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Does operating performance increase post-takeover for UK takeovers? A comparison of performance measures and benchmarks

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Abstract

Using several benchmarks and operating performance measures, the results from this paper suggest that takeovers completed in the UK over the period 1985 to 1993 result in modest improvements in operating performance. Using a matching procedure similar to that employed by Loughran and Ritter [J. Finance 52 (1997) 1823], in which benchmark firms are selected on the basis of several pre-takeover characteristics, the median increase in post-takeover performance for acquiring firms ranges from 0.13% per annum to a statistically significant 1.78% per annum, depending on the definition of operating performance used and choice of deflator. Using the same matching scheme in a Healy et al. [J. Financ. Econ. 31 (1992) 135] methodology, in which post-takeover performance is regressed on a combined target and acquirer pre-takeover performance, reveals larger improvements in operating performance, ranging from 0.80% to a statistically significant 3.1%, again depending on the definition of operating performance employed and deflator chosen. While there is some evidence that factors such as industrial relatedness and the removal of the target CEO have an impact on post-takeover performance, method of payment is found to have an insignificant impact.

JEL classification: G34
Keywords: Takeovers; Operating cash flows; Benchmarks; Market validation

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1. Introduction

The question of whether operating performance improvements arise from corporate takeovers is one that has been addressed by many researchers over the last three decades.[1] Unfortunately, there still appears to be no consensus as to whether takeovers create improvements in operating performance. The issue appeared to be settled in the USA with contributions by Healy et al. (1992), Switzer (1996) and Linn and Switzer (2001). The first two papers report statistically significant estimates of improvements in the post-takeover, industry-adjusted, operating cash flows for the takeovers in their respective samples, measured as the intercept of an OLS regression of post-takeover performance on the combined target and acquirer pre-takeover performance.[2] Both papers report a significant relationship between these estimates and abnormal returns for the combined firms measured around the takeover announcement date, indicating that, to some extent, the market could predict actual operating performance improvements. Similar results are also found in the UK (Manson et al., 1994; Manson et al., 2000).

In the USA, using a different methodology, where improvements are estimated as the difference between industry-adjusted, post-takeover performance and the combined, target and acquirer, pre-takeover, industry-adjusted performance (commonly referred to as the change model), Linn and Switzer (2001) find evidence of significant improvements of 1.8% per annum in the industry-adjusted, operating cash flows. They also report evidence suggesting that performance improvements are higher for cash-financed transactions (3.14%) compared to stock-for-stock takeovers (0.77%)

Following the publication of several simulation-type papers on methodological issues relating to performance measurement and appropriate benchmarks (e.g., Barber and Lyon, 1996; Barber et al., 1999) the existence of performance improvements from takeovers in the USA has been questioned (see Ghosh, 2001).[3] In particular, it is argued that when performance improvements are measured relative to industry benchmarks (e.g., industry adjusted, cash flows) the results are likely to be biased in favor of finding significant performance improvements since industry benchmarks fail to control for acquirer firm size and prior operating performance. It is well documented that acquirers are generally larger in size than their industry counterparts and, furthermore, tend to time takeover during periods of superior performance (see, Penman, 1991; Franks and Harris, 1989; Morck et al., 1990).[4] The degree of bias is likely to be greater when using a regression-based

[1] See, for example, Meeks (1977), Cosh et al. (1980), Healy et al. (1992), Cornett and Tehranian (1992), Switzer (1996), Manson et al. (1994), Manson et al. (2000), Linn and Switzer (2001) and Ghosh (2001).

[2] Switzer (1996) finds that there is, on average, a 7% per annum increase in industry-adjusted, post-takeover performance, after controlling for pre-takeover performance. This is significantly larger than the 2.8% reported by Healy et al. (1992). Using a change model, where performance improvements are estimated as the difference between the acquirers' industry-adjusted post-takeover performance and the combined target and acquirer pre-takeover performance, she reports a significant increase of 1.97%.

[3] None of the methodological issues relating to appropriate benchmarks are addressed in Linn and Switzer (2001).

[4] Another body of research suggests that the timing of takeovers coincides with the degree of stock market overvaluation of the acquiring firm. This 'market-driven' theory of takeovers has received some support for takeovers financed by stock (e.g., Shleifer and Vishny, 2003; Ang and Cheng, 2002).

methodology, since the intercept may be affected by nonrandom errors arising from permanent and/or temporary differences in prior performance between acquiring firms and their industry counterparts.

Using a change model and controlling for industry, size and pre-performance, Ghosh (2001) finds no evidence of statistically significant, post-takeover improvements in the operating cash flows arising from takeovers. Using industry-adjusted and industry, size and pre-performance-adjusted benchmarks, the median improvements are reported as 0.27% and 0.26% per annum, respectively, with both estimates statistically indistinguishable from zero (see Ghosh, 2001, Tables 2 and 3). Clearly, controlling for size and pre-performance has little impact on the performance improvements estimated from a change model. If, however, the Healy et al. (1992) regression-based methodology is used, Ghosh (2001) reports statistically significant estimates of performance improvements of 2.4% per annum (see Ghosh, 2001, Table 2), which are similar to the 2.8% reported by Healy et al. (1992). He argues that the regression-based results are likely to be biased, since they fail to account for acquirer firms' superior pre-performance. Ghosh (2001), however, does not report the regression-based results using benchmarks controlling for size and pre-performance. Hence, it is difficult to say if better benchmarks reduce the bias in the Healy et al. (1992) regression based methodology.[5] This issue is examined in this paper in the context of UK takeovers.

The main focus of this paper is to examine the sensitivity of estimates of operating performance improvements from UK takeovers to definitions of operating performance, deflator choice, performance benchmarks and methodology. The main contributions are as follows. First, we employ two measures of operating cash flow—the first is as defined by Healy et al. (1992) but a second measure, which we call a 'pure' cash flow measure, is also employed. This measure adjusts for the effect of accounting operating accruals. By adopting both measures of cash flow, this paper allows for conclusions to be reached on the sensitivity of estimates of performance improvements to different performance metrics. Second, we deflate operating performance measures in several ways (i.e., by market value, adjusted market value, book value of assets and sales) to help cast some light on the possible biases that may exist in using market value scaling techniques. For example, any overreaction by the market to takeover announcements could lead to significant errors in operating performance measures deflated by market value. Third, we use industry-adjusted and industry, size and pre-performance adjusted benchmarks to show the impact, if any, of failing to control for acquirer firms' pre-takeover size and performance characteristics. Fourth, we estimate performance improvements using both the Healy et al. (1992) regression-based model and the change model advocated by Ghosh (2001). Fifth, we investigate the impact of several firm, industry and takeover characteristics on the acquiring firms' post-takeover performance. For example, there is

[5] Ghosh (2001) does, however, report Healy et al. (1992) regressions that include dummy variables controlling for method of payment. Consistent with Linn and Switzer (2001), he finds significant improvements in the operating performance of takeovers financed by cash and insignificant declines for stock transactions. The impact of method of payment is, however, surprising since the choice of cash versus stock should have no impact on operating cash flows. This finding may have more to do with equity issuers underperforming post issue (Loughran and Ritter, 1997).

some evidence to suggest that large takeovers, takeovers from within the same industry (Healy et al., 1992), method of payment and takeovers that result in the removal of the target Chief Executive Officer (Denis and Denis, 1995) are more likely to result in improvements in the acquiring firms' post-takeover performance. Sixth, by using UK data, we present independent tests on the importance of the five methodological concerns identified above in a different setting from the USA. Seventh, and rather more parochially, we also contribute to the understanding of the operations of the UK market for corporate control.

The rest of this paper is organized as follows. Section 2 describes several methodological issues that need to be considered when estimating the impact of takeovers on firm performance. Section 3 describes the sample and benchmark construction procedures. Section 4 presents the results of the empirical study and Section 5 concludes with a discussion and summary of the main results.

2. Methodological issues

2.1. Performance measures

It is widely accepted that, in measuring the performance of firms after significant events such as takeovers, the use of operating cash flows is deemed optimal (Barber and Lyon, 1996). Other measures, such as earnings, can be easily manipulated, especially around significant corporate events such as takeovers. Erickson and Wang (1999), for example, provide some evidence which suggests earnings manipulation is practiced by managers of acquiring firms in stock for stock mergers.

The performance measure used predominately in previous papers tends to be an accruals definition of operating cash flow, defined simply as pre-depreciation profit (see, e.g., Healy et al., 1992; Linn and Switzer, 2001 and Ghosh, 2001). This measure is still likely to be distorted by the particular accounting policies adopted by the firm. In this paper, two definitions of operating performance are used. First, Lawson's (1985) definition of operating cash flow, defined as pre-depreciation profit adjusted for changes in working capital (i.e., changes in inventories, receivables and (nontax) prepayments *less* changes in payables and (nontax, non-interest) accruals) is employed. Thus, operating performance does not reflect interest or tax payments, nor is it impacted by the recognition of bad debts or the accounting policies adopted on the valuation of inventories. We refer to this measure as a 'pure' cash flow measure (OP1) since it adjusts for the accounting accruals process. Second, operating performance is defined simply as pre-depreciation profit (OP2). This measure is employed to ensure a degree of comparability with Healy et al. (1992), Lin and Switzer (2001) and Ghosh (2001).

2.2. Deflator choice

Rather than use raw measures of operating performance, the usual approach is to deflate them before and after the takeover's completion to create, for example, a cash flow return

on assets or sales margin. Operating cash flows before the takeover are constructed by adding together the separate cash flows of the target and acquirer to create a pro forma 'merged' performance measure comparable with the operating performance measure for the acquirer after the takeover. Both Healy et al. (1992) and Ghosh (2001) deflate by total market value (TMV) which is calculated as the sum of the market value of equity plus the book value of debt plus the book value of preferred stock for the target and acquirer prior to the takeover. TMV is used rather than accounting measures (such as book value of assets), first, since it more accurately reflects the productivity of the firm's assets in generating economic benefits. Second, TMV is used because it simplifies inter-temporal and cross-sectional comparisons (Healy et al., 1992; Barber and Lyon, 1996). This results from the fact that accounting policy choice varies over time and varies between companies. A market-based comparison is not directly affected by the accounting policy choice. Also, not all assets for all firms are valued at the same point in time. This is particularly important when comparing the performance of the acquiring firm to its benchmark.

The disadvantage of using market values is that they are a forward-looking measure and, as such, reflect not only the assets in place but also all assets the firm is expected to acquire (Barber and Lyon, 1996). Consequently, to observe any potential improvements in performance post-takeover, the return metric is modified to exclude estimates of announcement period abnormal returns to both target and acquirer firms. In efficient markets, these abnormal returns represent the capitalized value of any post-takeover performance improvements. This method of adjustment is problematic. In particular, it relies on the assumption of efficient markets to properly assess the gains arising from the takeover. This is contentious given empirical evidence that investors tend to overestimate the expected gains arising from takeovers (see Jensen and Ruback, 1983). For example, empirical evidence in the UK and elsewhere suggests a systematic decline in market values for acquiring firms post-takeover (e.g., Gregory, 1997; Agrawal et al., 1992).[6]

In response, takeover studies have employed other deflators. Healy et al. (1992) test the sensitivity of using market values by constructing a quasi-market value of equity, to which is then added the total book value of debt to form a quasi-market value of assets. Although this measure excludes post-takeover revaluations from the asset base, it fails to correct for a reduction in asset values because of depreciation. Ghosh (2001) addresses the issue by using sales as an alternative deflator. The benefit of using sales is that, like TMV, it is a current measure. Barber and Lyon (1996) argue that, since both numerator

[6] Evidence from the USA (Franks et al., 1991) argues that poor post-takeover performance (stock returns) is a result of the benchmarks used to measure 'normal' performance. Using a multifactor benchmark, Franks et al. (1991) do not find significant underperformance over a 3 year period following takeover. Agrawal et al. (1992), however, suggest that the results of Franks et al. (1991) are confined to their sample of takeovers and the time period which they study. Extending the sample of takeovers outside this time period results in additional evidence of poor stock market performance post-takeover. In the UK, Gregory (1997) finds significant evidence of a decline in the post-takeover period using several benchmarks. The evidence appears to be unclear as to the rationality of the market in valuing the gains from takeovers. This would also suggest that the analysis of stock market data on its own is incapable of providing sound evidence of the existence of gains from takeovers.

and denominator of the return metric come from the income statement, they are appropriately matched. The disadvantage, however, is that sales do not directly measure the productivity of the assets. For example, through price reductions, a firm might increase sales and, consequently, operating performance, ceteris paribus, without increasing the asset base. Thus, operational improvements in the firm may not be detected.

The use of the book value of assets as a deflator may be one way to overcome the above problems. In the USA, book values are rarely used, however, due to problems of accounting for goodwill. There, takeovers classified as acquisitions must use purchase accounting as opposed to the much preferred 'pooling' of interests applied to mergers. This gives rise to purchase goodwill, which simply represents the premium above the 'fair value' of the target firm. Purchase goodwill is shown in the balance sheet and amortized over an extended period, usually 40 years, to the income statement.[7] Naturally, this has a negative impact on earnings but will have no impact on operating cash flows. Clearly, however, in measuring improvements (if any), to acquiring firms post-takeover, goodwill should not be reflected in the book value of assets. In the UK, the preferred accounting treatment over our sample period was to write-off purchase goodwill immediately against shareholders' reserves.[8] Since goodwill would not be included in our book value of assets, no adjustment is necessary. Note, however, that this would not be the case for USA studies that employ book value of asset measures as deflators.

To test for any bias introduced by using market value-based deflators, we employ the following set of deflators: (i) TMV; (ii) TMV adjusted for market reaction to the takeover; (iii) book value of total assets; and (iv) total sales. By comparing (i) and (ii) we should get some idea of the magnitude of any overreaction by the market to takeovers. For example, if we observe improvements in operating performance using TMV as the deflator, this suggests that actual operating improvements are greater than those capitalized by the market around the takeover announcement period. The use of book value of total assets and sales as deflators enables us to comment on the sensitivity of estimates of operating performance improvements to the use of market value-based deflators.

2.3. Performance benchmarks

Prior to Barber and Lyon (1996), industry performance measures were usually employed as the preferred benchmark against which to evaluate corporate performance. The use of such benchmarks allows for a separation of firm-specific from industry-specific

[7] From June 2001, firms in the USA no longer have to make a charge to the income statement for goodwill. Goodwill will continue to be shown in the balance sheet and charges will only be made to the income statement for any fall in the value of assets acquired. The FASB have also eliminated 'pooling of interests' as an accounting option.

[8] In the UK, from December 1999, Financial Reporting Standard (FRS) 10 requires purchased goodwill to be capitalized and, in most circumstances, to be amortized systematically through the profit and loss account (usually over 20 years or less).

effects. Healy et al. (1992) show, for example, that takeovers in their sample typically occur in industries with declining performance. That is, while absolute, post-takeover performance declined, after industry adjustment, relative performance actually increased. As described above, Healy et al. (1992) employ a regression-based approach to estimating any improvements in performance, post-takeover. This involves regressing the post-takeover, median, industry-adjusted, operating performance for each combination on an equivalent, pre-takeover, combined measure for target and acquirer firms. The intercept in this regression is interpreted as an estimate of the average improvements in performance for the sample of takeovers employed. By controlling for pre-takeover performance in this way, the mean amount of post-takeover performance left unexplained (i.e., the intercept) must be, by definition, attributable to the takeover. Formally:

$$\mathrm{IAOP}_i^{(\mathrm{post})} = \beta_0 + \beta_1 \mathrm{IAOP}_i^{\mathrm{pre}} + \varepsilon_i \tag{1}$$

where $\mathrm{IAOP}_i^{(\mathrm{post})}$ and $\mathrm{IAOP}_i^{(\mathrm{pre})}$ are the median, post- and pre-takeover, industry-adjusted operating performance measures for takeover i. Note that the approach followed by Healy et al. (1992) allows the benchmark for post-takeover performance to be a multiple (constant across the sample of takeovers and estimated from the sample data) of pre-takeover performance. This multiple is β_1 from Eq. (1). Average performance improvements arising from takeovers will then equal the intercept (β_0). If β_1 is constrained to equal one, improvements in performance are estimated as post-takeover performance less the combined, target and acquirer, pre-takeover performance. This approach is generally referred to as the change model. Further, if superior operating performance pre-takeover is regarded as transitory, that is, the benchmark for post-takeover performance is zero (i.e., $\beta_1 = 0$ in Eq. (2)), both the regression-based and change model will yield unbiased estimates of any improvements in post-takeover performance.

However, evidence suggests that acquiring firms differ from their industry counterparts in terms of size and performance. Acquiring firms are likely to be larger than industry median firms, which suggests the possibility of better operating performance, since larger firms can take advantage of economies of scale (Penman, 1991). Furthermore, acquiring firms time takeovers during periods of superior stock-price performance (Franks and Harris, 1989; Morck et al., 1990). This probably makes most sense for acquisitions where stock is used as the primary method of payment. For the sample employed in this study, the median acquirer is over five times larger in size (measured as TMV in the year prior to takeover) than its industry median firm. Also, using the two performance measures described above (Section 2.1), the mean (median) industry-adjusted, operating performance for acquiring firms in our sample is 2.5% (1%) for IAOP1 and 3.5% (0.7%) for IAOP2, respectively, using TMV as the deflator. Nonetheless, these amounts are not significantly different from zero from a statistical point of view.

Ghosh (2001) demonstrates that both the change and regression-based approaches can lead to estimates of improvements in operating performance that are biased when acquiring firms out-perform their industry counterparts prior to the takeover due to either

permanent or temporary factors. If superior acquirer pre-performance is expected to be permanent, then controlling for this superior pre-performance should give unbiased estimates of operating improvements. However, if superior pre-performance is only a temporary factor in that it is unlikely to persist into the future, then this decay in performance needs to be factored into the pre-performance benchmark. Under the last scenario, both the regression-based and change model will lead to biased estimates in operating performance improvements. Clearly, to overcome this potential bias, we need to control for acquirer pre-performance.

To ameliorate this problem, and consistent with Ghosh (2001), we employ benchmarks that control for industry, size and prior operating performance. By matching merging firms with industry firms on the basis of size and pre-performance, we are assuming that the decay in operating performance over time resembles that of the matched firm. For comparison purposes, we also use industry medians as a benchmark.

2.4. Market validation of improvements in performance

Assuming efficient markets, if takeovers give rise to real improvements in the post-takeover operating performance of acquiring firms, we should expect the market to be able to predict these improvements. Some prior studies suggest that takeovers are value enhancing transactions in that target shareholders gain and acquirer shareholders see only modest or zero increases, but no decrease in the value of their holdings (Jensen and Ruback, 1983; Franks and Harris, 1989). In the USA, Healy et al. (1992) report statistically significant combined equity (asset) abnormal returns of 9.1% (8.8%) measured around the takeover announcement period. In the UK, Manson et al. (1994) and Manson et al. (2000), employing similar data sets, report median combined equity (asset) market-adjusted returns of 14.7% (9.3%).

If markets are informationally efficient, these abnormal returns capture the market's perception of improvements in performance arising from takeovers. In the UK, Manson et al. (1994) and Manson et al. (2000) find significant associations between the market's assessment of the improvements in operating performance and their estimates of improvements in operating performance. In the USA, Healy et al. (1992) and Switzer (1996) find a significant and positive association between the market's assessment of the improvements in operating performance and post-takeover performance. Ghosh (2001), on the other hand, fails to find a significant relationship between cash flow improvements, estimated using an industry, size and pre-performance matching scheme, and the market's assessment of the gains. He argues that this makes sense since the estimated median cash flow improvements of 0.26% per annum are statistically indistinguishable from zero. However, Ghosh (2001) fails to report the actual equity (asset) abnormal returns, making it difficult to interpret the market's response to his sample of takeovers. More importantly, if the Healy et al. (1992) and Switzer (1996) estimated operating improvements are measured with error because of inappropriate benchmarks (as Ghosh, 2001 seems to suggest), it is difficult to reconcile this with the significant and positive association between these improvements and the market's assessment of the improvements.

To re-examine this issue, we measure the market's assessment of the gains and include this variable as an independent variable in regression (Eq. (1)) above. If the market capitalizes the expected performance improvements from takeovers, we should expect a significant and positive relationship between the market's assessment of the gains and the actual operating performance improvements post-takeover.[9] Formally, we estimate the following regression:

$$\mathrm{IAOP}_i^{(\mathrm{post})} = \beta_0 + \beta_1 \mathrm{IAOP}_i^{(\mathrm{pre})} + \beta_2 \mathrm{MAAR}_i + \varepsilon_i \tag{2}$$

where MAAR_i is the combined, cumulative, abnormal asset returns to the acquiree and acquirer firms measured around the takeover announcement period.[10]

Nonetheless, there are certain *caveats* attached to the validity of the above regression equation. The seepage of insider information, or merely market anticipation, prior to the takeover announcement date may result in traders marking up a merging firm's share price. If these conditions are in place, the measured market forecast of takeover gains will be understated to the extent of the anticipation. What is more, Gregory (1997) and Agrawal et al. (1992) report significant negative abnormal returns for acquiring firm shareholders after takeovers in the UK and the USA, respectively. Consequently, measuring changes in market values of shares only as far as the bid's being declared unconditional as a surrogate for estimated gains from takeovers will lead to any gains being overestimated to the extent of the long-run negative performance for acquirers.

The possibility of introducing systematic bias into Eq. (2) raises the question of its effect on the tests performed. If market-assessed gains are biased with reference to the true results, post-takeover performance will be consistently overestimated due to the market's over-optimism reducing the denominator of $\mathrm{IAOP}_i^{(\mathrm{post})}$. Similar but opposite phenomena will be reported where the market methodically underestimates the gains from takeovers. To overcome this potential bias, we use different windows to measure the market's assessment of the gains, starting from 5 days before the takeover announcement date to 5 days, 10 days and the date the takeover was completed (taken to be the unconditional date). Note also, that the use of unadjusted TMV, book value of assets and sales as alternative scaling techniques should cast some light on the magnitude of this potential bias.

[9] Note that operating performance improvements are not necessarily the only source of gains from takeovers. As a consequence, MAAR_i should capitalize all the benefits expected to arise from a takeover.

[10] Calculating asset returns ensures comparability with the gains derived from total assets. The abnormal asset returns are computed by adjusting the abnormal equity returns for the relative equity market value capital structure. The proportion of equity in a firm's capital structure is calculated using the equity market value to TMV ratio. The combined asset return is a weighted average of the target and acquirer asset returns, where TMV from the year prior to takeover is used to calculate the weights. Abnormal equity returns to the target (acquirer) are the cumulative daily market-adjusted returns measured over three windows, from 5 days prior to the first bid date to 5 days, 10 days, and up until the date the bid went unconditional. The Financial Times All Share Index was used as a proxy for movements in the market. TMV, measured at the year prior to takeover, is used to compute the relative weights.

3. Sample and benchmark construction

3.1. The sample

The sample used in the study includes 191 takeovers made by UK industrial firms over the period January 1985 to July 1993. Each takeover included in the sample satisfies the following requirements:

(i) Datastream codes are available for both target and acquirer;
(ii) Accounting and market value data are available on Datastream such that the various measures of operating performance and the market's assessments of the gains from takeovers can be estimated;
(iii) The dates at which (i) a bid was first made for the target firm (not necessarily by the eventual acquirer); (ii) the acquiring firm first bid for the target; and (iii) the takeover went unconditional, as reported in *Acquisitions Monthly* and cross-referenced to the *Financial Times Index*, are available.
(iv) Data for the calculation of industry-adjusted and industry, size and pre-performance adjusted measures of operating performance are available.

Table 1 presents some characteristics of the sample employed. Over 72% (131) of the takeovers occurred during the takeover boom period of 1985 to 1988. Only 28% (53) of the takeovers were completed during the downturn period of 1989 to July 1993. For over 60% of the sample, the size (total market value) of the target is at least 10% of the acquirer size. Of these, 22% represent significant takeovers in that the target is at least 50% of the size of the acquirer. Classifying the sample in terms of their industry grouping, the sample is evenly divided between firms with high industrial relatedness (46%) and low industrial relatedness (54%). High industrial relatedness occurs when the target and acquirer belong to the same industrial group, as classified by the Financial Times All Share Index (Datastream level 4). Firms that do not belong to the same industrial group are classified as having low industrial relatedness.

Notes to Table 1:
This table shows the sample characteristics of 191 takeovers completed during January 1985 to July 1993. The completion year is defined as the year in which the takeover went unconditional. The number of takeovers represents those that met all data requirements. Relative target size is measured as the target total market value divided by the acquirer total market value at the financial year prior to the takeover completion ($t-1$). Total market value is defined as the market value of equity plus the book value of debt and preferred stock. High industrial relatedness is where both target and acquirer belongs to the same industrial grouping as defined as that used by the Financial Times All Share Index; otherwise, relatedness is defined as low. Hostile takeovers are defined as those where the target management rejects the first bid by the acquirer firm. All other takeovers are defined as friendly. Disciplining takeovers are defined as those in which the chief executive officer is removed (nonroutine departure) in the 12 months following takeover. All other takeovers are defined as nondisciplining. Method of payment relates to the form of the consideration offered by the acquiring firm. The announcement window is measured for the target from the first bid date (not necessarily by the successful acquirer) to the date the takeover went unconditional. The announcement window for the acquirer firm is measured from the first bid date to the date the takeover went unconditional.

Based on the annual reviews of *Acquisitions Monthly* (published by Thomson Financial), 18% (or 35) of the takeovers are defined as hostile and 82% (or 156) as friendly. A takeover is defined as hostile if the target management rejects the initial bid from the successful acquirer. All other takeovers are classified as friendly. Since not all hostile takeovers may be disciplining (Franks and Mayer, 1996), the sample is further classified as disciplining (32% or 61%) and nondisciplining (68% or 130%). Disciplining takeovers are defined as those that result in the nonroutine departure of the target Chief Executive Officer in the 12 months following takeover. For targets, the average (median)

Table 1
Sample characteristics

	Number of takeovers	Percent (%)
Panel A: completion year		
1985	29	15.18
1986	43	22.51
1987	38	19.90
1988	28	14.66
1989	12	6.28
1990	10	5.24
1991	19	9.95
1992	10	5.24
1993 (July)	2	1.05
Total	191	100.00
Panel B: relative size of target		
Target is less than 10% of acquirer size	71	37
Target is 10%–50% of acquirer size	78	41
Target is greater than 50% of acquirer size	42	22
Total	191	100
Panel C: industrial relatedness		
High	88	46
Low	103	54
Total	191	100
Panel D: type of takeover		
Hostile	35	18
Friendly	156	82
Disciplining	61	32
Nondisciplining	130	68
Panel E: method of payment		
Cash only	18	9
Stock only	40	21
Cash and stock (mixed)	133	70
Panel F: announcement window (days)		
Target mean	48	
Target median	41	
Acquirer mean	43	
Acquirer median	41	

window from the takeover announcement date to the date of completion (unconditional date) is 48 (41) days. For acquirers, these statistics are 43 (41) days.

3.2. Benchmark construction

Section 2.3 above discusses the methodological issues relating to the construction of benchmarks against which to compare the merging firms' operating performance. Two benchmarks are used in this study: (1) industry median operating performance; and (2) firms matched on industry, size and pre-operating performance characteristics. To construct industry median benchmarks, the population of firms for the UK is reconstructed for each of the years 1983 to 1996. We reconstruct the population each year because industry averages provided by Datastream suffer from survivorship bias. That is, firms that are delisted from the London Stock Exchange due to takeover and bankruptcy are not included as constituents in subsequent industry classifications and, hence, do not form part of the average. Only currently 'live' firms are included in Datastream's industry classifications. Naturally, the exclusion of 'dead' firms is likely to cause significant bias in industry averages, particularly for early years. To address this problem, we extract the official list, the small companies list and the 'dead' companies list from Datastream for each of the years 1983–1996 and use all firms to construct industry groupings, as defined by Datastream's level 4 (Financial Times All Share Index). These industry groupings are then used to calculate industry medians.

We select matched firms from target and acquirer industries based on a firm size filter of between 25% and 200% of target and acquirer size, measured 1 year prior to takeover. If no matched firms satisfy this requirement, the size restriction is extended by using a filter of between 0% and 300%. From this list of potential matched firms, firms with the closest operating performance of the target and acquirer, measured 1 year prior to the takeover are selected as the benchmark. This procedure is similar to that employed by Ghosh (2001) and Loughran and Ritter (1997) and is consistent with the recommendations contained in Barber and Lyon (1996) that, test statistics will be well-specified and powerful only by matching on pre-event performance and size.

4. Results

This section describes the results of the empirical analysis. First, the Healy et al. (1992) regression-based results (i.e., Eq. (1)) are presented for both measures of operating performance using both benchmarks and the four different deflators. We also report the results of an extended model, which includes several control variables, such as relative size, method of payment, the nature of the takeover (disciplining or nondisciplining) and the level of industrial relatedness. Second, we report the results of the change model, where improvements are measured as the difference between post-takeover performance and the combined target and acquirer pre-takeover performance. Note, that this is equivalent to constraining the coefficient of pre-takeover performance (i.e., β_1) in Eq. (1) to equal one. Third, the results of calculating the market's assessment of the gains around the takeover are reported for the target, acquirer and the combined firm for

different windows around the takeover announcement date. Fourth, we present the results of regressing post-takeover performance on pre-takeover performance and the market's assessment of the gains to the takeover (i.e., Eq. (2)). Of interest here is whether the market can predict future operating performance improvements.

4.1. Healy et al. (1992) regression-based results

Table 2 below presents the results of estimating Eq. (1) for both performance measures and benchmarks using TMV (Panel A), TMV adjusted for the market reaction to the takeover (Panel B), book value of assets (Panel C) and sales (Panel D) as deflators. Models 1, 3, 5 and 7 provide results in which the constant term estimates the size of the average operating gains from our sample of takeovers. Models 2, 4, 6 and 8 investigate whether any performance improvements can be specifically attributed to factors such as whether the offer is made in cash, whether the takeover is disciplinary, whether the takeover is between firms in the same industry grouping, and the relative sizes of the target and acquirer.

Panel A reports the results using as deflator TMV unadjusted for the market's assessment of the gains to the takeover. Since the market gains have not been removed from the denominator, we expect no improvements in the operating performance of acquiring firms' post-takeover if the market has reasonably accurately assessed the gains from the takeover. Considering models 1, 3, 5 and 7 first, the results for models 1 and 5, using a 'pure' definition of operating cash flows, confirm this with insignificant intercepts in models using both industry-adjusted (IAOP1) and industry, size and pre-performance adjusted (ISPAOP1) benchmarks. For models 3 and 7, using an accruals definition of operating performance provides mixed results, depending on the benchmark used. Using ISAOP2, the intercept in model 7 is positive and significant, suggesting that actual operating gains are higher than those predicted by the market around the takeover announcement date. Further, apart from IAOP1, there appears to be no relationship between pre- and post-takeover performance using TMV as a deflator.

Turning to models 2, 4, 6 and 8, there is little in the results to suggest that the control variables are able to consistently explain post-takeover performance, once pre-takeover performance is controlled for. The only exception is a negative relationship between the relative size of target and acquirer and post-takeover performance when and industry-adjusted, accruals performance measure (IAOP2) is employed.

The results from Panels B, C and D provide a somewhat different picture. Again focusing first on models 1, 3, 5 and 7, they generally suggest that takeovers generate significant improvements in operating performance with positive intercepts, statistically distinguishable from zero at the 10% level or better.[11] The magnitude of the estimated gains depends on the deflator and benchmark used, but averages between 0.80% and 3.1% per annum. In the UK, Manson et al. (1994) report estimates of over 3% per annum using a much smaller sample than the one in the current study. In the USA, Healy et al. (1992) report average gains of 2.8% per annum.

[11] In particular, when adjusted TMV and industry-adjusted performance measures are employed, the results are consistent with prior UK work (e.g., Manson et al., 1994, 2000). The current study, however, uses a substantially larger sample.

Table 2
Healy et al. (1992) OLS regressions of post-takeover performance on combined target and acquirer pre-takeover performance

Independent variables	Industry-adjusted median				Industry, size and pre-performance adjusted			
	IAOP1		IAOP2		ISPAOP1		ISPAOP2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: median pre- and post-takeover cash flows (accruals) relative to TMV								
Intercept	0.009	0.003	0.004	0.008	0.008	− 0.005	0.016***	0.018**
	(1.19)	(0.40)	(1.10)	(1.49)	(0.87)	(0.46)	(3.66)	(2.31)
Pre-performance	0.155**	0.163**	0.119	0.136*	0.069	0.076	0.037	0.041
	(2.21)	(2.40)	(1.30)	(1.69)	(0.82)	(0.74)	(0.38)	(0.43)
Controls								
Cash		− 0.013		− 0.013		− 0.015		− 0.002
		(0.90)		(1.24)		(0.67)		(0.13)
Disciplining		0.021		0.008		0.017		− 0.002
		(0.84)		(1.19)		(0.67)		(0.18)
IND-relatedness		0.014		− 0.002		0.015		0.000
		(0.87)		(0.37)		(0.78)		(0.02)
Size		− 0.013		− 0.011**		0.006		− 0.003
		(1.29)		(2.31)		(0.48)		(0.26)
F-statistic	4.60**	1.55	13.09***	4.14***	0.51	0.52	0.53	0.15
p-value	(0.03)	(0.18)	(0.000)	(0.001)	(0.47)	(0.76)	(0.47)	(0.98)
Adjusted R^2	0.02	0.01	0.06	0.08	− 0.003	− 0.01	− 0.002	− 0.02
Panel B: median pre- and post-takeover cash flows (accruals) relative to adjusted TMV								
Intercept	0.019**	0.004	0.016**	0.010	0.020*	0.007	0.031***	0.033**
	(1.97)	(0.40)	(2.50)	(1.24)	(1.83)	(0.47)	(3.95)	(2.38)
Pre-performance	0.273***	0.284***	0.354***	0.355***	0.291***	0.298***	0.368***	0.368***
	(3.90)	(3.83)	(9.95)	(7.68)	(3.00)	(2.73)	(9.00)	(6.72)
Controls								
Cash		− 0.011		− 0.016		− 0.021		− 0.007
		(0.67)		(1.49)		(0.83)		(0.41)
Disciplining		0.032		0.018		0.024		0.003
		(1.19)		(1.27)		(0.88)		(0.16)

IND-relatedness		0.012		− 0.001		0.010		− 0.006
		(0.60)		(0.07)		(0.44)		(0.38)
Size		0.000		0.005		0.007		0.000
		(0.02)		(0.28)		(0.39)		(0.03)
F-statistic	10.28***	2.60 **	34.40***	7.45***	6.24***	1.63	17.43***	3.46 ***
p-value	(0.002)	(0.03)	(0.000)	(0.000)	(0.01)	(0.16)	(0.000)	(0.005)
Adjusted R^2	0.05	0.04	0.15	0.15	0.03	0.02	0.08	0.06
Panel C: median pre- and post-takeover cash flows (accruals) relative to book value of assets								
Intercept	0.012**	0.022***	0.008**	0.019***	0.015**	0.036***	0.012**	0.017*
	(2.24)	(2.83)	(1.99)	(2.78)	(1.95)	(2.61)	(2.17)	(1.87)
Pre-performance	0.267***	0.259***	0.286***	0.278***	0.201	0.148	0.249***	0.236***
	(4.56)	(4.47)	(7.03)	(6.89)	(1.54)	(1.05)	(3.45)	(3.04)
Controls								
Cash		− 0.006		− 0.027**		− 0.004		− 0.022
		(0.41)		(2.23)		(0.14)		(0.91)
Disciplining		0.010		0.018**		0.006		0.016
		(0.90)		(2.10)		(0.36)		(1.27)
IND-relatedness		− 0.024**		− 0.023***		− 0.029*		− 0.020*
		(2.40)		(2.91)		(1.93)		(1.76)
Size		− 0.003		− 0.006		− 0.018 **		0.004
		(0.53)		(1.18)		(1.97)		(0.37)
F-statistic	20.33***	5.36 ***	46.26***	13.01***	2.47	1.95	11.76***	3.52 ***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.12)	(0.09)	(0.001)	(0.005)
Adjusted R^2	0.09	0.10	0.19	0.24	0.01	0.02	0.05	0.06
Panel D: median pre- and post-takeover cash flows (accruals) relative to total sales								
Intercept	0.017**	0.006	0.016**	0.009	0.018**	0.002	0.020***	− 0.001
	(2.23)	(0.45)	(2.39)	(0.82)	(2.07)	(0.13)	(2.80)	(0.11)
Pre-performance	0.409***	0.456***	0.449***	0.452***	0.484*	0.517*	0.347**	0.316**
	(2.85)	(3.53)	(5.27)	(5.52)	(1.73)	(1.90)	(2.32)	(2.03)

(continued on next page)

Table 2 (*continued*)

Independent variables	Industry-adjusted median				Industry, size and pre-performance adjusted			
	IAOP1		IAOP2		ISPAOP1		ISPAOP2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel D: median pre- and post-takeover cash flows (accruals) relative to total sales								
Controls								
Cash		0.024		−0.000		0.030		−0.002
		(1.08)		(0.15)		(1.09)		(0.07)
Disciplining		− 0.003		0.024**		− 0.004		0.035**
		(0.21)		(2.03)		(0.20)		(2.05)
IND-relatedness		− 0.013		− 0.011		− 0.005		− 0.006
		(0.97)		(1.07)		(0.27)		(0.45)
Size		0.034		0.012		0.037		0.031
		(1.23)		(0.73)		(1.06)		(1.08)
F-statistic	31.46***	8.77***	78.07***	17.41***	8.85***	3.59***	8.99***	5.26 ***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)	(0.003)	(0.000)
Adjusted R^2	0.14	0.17	0.29	0.30	0.04	0.06	0.04	0.10

Operating cash flows are defined as pre-depreciated profit adjusted for short-term accruals (IAOP1 and ISPAOP1) and as pre-depreciated profit (IAOP2 and ISPAOP2). Industry-adjusted measures (IAOP1 and IAOP2) are defined as the raw performance measure for each firm less the median industry performance measure for each firm. Industry, size and pre-performance adjusted measures (ISPAOP1 and ISPAOP2) are defined as the raw performance measure for each firm less the performance of a control firm matched according to industry, size and pre-performance, measured in the year prior to takeover. In Panels A and B, the asset base is total market value, which is the sum of the market value of equity plus the book value of debt and preferred stock. For Panel B, the total market value in the post-takeover years is reduced by the combined market adjusted gains attributable to the target and acquirer firms. In Panels C and D, the asset base is the book value of total assets and total sales, respectively. The control variable cash takes the value 1 if cash was used as the only form of consideration in financing the takeover. The control variable disciplining takes the value 1 if the takeover is disciplining. Disciplining takeovers are defined as those in which the chief executive officer is removed (nonroutine departure) in the 12 months following the takeover. The control variable IND-relatedness takes the value 1 if both target and acquirer belong to the same industrial grouping as that defined by the Financial Times All Share Index. The control variable size is the relative target size measured as the target total market value divided by the acquirer total market value at the financial year prior to the takeover completion ($t-1$). Numbers in parentheses are *t*-statistics, unless otherwise stated. ***, **, * denote statistical significance using a two-tailed test at the 1%, 5% and 10% levels, respectively. All *t*-statistics are computed using White (1980) correction for an unknown form of heteroscedasticity.

The association between pre- and post-takeover performance also appears to be strong with statistically significant slope coefficients. The only exception to this is when an industry, size and pre-performance benchmark is combined with a 'pure' cash flow measure of performance and book value of assets is used as the deflator. The coefficient of pre-takeover performance is substantially less than one in all cases. If the modeling structure performance is accepted, this suggests that excess performance, whatever the benchmark, disappears over time.

When examining the results for models 2, 4, 6 and 8, there is little of any consistency. For example, when adjusted TMV is employed as deflator, none of the control variables have a significant ability to explain post-takeover performance. When either book value of assets or sales are used as deflator, some of the control variables appear to have explanatory power for post-takeover performance. Nonetheless, no variable has consistent explanatory power across performance measures. Further, even for these deflators, only whether the takeover is disciplinary has a consistent effect for a single performance measure (IAOP2).

Overall, the results presented in Table 2, as indicated by the results for models 1, 3, 5 and 7, provide evidence of significant improvements in the operating performance of acquiring firms post-takeover.[12] The size of the estimates, however, shows some sensitivity to the measure of operating cash flows and deflator employed. The conclusion that takeovers generate operating performance improvements is perhaps supported more by the use of an accruals definition of operating cash flow. Furthermore, the impact of pre-takeover performance on post-takeover performance is generally more pronounced and significant when we use the accruals definition of operating cash flow, as evaluated by the degree of explanatory power for the estimated equations. The use of industry or industry, size and pre-performance benchmarks does not seem to impact greatly on our conclusions, in terms of the *existence* of performance improvements. As a general rule, however, the *size* of the estimates of performance improvements are higher when the benchmark for performance adjusts for the impacts of industry, firm size, and pre-takeover performance than when industry is the only factor adjusted for. The results for models 2, 4, 6 and 8 provide little consistent evidence across deflator and performance measure choice that (i) the form of payment; (ii) whether the takeover is disciplinary; (iii) the degree of industry relatedness for the takeover; (iv) and the relative size of target and acquirer have the ability to explain post-takeover performance, once pre-takeover performance is controlled for.

4.2. The change model

Table 3 provides the results of examining the average size of performance improvements measured as the difference between post-takeover performance and the combined target and acquirer pre-takeover performance, using different benchmarks and scaling

[12] Following Belsley, Kuh and Welsch (1980), we test for the influence of outliers by plotting the standardized residuals for each regression. Values greater than two indicate possible outliers. The results reveal one outlier when sales is used as the scaling metric—Daily Mail and General's takeover of Hobson's publishing in 1990. Combined operating performance (OP1) to sales in the year prior to takeover was a staggering 1.231% compared to only 15% in the year after takeover. The huge operating sales margin prior to takeover was the result of near zero sales reported for Daily Mail and General. This observation was dropped for all analysis using sales as a scaling metric.

Table 3
Improvements in operating performance using different benchmarks and deflators (change model)

Year relative to takeover	Firm median		Industry-adjusted median		Industry, size and pre-performance adjusted	
	OP1 (%)	zOP2 (%)	IAOP1 (%)	IAOP2 (%)	ISPAOP1 (%)	ISPAOP2 (%)
Panel A: sample median pre- and post-takeover cash flows (accruals) relative to TMV						
− 1	15.67	18.88	1.52	0.80	− 0.04	0.03
1	14.44	16.51	0.95	0.07	0.36	0.67
2	14.00	15.96	1.28	− 0.03	1.06	1.94
3	14.60	15.78	1.57	0.82	1.16	2.57
Median annual post-performance	14.14	16.16	1.33	0.23	0.75	1.55
Post median *less* pre	− 1.66	− 2.46	− 0.14	− 0.23	0.79	1.10
Panel B: sample median pre- and post-takeover cash flows (accruals) relative to adjusted TMV						
− 1	15.67	18.88	1.52	0.80	− 0.01	0.03
1	14.76	16.90	1.41	0.68	0.65	1.26
2	14.82	16.46	1.90	0.97	1.85	3.01
3	15.22	16.35	2.41	1.58	1.38	3.37
Median annual post-performance	14.82	16.71	2.13	1.10	1.55	2.52
Post median *less* pre	− 1.00[a]	− 2.02***	0.35	0.48	1.61	1.78***
Panel C: sample median pre- and post-takeover cash flows (accruals) relative to book value of assets						
− 1	15.49	16.97	2.84	1.79	0.21	0.34
1	15.75	19.24	2.16	2.32	1.30	2.18
2	15.18	18.24	1.16	0.96	1.87	1.72
3	15.62	16.79	2.27	1.08	1.94	2.24
Median annual post-performance	15.65	18.00	2.16	1.62	1.24	1.83
Post median *less* pre	− 0.42	0.30	− 0.35	− 0.29	0.13	0.81
Panel D: sample median pre- and post-takeover cash flows (accruals) relative to total sales						
− 1	11.01	12.63	2.10	1.51	0.32	0.16
1	14.17	16.82	4.26	3.96	2.44	2.32
2	12.67	14.84	2.53	2.06	1.03	1.24
3	12.77	13.46	2.57	1.43	1.51	0.28
Median annual post-performance	12.72	15.17	2.78	2.21	1.41	1.24
Post median *less* pre	1.38	2.09	0.67	0.73[c]	0.80	0.95*

The table shows the raw median and industry-adjusted median performance for different asset bases for 191 takeovers completed over the period January 1985 to July 1993. Performance is measured as pre-depreciated profit adjusted for short-term accruals (OP1) and as pre-depreciated profit (OP2). Industry-adjusted measures (IAOP1 and IAOP2) are defined as the raw performance measure for each firm less the median industry performance measure for each firm. Industry, size and pre-performance adjusted measures (ISPAOP1 and ISPAOP2) are defined as the raw performance measure for each firm less the performance of a control firm matched according to industry, size and pre-performance, measured in the year prior to takeover. In Panels A and B, the asset base is total market value, which is the sum of the market value of equity plus the book value of debt and preferred stock. For Panel B, the total market value in the post-takeover years is reduced by the combined market adjusted gains attributable to the target and acquirer firms. In Panels C and D, the asset base is the book value of total assets and total sales, respectively. Post median *less* pre is the median of the differences between the median annual post-performance and pre-performance for each combination. ***, **, * indicates a significant difference using a Wilcoxon signed ranks test at the 1%, 5% and 10% levels, respectively.

metrics. Ghosh (2001) advocates the use of the change model as it is less likely to be impacted by the biases in the Healy et al. (1992) regression-based model.

Several observations can be made about the results presented in Table 3. First, the operating performance improvements using a change model are lower than those reported in Table 2. This is consistent with findings of Linn and Switzer (2001) for the USA. Second, the benchmark used appears to have a significant impact on the magnitude of the post-takeover improvements. For example, the estimated performance improvements are always higher when benchmarks are constructed which control for industry, size and pre-performance relative to when benchmarks only control for industry performance. Third, and consistent with Table 2, the use of an accruals definition of operating performance results, with one exception, in larger reported improvements in post-takeover performance.[13] Fourth, the results for the 'raw', benchmark-unadjusted, performance measures (OP1 and OP2) indicate post-takeover performance generally declines whatever the performance measure. However, after adjustment for industry or industry, size and prior performance, estimates of performance improvements are higher. The main exception to this is when sales is used as deflator. In this case, both the raw results and the benchmark-adjusted results suggest performance improvements (if not necessarily distinguishable from zero from a statistical point of view) and the estimates for the benchmark-adjusted performance measures are lower than for the raw measures.

In summary, when improvements in operating performance are measured using a change model, the results in Table 3 suggest that takeovers, on average, generate improvements in operating performance, although, they are mainly not statistically significantly different from zero. Consistent with Table 2, improvements are larger when an accrual definition of operating performance is used and the benchmark controls for industry, size and pre-performance (ISPAOP).

Overall, taking the results reported in both Tables 2 and 3 together, the results suggest the existence of improvements in the post-takeover operating performance of acquiring firms, although there is some sensitivity to the performance measure, benchmark and scaling metric used. The results appear to be strongest when improvements are estimated by the intercept in a regression of post-takeover performance on pre-takeover performance, but they do not disappear when we use a change model.

4.3. Can the market predict actual post-takeover operating improvements?

Table 4 presents the results of the market's assessment of the gains to takeovers. For targets (acquirers) the cumulative, average, market-adjusted, equity return attributed to takeovers is 28.71% (4.93%), with comparable median values of 26.62% (0.55%), measured over the period 5 days prior to the first bid date to the completion of the takeover (unconditional date). The combined cumulative average (median) market-adjusted equity return is 8.85% (4.69%). All measures are significantly different from zero at the 1% level using a two-tailed test. Comparable results are reported for different

[13] The exception, however, occurs when TMV is used as a deflator and the benchmark for performance only controls for industry performance. Given that we have reasons to prefer other deflators to TMV, as explained above, we tend to put more weight on results arising from the use of other deflators.

Table 4
Market-adjusted equity and asset returns measured around the takeover announcement date

	Window (days)		
	− 5 to + 5 (%)	− 5 to + 10 (%)	− 5 to completion (%)
Panel A: abnormal equity returns			
Target mean	26.36***	26.91***	28.71***
Target median	23.73	24.55	26.62
Acquirer mean	− 1.50**	− 1.20	4.93***
Acquirer median	− 1.62	− 1.44	0.55
Combined mean	3.81***	4.21***	8.55***
Combined median	2.59	3.17	4.69
Panel B: abnormal asset returns			
Target mean	19.60***	20.08***	21.31***
Target median	16.77	17.76	18.42
Acquirer mean	− 1.22***	− 0.94	4.07***
Acquirer median	− 1.31	− 0.99	0.44
Combined mean	2.75***	3.11***	6.54***
Combined median	1.97	2.18	3.70

The abnormal equity returns to the target (acquirer) are the cumulative daily market-adjusted returns measured from 5 days prior to the first bid date to 5 days, 10 days and the date the bid went unconditional. The Financial Times All Share Index was used as a proxy for movements in the market. The abnormal asset returns are computed by adjusting the abnormal equity returns for the relative equity market value capital structure. The proportion of equity in a firm's capital structure is calculated using the equity market value to total market value ratio. The combined equity (asset) return is a weighted average of the target and acquirer equity (asset) returns, where total market value from the year prior to takeover is used to calculate the weights. ***, **, * denote significant difference from zero using a two-tailed test at the 1%, 5% and 10% levels, respectively.

windows around the takeover announcement period, starting 5 days prior to the first bid to 5 and 10 days post first bid. Cumulative average asset returns are also reported in Panel B of Table 4 and are consistent with the equity returns. The results are generally supportive of previous short-term share price studies, which show that takeovers create value around the takeover announcement (e.g., Franks and Harris, 1989). The results suggest that the market expects improvements to arise from takeovers. The results in Tables 2 and 3 provide some evidence of actual operating performance improvements. As a cross-validation check, we examine which, if any, of our measures are associated with the market's assessment.

Table 5 presents the results of estimating Eq. (2) for the various measures of operating performance employed. Of particular interest here is the coefficient of abnormal asset returns (β_2). As a check on the sensitivity of our results to asset return windows, we estimate two regressions for each performance measure and benchmark using asset returns calculated over two time periods: (1) 5 days before the first bid date to 5 days after; and (2) 5 days before the first bid date to 10 days after.[14]

The results in Table 5 (Panel A) suggest the following. When TMV is used as deflator (see Panel A), there is no significant relationship between the market's assessments of the

[14] When we measure abnormal asset returns cumulated from 5 days prior to the first bid date to the date the takeover was completed (i.e., the unconditional date), the results are unchanged in a qualitative sense.

Table 5
OLS regressions of post-takeover performance on combined target and acquirer pre-takeover performance and unexpected asset returns

Independent variables	Industry-adjusted median				Industry, size and pre-performance adjusted			
	IAOP1		IAOP2		ISPAOP1		ISPAOP2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: median pre- and post-takeover cash flows (accruals) relative to TMV								
Constant	0.008	0.007	0.004	0.004	0.005	0.005	0.013***	0.013***
	(1.11)	(1.04)	(0.95)	(1.05)	(0.60)	(0.56)	(2.58)	(2.62)
Pre-performance	0.157**	0.158**	0.118	0.118	0.071	0.070	0.044	0.040
	(2.21)	(2.20)	(1.29)	(1.29)	(0.84)	(0.83)	(0.44)	(0.41)
Asset returns								
−5 to +5 days	0.065		−0.006		0.098		0.116	
	(0.62)		(0.12)		(0.75)		(1.36)	
−5 to +10 days		0.069		−0.017		0.099		0.098
		(0.71)		(0.35)		(0.86)		(1.29)
F-statistic	2.44*	2.51*	6.52***	6.60***	0.55	0.63	2.00	1.84
p-value	(0.09)	(0.08)	(0.01)	(0.002)	(0.58)	(0.54)	(0.14)	(0.16)
Adjusted R^2	0.01	0.02	0.05	0.06	−0.005	−0.004	0.01	0.009
Panel B: median pre- and post-takeover cash flows (accruals) relative to adjusted TMV								
Constant	0.010	0.009	0.006	0.005	0.013	0.013	0.021***	0.021***
	(1.41)	(1.38)	(1.22)	(1.23)	(1.27)	(1.26)	(2.83)	(2.85)
Pre-performance	0.282***	0.285***	0.375***	0.372***	0.297***	0.293***	0.387***	0.377 **
	(3.87)	(3.96)	(10.96)	(11.29)	(2.95)	(2.92)	(8.98)	(9.14)
Asset returns								
−5 to +5 days	0.313*		0.350***		0.269		0.336**	
	(1.87)		(2.58)		(1.37)		(2.31)	
−5 to +10 days		0.287*		0.318**		0.248		0.312**
		(1.85)		(2.56)		(1.42)		(2.45)
F-statistic	7.82***	8.02***	27.92***	28.56***	4.67***	4.81***	14.14***	14.74***
p-value	(0.001)	(0.000)	(0.000)	(0.000)	(0.01)	(0.009)	(0.000)	(0.000)
Adjusted R^2	0.07	0.07	0.22	0.22	0.04	0.04	0.12	0.13
Panel C: median pre- and post-takeover cash flows (accruals) relative to book value of assets								
Constant	0.012*	0.012*	0.007	0.007	0.016*	0.016*	0.008	0.009
	(1.94)	(1.83)	(1.46)	(1.49)	(1.78)	(1.72)	(1.22)	(1.26)
Pre-performance	0.267***	0.268***	0.290***	0.289***	0.195	0.198	0.263***	0.261***
	(4.59)	(4.61)	(7.01)	(7.03)	(1.47)	(1.49)	(3.02)	(3.08)
Asset returns								
−5 to +5 days	−0.003		0.046		−0.036		0.150	
	(0.03)		(0.72)		(0.28)		(1.53)	
−5 to +10 days		0.009		0.032		−0.022		0.121
		(0.10)		(0.56)		(0.19)		(1.40)
F-statistic	10.11***	10.12***	23.40***	23.26***	1.29	1.26	7.79***	7.44***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.28)	(0.29)	(0.001)	(0.001)
Adjusted R^2	0.09	0.09	0.19	0.19	0.003	0.003	0.07	0.06
Panel D: median pre- and post-takeover cash flows (accruals) relative to total sales								
Constant	0.016**	0.015*	0.013*	0.013*	0.017*	0.015*	0.015**	0.016**
	(1.99)	(1.86)	(1.86)	(1.85)	(1.81)	(1.64)	(2.11)	(2.14)

(continued on next page)

Table 5 (*continued*)

Independent variables	Industry-adjusted median				Industry, size and pre-performance adjusted			
	IAOP1		IAOP2		ISPAOP1		ISPAOP2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel D: median pre- and post-takeover cash flows (accruals) relative to total sales								
Pre-performance	0.410***	0.411***	0.454***	0.454***	0.485*	0.487*	0.350**	0.350**
	(2.86)	(2.87)	(5.33)	(5.33)	(1.74)	(1.75)	(2.28)	(2.27)
Asset returns								
−5 to +5 days	0.048		0.108		0.053		0.183**	
	(0.49)		(1.48)		(0.48)		(2.35)	
−5 to +10 days		0.066		0.094		0.096		0.146[b]
		(0.75)		(1.49)		(1.00)		(2.27)
F-statistic	15.77***	15.95***	40.23***	40.18***	4.49***	4.78***	6.20***	5.87***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.001)	(0.002)	(0.003)
Adjusted R^2	0.14	0.14	0.29	0.29	0.04	0.04	0.05	0.05

The table shows OLS regressions of post-takeover performance on combined pre-takeover performance and abnormal asset returns for 191 takeovers over the period 1985–1993. Asset returns are defined as the combined cumulative daily abnormal asset returns to the target and acquirer firm measured from 5 days prior to the first bid date to 5 days and 10 days after the first bid date. The total market value, measured at the year prior to takeover, is used to compute the relative weights. Industry-adjusted measures (IAOP1 and IAOP2) are defined as the raw performance measure for each firm less the median industry performance measure for each firm. Industry, size and pre-performance adjusted measures (ISPAOP1 and ISPAOP2) are defined as the raw performance measure for each firm less the performance of a control firm matched according to industry, size and pre-performance, measured in the year prior to takeover. In Panels A and B, the asset base is total market value, which is the sum of the market value of equity plus the book value of debt and preferred stock. For Panel B, the total market value in the post-takeover years is reduced by the combined market adjusted gains attributable to the target and acquirer firms. In Panels C and D the asset base is the book value of total assets and total sales, respectively. ***, **, * denote statistical significance using a two-tailed test at the 1%, 5% and 10% levels, respectively. All *t*-statistics are computed using White (1980) correction for an unknown form of heteroscedasticity.

overall benefits expected to arise from takeovers and post-takeover performance, once pre-takeover performance is controlled for. Perhaps this is not surprising, given the arguments against the use of TMV as deflator advanced above. When adjusted TMV is used as the deflator (see the results in Panel B), there is stronger evidence that the market's assessments of the overall benefits expected to arise from takeovers and post-takeover performance are positively associated. This is particularly the case when accruals measures of performance are used.[15] Using book value of assets and sales as deflators (Panel C and D) reveals little evidence that the market's assessments of the overall benefits expected to arise from takeovers and post-takeover performance are related.

Taken at face value, the results in Table 5 offer little comfort that the market has much ability to predict improvements in post-takeover performance. The results are not robust across deflators and performance measures.

[15] These results are different from those found in Manson et al. (1994). They find a consistently significant relationship between the market's assessments of the overall benefits expected to arise from takeovers and post-takeover performance when 'pure' cash flow measures of performance are used. Note that, as mentioned before, this study employs a substantially more comprehensive sample of takeovers.

5. Summary and conclusions

The results of this study highlight some methodological issues that appear to be significant in testing whether takeovers create real improvements in the post-takeover operating performance of acquiring firms. Prior studies have adopted two approaches to testing for performance improvements: (i) a regression-based methodology, comparing post-takeover performance with some multiple of pre-takeover performance; and (ii) a change model, comparing post-takeover operating performance with some pro forma combined target and acquirer pre-performance measure. Ghosh (2001) suggests that both approaches can lead to biased conclusions as to the existence of post-takeover improvements if industry benchmarks are used as a model of expected performance. This is because acquiring firms tend to outperform industry benchmarks prior to takeover due to size and timing considerations. This study adopts both methodologies using different definitions of operating performance, deflators and benchmarks for expected performance and applies them to a sample of UK takeovers.

The results suggest the following. First, estimates of improvements in post-takeover performance are generally higher when a regression-based methodology is used compared to a change model. Second, improvement estimates are higher when an accruals definition of operating performance is used compared to a 'pure' operating cash flow measure. Third, using a benchmark of expected performance that controls for industry, size and pre-performance does not significantly alter our conclusions that takeovers create real improvements in operating performance for acquiring firms relative to using a benchmark that controls only for industry. Nonetheless, the size of the estimated improvements is higher when the benchmark controls for industry, size and pre-performance. Fourth, the results are sensitive to the deflator used, particularly when the regression-based methodology is used. Fifth, there is little consistent evidence that the form of payment, whether the takeover is disciplinary, whether the takeover is between firms in the same industry grouping, and the relative size of target and acquirer help explain post-takeover performance, once pre-takeover performance is controlled for. Sixth, while the market expects improvements in operating performance, these expectations are not necessarily significantly associated with post-takeover performance, once pre-takeover performance is controlled for.

It is clear that some aspects of our results are sensitive to the particular methodology, definitions of operating performance, deflators and models of expected performance used. However, we are unable to confirm the claim made by recent papers (i.e., Ghosh, 2001) that takeovers do not result in operating performance improvements. Whether this is because we analyze UK takeovers, whereas other papers analyze US takeovers is not clear. Nonetheless, our results largely establish that prior results on operating performance improvements arising from takeovers are robust to some of the methodological concerns raised.

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