assumption and therefore the residual income measurement in Eq. (6) needs to be subsequently adjusted. In the U.K. over the period of our study (1985-96) companies could account for acquisition using either acquisition or merger accounting. Acquisition accounting involves capitalising goodwill on the acquirer's balance sheet and amortising it over its economic life. If this method is employed, then the residual income described in Eq (6) does not need to be adjusted because it already incorporates the cost of the acquisition.¹³

However, if the transaction is accounted for using the merger method where the two parties' accounts are added together without any goodwill being capitalised, the value creation measure needs to include a deduction for the goodwill paid.¹⁴

In the U.K. prior to 1998, nearly all acquiring firms used the acquisition method but then immediately wrote-off the purchased goodwill from their equity (Higson, 1998). This gives a result, which is identical to that of merger accounting, and for acquiring firms using this method, goodwill needs to be deducted.¹⁵ A straightforward interpretation of the deduction is that the higher the price paid the more value must be generated in order to justify the price.¹⁶

As well as incorporating the goodwill costs associated with the sample acquisition, we must take account of the subsequent treatment of goodwill associated with further acquisitions in the post-takeover period. For acquiring firms that do not capitalise goodwill for further acquisitions in the post-takeover period, we subtract the present value of further goodwill that is not capitalised from the value creation measure. These two deductions for goodwill result in Eq. (6) being adjusted as follows:

$$VC = \frac{\sum_{i=0}^4 \frac{(ROE_t - r_e)B_{t-1}}{(1+r_e)^t}}{M(B_0)} + \frac{\frac{[M(B_4) - B_4]}{(1+r_e)^4}}{M(B_0)} - \frac{GW_0}{M(B_0)} - \frac{\sum_{i=1}^4 \frac{GW_{1-4}}{(1+r_e)^t}}{M(B_0)} - \frac{[M(B_0) - B_0]}{M(B_0)} \quad \text{Eq. 7}$$

where GW_0 is goodwill not capitalised for the year of acquisition, and GW_{1-4} is goodwill not capitalised for other acquisitions during the 5 year period.

Henceforth, the first component in Eq. (7) will be referred to as residual income or *RI*. The second and last components will be referred to as the value premiums or *VP*. The third and fourth components will be referred to as goodwill non-capitalised or *GW*.

Given the method described in Eq. (7), the treatment of goodwill by acquirers, that is whether they capitalise or do not capitalise goodwill, will not have an effect on the value creation measure.

Finally, to control for other problems of dirty surplus accounting which occur following acquisition such as extraordinary items and write-downs to fair values (Chatterjee and Meeks 1996), we employ a further measure of residual income. Rather than trying to incorporate such violations individually, we employ an all-inclusive residual income measure defined as:

$$ROEAI_t = \frac{(B_t - B_{t-1} + D_t - S_t)}{B_t} \quad \text{Eq. 8}$$

where D_t is dividends and S_t is share issues. This all-inclusive *ROE* measure (*ROEAI*) should be used in the first term of Eq. (7) instead of the *ROE* defined above. When the all-inclusive measure is used there is no need to adjust for goodwill not capitalised, and the goodwill adjustments are excluded from the calculations. This first term is henceforth referred to as the residual income all-inclusive measure or *RIAI*. The value creation measure using the all-inclusive residual income method is referred to as *VCAI*.

4. Sample Descriptives and Variable Definitions

4.1 Sample descriptives

We test the above methodology on a comprehensive sample of acquisitions of U.K. public companies by other U.K. public companies, completed between January 1985 and December 1996. The sample acquisitions are drawn from the monthly periodical *Acquisitions Monthly*. Takeovers are defined as occurring when the acquirer owns less than 50 percent of the target's shares before the takeover, and increases its ownership to at least 50 percent as a result of the takeover. We exclude takeovers if either bidder or target accounting and share price data is not held on the Datastream Database for a minimum period of one year prior to and one year following takeover. This procedure results in a sample of 386 acquisitions.

The characteristics of the sample acquisitions are described in Table 1. The number of sample acquisitions is greater in the 1980s than in the early to mid-1990s. 62 percent of our sample acquisitions took place during 1985-1989. The average acquirer market value of equity is very large at £858m. The corresponding average target size is £174m, and the average relative size is 0.44. Therefore, the sample of acquisitions represents significant investments for the acquirers. The value of the target companies at the announcement of acquisition is significantly greater than their book values, with an average market-to-book-value of 2.38, implying a large amount of goodwill creation on average.

Table 1. Sample statistics

Panel A: Completion year		
	Number	Percent
1985	48	12.4
1986	40	10.4
1987	63	16.3
1988	52	13.5
1989	36	9.3
1990	23	6.0
1991	25	6.5
1992	19	4.9
1993	19	4.9
1994	17	4.4
1995	27	7.0
1996	16	4.1
Total	386	100.0

Panel B: Company and transaction characteristics		
	Average	Median
Acquirer size market value at announcement (£m)	858.76	175.01
Target size market value at announcement (£m)	174.15	26.75
Relative size at announcement	0.44	0.24
Acquirer MTBV at announcement	2.99	1.87
Target MTBV at announcement	2.38	2.41
Bid premium (percent)	37.8	32.6

Panel A reports the sample acquisitions by completion year. Panel B reports acquirer and target characteristics, and transaction characteristics. The bid premium is estimated as the difference between the transaction value and the value of the target one-month prior to acquisition announcement.

4.2 Variable definitions

The variables we use and their definitions are described in Table 2. The profit measure we employ for return on equity in both the traditional method and the residual income method consists of net income (Datastream Variable 182), scaled by the beginning-period book value of ordinary shareholders funds (Datastream Variable 305).

To calculate the acquirers' value premium at acquisition, we use the acquirers' market value 4 months prior to bid announcement,¹⁷ and subtract from this the acquirer's book value in the last year prior to consolidation (year -1). To calculate the value premium 5-years after merger, we take the market value 60

months following completion and subtract from this the acquirers' book value in the 5th year after acquisition.

We estimate the firm specific costs of equity using the CAPM model. Firm betas are calculated for each post-acquisition year using the previous 240 trading day share returns. For each post-acquisition year, we estimate the cost of equity by adding the risk free rate to the firm beta multiplied by the risk premium. The risk free rate is the return on U.K. government bonds (Datastream variable AUKGVALRI). The risk premium is the return on the FTSE All Share Index (Datastream variable FTALLSHRI) minus the risk free rate. For each firm, the cost of equity is the average over the 5 post-takeover years.^{18,19} We assume that there are six months on average between the bid completion date and the consolidation year, and therefore the discount rate for the year of consolidation is for 6 months only.

We estimate goodwill written off, both in the acquisition year and in subsequent years 1-4, as the total goodwill paid (Datastream variable 498), minus the increase in capitalised goodwill (Datastream Variable 343) minus goodwill amortised (Datastream variable 562). The vast majority of our sample acquirers write off goodwill immediately to reserves, which is consistent with the evidence of Higson (1998). We compare the change in total goodwill (Datastream variable 343) in the year of the acquisition, with the expected goodwill given the bid value and the equity value of the target (Datastream variable 305). We find that of the 386 acquisitions, only 10 acquirers actually capitalise the acquired goodwill following acquisition. Of the remaining 376 acquirers, 276 do not have any capitalised goodwill for either the year of acquisition or the four post-acquisition years. The remaining 100 acquirers either already had capitalised goodwill at acquisition or capitalised it in the four years following the acquisition.

Table 2. Variable definitions and calculations

Variable	Definition	Calculation using Datastream variables
<i>RI</i>	<i>Residual income.</i> Residual income for each year 0 to 4 is net income (DS 182) divided by shareholders equity (DS 305), minus the cost of equity (r_e), then multiplied by shareholders equity. The cost of equity is calculated using CAPM over years 0-4. The annual residual income figures are discounted to present values using the cost of equity, summed for years 0-4, then divided by the market value of shareholders equity (DS MV) in year -1.	$\sum_{i=0}^4 [(182_t / 305_{t-1} - r_e) * 305_{t-1} / (1 + r_e)^t] / MV_{-1}$
<i>RIAI</i>	<i>Residual income all-inclusive.</i> All-inclusive residual income return is calculated for each year 0-4 by firstly taking the change in annual shareholders equity (DS 305) plus annual dividends paid (DS 187) minus share issues [calculated as share issue for acquisition (DS 414) and share issue for cash (DS 412)], and dividing by shareholders equity. The cost of equity is subtracted from this return, which is then multiplied by shareholders equity. The annual residual income figures are discounted to present values using the cost of equity, summed for years 0-4, then divided by the market value of shareholders equity in year -1.	$\sum_{i=0}^4 \{ [(305_t - 305_{t-1} + 187_t - 414_t - 412_t) / 305_t] - r_e \} * 305_{t-1} / (1 + r_e)^t / MV_{-1}$
<i>VP₀</i>	<i>Value premium in year 0.</i> Market value of shareholders equity (DS MV) 4 months prior to acquisition announcement month (notated as year zero), minus shareholders equity in year -1, divided by the market value of equity in year -1.	$(MV_0 - 305_{-1}) / MV_{-1}$
<i>VP₄</i>	<i>Value premium in year 4.</i> Market value of shareholders equity (DS MV) 60 months after the acquisition completion month (notated as year four), minus shareholders equity in year 4. This is discounted to the present value using the cost of equity, then divided by the market value of equity in year -1.	$(MV_4 - 305_4) / (1 + r_e)^4 / MV_{-1}$
<i>GW₀</i>	<i>Goodwill not capitalised in year 0.</i> Calculated as annual goodwill expenditure (DS 498) minus annual change in total goodwill capital (DS 343) minus annual goodwill amortisation (DS 562). This is divided by the market value of equity in year -1.	$[498_0 - (343_0 - 343_{-1}) - 562_0] / MV_{-1}$
<i>GW₁₋₄</i>	<i>Goodwill not capitalised in years 1-4.</i> Calculated as annual goodwill expenditure (DS 498) minus annual change in total goodwill capital (DS 343) minus annual goodwill amortisation (DS 562). The annual figures are discounted to present values using the cost of equity, summed for years 1-4 and then divided by the market value of equity in year -1.	$\sum_{i=1}^4 [498_t - (343_t - 343_{t-1}) - 562_t] / (1 + r_e)^t / MV_{-1}$
<i>VC</i>	<i>Value creation.</i>	$RI - GW_0 - GW_{1-4} + VP_4 - VP_0$
<i>VCAI</i>	<i>Value creation all-inclusive.</i>	$RIAI + VP_4 - VP_0$

This Table gives the definitions for the components of the value creation measure, and their Datastream (DS) definitions. Year -1 is the last financial year prior to the acquisition, year 0 is the year of consolidation.

For the all-inclusive residual income measure, dividends are measured by the Datastream variable 187, and share issues are measured by Datastream variables 412 (equity issued for cash) and 414 (equity issued for acquisition).

If acquirers die within the 5 post-takeover years then the year of death essentially becomes the final year of evaluation, for both the acquirer and the control firm.

5. Empirical Results

5.1 Results using the traditional accounting performance method

Table 3 reports the results using the traditional accounting performance measure. The combined ROE of the acquired and acquiring firms increases over the 4 years prior to acquisition, from 8.86 percent in year -4 to 13.25 percent in year -1 . The median ROE for the 4 pre-takeover years is 11.75 percent. The combined ROE of the control firms also increases over the pre-takeover period, but is notably lower than the merging firms in the year prior to acquisition. The merging firms' median ROE is 1 percent higher than the control firms over the 4 year pre-takeover period.

In the post-takeover period there is a dramatic increase in ROE for the merging firms, which increases to over 15 percent in years 0, 1 and 2, before falling back to 13 percent in years 3 and 4. The median ROE for years 1 to 4 is 14.9 percent and significantly higher than the pre-takeover ROE. The change in the control firms combined ROE also increases (to 12 percent) over the post-takeover period but insignificantly, indicating that the improvement in the merging firms' ROE is not driven by size or industry factors. The median difference between the control firm adjusted pre- and post-takeover ROE is significantly significant at the 10 percent level. The proportion of adjusted post-bid ROEs which are greater than the adjusted pre-bid ROEs is 58 percent, significant at the 5 percent level.

These differences may understate the true improvement in performance if some regression to the mean in ROE was expected for acquirers, given their above average pre-bid ROE. To allow for this we estimate Eq. (1). The intercept from this regression has a value of 4.27 percent, which is statistically significant at the 5 percent level. This indicates that there is a 4.27 percent per year increase in post-takeover return on equity after the pre-takeover ROE is controlled for.

Table 3. *The effect of takeover on the accounting rate of return of the merged companies*

Year relative to takeover	No. of observations	Merged firms median	Control firms median	Difference
- 4	249	8.86	9.79	0.25
- 3	300	10.13	10.97	0.36
- 2	351	12.32	12.42	-0.06
- 1	386	13.25	11.55	1.99
Median ROE for years - 4 to -1	386	11.75	10.74	0.79
0	386	15.24	12.59	1.83
1	386	15.76	12.52	3.23
2	359	15.42	12.26	2.42
3	335	13.67	12.37	1.47
4	271	13.04	11.26	1.01
Median ROE for years 1 to 4	386	14.90	12.00	2.76
Median difference in pre- and post-bid ROE	386	2.66 ^a (4.12)	0.66 (0.91)	2.28 ^c (1.86)
Proportion of post-bid ROE > pre-bid ROE	386	0.65 ^a -(4.55)	0.52 -(0.58)	0.58 ^b -(2.37)

This Table reports the return on equity (ROE) for merged firms and non-merging control firms matched on industry and size, for the 4 pre-takeover years and the 4 post-takeover years. Year 0 is the year of consolidation. ROE is defined as net income divided by beginning value of shareholders' equity. Pre-takeover returns for the combined firm are weighted averages of bidder and target, with the weights being the relative book equity values of the two firms. ^{a, b, c} indicate statistical significance at the 1, 5 and 10 percent levels respectively, using a two tailed test .

We conclude that overall, the results indicate that in the post-takeover period, there is a significant improvement in the merging firms' return on equity, compared to the pre-takeover period. This conclusion is consistent with the results of Chatterjee and Meeks (1996), for acquisitions that took place during 1984-90. It is also consistent with the operating performance results of Higson (1998), Manson, Powell, Stark and Thomas (2000), and Carline, Linn, and Yadav (2002). In contrast to their results for 1984-90, Chatterjee and Meeks (1996) find no positive impact of acquisitions during 1977-83 and hypothesise that the improvement in the former period may be due to the relatively beneficial impact on profitability of immediately writing off goodwill to reserves.

5.2 Results using the residual income method and the all-inclusive residual income method

5.2.1 Results using the residual income method

In this section we report the results of the residual income approach. Table 4 reports the results of estimating Eq. (7) for all acquirers, using both median and mean measures. The median measures are shown graphically in Figure 1.

The acquirers' market values are roughly double their equity book values in year 0. The control firms market values are higher than book values, but the value premium is significantly higher for acquirers compared to control firms. The present value of residual income created in years 1-4 is on average 12 percent of the acquirers' initial market value. The median figure is 5 percent. This appears to be a respectable return, especially compared to the control firms whose average return is less than the cost of equity. The difference between acquirers and control firms is significant both for the average and median measures.

However, this superior performance does not take into account the goodwill paid to acquire the sample target or subsequent targets, which were not capitalised and hence were excluded from the residual income. These costs are significant and have an important effect on the value creation measure. The goodwill paid on average by acquirers in the sample acquisition is 25 percent of their pre-acquisition market value. Since acquirers do not include this goodwill on their balance sheets, any value created will have to be greater than this figure if the acquisition is to create value overall. The acquirers on average carried out further acquisitions over the 5 post-takeover years. The median present value of future goodwill paid is equal to 15 percent of the acquirers' pre-acquisition market value. Total non-capitalised goodwill is larger than the residual income earned in the post-takeover period. However, if the present value of future residual income is sufficient to cover the difference (and the initial market expectation of residual income to be generated) then the acquisition should be considered value creative. This is not the case. The present value of the difference between the acquirers' market value in year 4 and its equity book value is 41 percent (median value) of the acquirers' market value in year 0. The value of the expected future residual income in year 4 plus the residual income earned during years 0-4, minus the non-capitalised goodwill is significantly less than the expected future residual income in year 0. The overall loss is equal to 32 percent of the acquirers' initial market value in terms of the average and 43 percent in terms of the median.

To examine whether this value destruction is due to a downturn in the stock market or because of a downturn in the acquirers' industry, we compare the figures with those of control firms. We also find for the control firms that the market value minus book value does not grow at a faster rate than the firms' cost of equity. However, the major difference is that unlike the acquirers, the control firms do not incur expenditure on non-capitalised goodwill. The difference between acquirers and control firms in terms of overall value destruction is statistically significant at the 1 percent level for both the average and median measures.

One argument could be that acquirers are overvalued at acquisition and that our measure simply reflects a mean reversion in share prices over the post-takeover period (Agrawal and Jaffe, 2000). However, we find that our acquirers

Table 4. *The effect of takeover on the intrinsic value of the acquirer using the residual income approach*

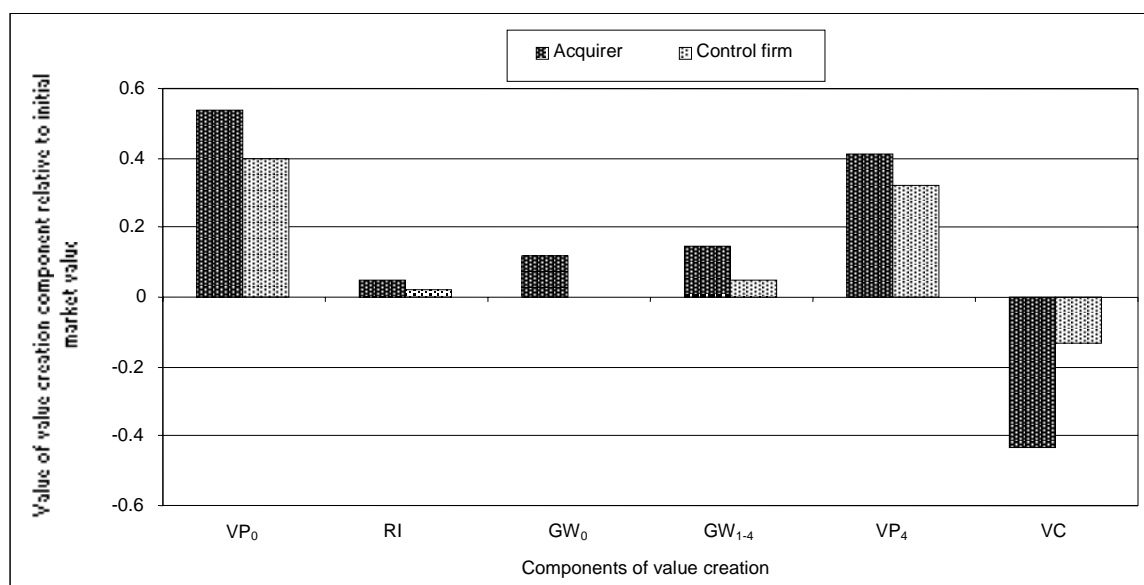
Variable	Acquirer	Control firm	Difference
Panel A: Averages			
<i>RI</i>	0.12	-0.07	0.19 ^a
<i>GW₀</i>	0.24	0.00	0.24 ^a
<i>GW₁₋₄</i>	0.68	0.17	0.52 ^a
<i>VP₄</i>	0.89	0.50	0.39 ^b
<i>VP₀</i>	0.40	0.25	0.16 ^c
<i>VC</i>	-0.32	0.01	-0.33 ^a
Panel B: Medians			
<i>RI</i>	0.05	0.02	0.03 ^a
<i>GW₀</i>	0.12	0.00	0.12 ^a
<i>GW₁₋₄</i>	0.15	0.05	0.10 ^a
<i>VP₄</i>	0.41	0.32	0.09 ^b
<i>VP₀</i>	0.54	0.40	0.14 ^a
<i>VC</i>	-0.43	-0.13	-0.30 ^a

This Table reports the results of estimating value creation. The definitions of each component are shown in Table 2. Year -1 is the last financial year prior to the acquisition, year 0 is the year of consolidation. Each variable has been winsorized at the 99th percentile. The tests used to test differences in the mean and median are a *t*-test and the Wilcoxon Signed Ranks test.^a

^{b, c} indicate statistical significance at the 1, 5 and 10 percent levels respectively, using a two tailed test.

experience a similar pattern in market-to-book values as the control firms. Besides, the key factor driving the value destruction would not appear to be the decrease in market-to-book value but instead the non-capitalised goodwill expenditure. In order to investigate this further we examine the results using the all-inclusive residual income measure.

Figure 1. *The effect of takeover on the intrinsic value of the acquirer using the residual income approach*



This Figure shows the median values for the different components of value creation, for both the acquirer and control firm. The definitions of each component are shown in Table 2.

5.22 Results using the residual income all-inclusive method

The results using the all-inclusive measure are reported in Table 5. The market value minus book measures are identical to those in Table 4. The all-inclusive net income measure takes account of the goodwill expenditure which is not capitalised. The average figure is negative and equal to 38 percent of the acquirers' initial market value. This figure is much larger than the difference in the expected value of residual income at time 0 (measured by market value minus book) and the expected value of future residual income at year 4. This confirms the finding that by including non-capitalised goodwill, the value created by the sample acquisitions is significantly negative, and that this result is not driven by a decline in stock market returns. Our basic metric therefore appears robust to the violations of clean surplus accounting discussed by O'Hanlon and Pope (1999).

Table 5. *The effect of takeover on the intrinsic value of the acquirer using the all-inclusive residual income approach*

Variable	Acquirer	Control firm	Difference
Panel A: Averages			
<i>RIAI</i>	-0.38	-0.14	-0.24 ^a
<i>VP₄</i>	0.67	0.48	0.19 ^c
<i>VP₀</i>	0.41	0.26	0.15
<i>VC</i>	-0.12	0.08	-0.20 ^b
Panel B: Medians			
<i>RIAI</i>	-0.22	-0.09	-0.13 ^a
<i>VP₄</i>	0.42	0.33	0.09 ^b
<i>VP₀</i>	0.56	0.41	0.15 ^a
<i>VC</i>	-0.32	-0.13	-0.19 ^a

This Table reports the results of estimating value creation with the all-inclusive net income measure. The definitions of each component are shown in Table 2. Year -1 is the last financial year prior to the acquisition, whilst year 0 is the year of consolidation. Each variable has been winsorized at the 99th percentile. The tests used to test differences in the mean and median are a *t*-test and the Wilcoxon Signed Ranks test. ^{a, b, c} indicate statistical significance at the 1, 5 and 10% levels respectively, using a two tailed test.

6. Conclusion

In this paper we have developed a methodology for evaluating takeover success which measures whether the fundamental valuation of the acquirer is greater after the acquisition than it was beforehand. Our methodology employs the residual income approach to fundamental valuation, and differs from previous event and accounting studies which are not designed to directly address this issue. The stock market reaction to a takeover bid reflects many factors, such as signalling overvalued stock, as well as the marginal impact of acquisition. Alternatively, accounting studies do not explicitly account for the cost of acquisition and the time value of money. In order to create fundamental value, acquirers must outperform the pre-merger expectations formed by the stock market and exceed the value creation achieved by non-merging control firms.

We test this methodology on a comprehensive sample of 386 takeovers between U.K. public companies, completed between 1985 and 1996. Using the traditional accounting study approach, we find that merger has a significantly positive impact on the return on equity. This finding runs contrary to the majority of earlier U.K. studies, but is consistent with U.K. studies for our time period. Our results using the residual income approach are in stark contrast to

those using the traditional approach. We find that the fundamental valuation of acquirers is significantly lower after the acquisition than it is before the acquisition. The acquirers' value destruction relative to control firms corresponds to 30 percent of their pre-acquisition market value. The difference in performance is not driven by lower returns on equity, but instead the deduction of goodwill expenditure, which is not capitalised at the time of acquisition.

One potential weakness in our approach is the use of market values, since acquirers typically experience negative share returns in the long-run period following acquisition. Future work should therefore estimate the robustness of these results using forecasts of future residual income, which do not rely on market values. Another line of enquiry is which factors have an impact on fundamental value creation. In this regard it is important to examine the impact of the bid premium on fundamental value creation. Given the method used by traditional methods in dealing with goodwill, higher bid premiums are unlikely to have an impact on the accounting performance. However, *ceteris paribus*, the higher the bid premium the lower the increase in fundamental value of the acquirer. Our methodology therefore appears well suited to examine this issue.

The overriding conclusion from our results is that the traditional accounting methodology provides a very weak, and in our case contradictory, guide to the effect of acquisition on the fundamental value of the acquiring company.

Notes

- 1 For reviews see Andrade, Mitchell and Stafford (2000) and Tichy (2002).
- 2 Prior research has generally not disclosed information regarding accounting methods, although Singh (1971) and Meeks (1977) conclude that their results are not sensitive to alternative goodwill treatments.
- 3 See for example, Opler and Weston (1993).
- 4 For an exception see Healy, Palepu and Ruback (1997).
- 5 For an exception see Chatterjee and Meeks (1996).
- 6 This industrial code is similar in detail to the 2 digit U.K. Standard Industrial Classification and is based on 51 different industries.
- 7 In separate tests, we included year 0 and therefore examine 5 years of post-acquisition data. Our results were unchanged by this alternative method.
- 8 In our case, we find that acquirers have above average ROE before acquisition and that this improves further following acquisition. Therefore, the implication is that once we take mean reversion into account, the improvement in ROE may be even larger.
- 9 Theoretical developments of this valuation method are found in Ohlson (1990, 1995) and Feltham and Ohlson (1995). Earlier treatments can be found in Preinreich (1938) and Edwards and Bell (1961).
- 10 The notion of clean surplus accounting states that all changes in the book value of equity have to pass the income statement, except for capital transactions between company and owners ($B_t = B_{t-1} + NIt - Dt$). The all-inclusive principle of accounting is also often used to describe the same concept.
- 11 In the short run, a company can maintain abnormal profits, due to extreme barriers to entry or some other sustainable competitive advantage. However, in the long run, abnormal profits should be expected to be eliminated by competitive forces (Fama and French, 2000).
- 12 Frankel and Lee (1998) show that market values tend to gravitate towards intrinsic values.
- 13 This is also the case when goodwill is capitalised on the balance sheet but not amortised, as is now the case in the U.S.
- 14 This could be an implicit rather than explicit premium if the merger is effected by creating a new company which acquires both existing companies. However, this type of transaction is very rare in the U.K. and did not occur for any of our sample takeovers.
- 15 O'Hanlon and Pope (1999) find that the four most important violations of clean surplus accounting in the U.K. over our sample time period are pur-

chased goodwill written off against shareholders' equity, asset revaluation, foreign currency translation and extraordinary items.

- 16 This occurs via a higher absolute capital charge and subsequent goodwill amortisation when goodwill is capitalised with the acquisition method.
- 17 We use market valuation four months prior to exclude the consequences of pre-bid market anticipation, since Schwert (1996) shows that stock markets tend to anticipate a bid some months beforehand. In separate tests, we used the acquirers' market value in the month prior to acquisition. The results were unchanged.
- 18 We also carried out the analysis using the yearly cost of equity rather than the average 5-year measure. The results were unchanged.
- 19 In three cases Datastream did not report a beta for the acquiring firms. In this case we used the average beta for all firms for these three acquirers.

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