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Operating performance changes associated with corporate mergers and the role of corporate governance

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Abstract

We find that corporate governance characteristics of acquiring firms (board ownership, board size, and block-holder control) have an economically and statistically significant impact on operating performance changes following mergers. We also show that dispersion of intra-board ownership stakes is an important but heretofore overlooked factor when judging the influence of ownership on the outcomes of corporate choices. Finally, we present evidence that suggests the market sometimes under- or overreacts to merger news when initially revaluing merger partners but corrects any miscalculation following the consummation of the merger.

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1. Introduction

The relation between corporate governance and managerial choices, and consequently fundamental value and operating performance changes, is a topic of continuing interest (e.g., Gompers et al., 2003; Cremers and Nair, 2005; Core et al., 2006). An important and open question in this regard is how corporate governance profiles of acquiring firms directly influence operating performance outcomes of merger decisions. This question is pertinent for several reasons.

First, mergers are among the most economically significant decisions made by corporate managers. Second, many hypotheses concerning motivation for corporate merger and conclusions based on initial market revaluations devolve from arguments about accompanying fundamental value and operating performance effects.[1] Yet little is known about whether these hypotheses ultimately are supported by actual operating performance data. Third, and crucially, while the role of corporate governance has been explored when assessing cross-sectional variation in the market revaluations of acquiring firms around merger announcements, the overriding question of how corporate governance impacts operating performance effects has received practically no attention. These largely unexplored issues are specifically addressed in this paper.

The paper differs in a number of important ways from Healy et al. (1992) and subsequent

[1] Healy et al. (1992) emphasize that analyzing market revaluations around merger announcements permits inferences to be drawn not about actual operating performance outcomes, but only about changes in the market's beliefs concerning operating performance effects. Bhagat et al. (1990, p. 57) go further by suggesting that "…the value gains may simply reflect the market's overestimation of the value of strategic combinations…". For recent evidence on this and related issues see Moeller et al. (2005) and Martynova and Renneboog (2008).

related studies focusing on the operating performance outcomes of corporate mergers (e.g., Ghosh, 2001; Linn and Switzer, 2001; Heron and Lie, 2002; Megginson et al., 2004; Doukas and Kan, 2008). First, we examine associations between corporate governance characteristics of acquiring firms and operating performance effects. The paper makes a more general contribution to measurement of corporate director influence on managerial choices and its actual performance outcomes by also modeling dispersion of intra-board ownership stakes, rather than conventionally restricting analysis to directors' aggregate stockholding. Second, as many merger hypotheses are either unrelated to or likely to be insufficiently tested by a set of corporate governance factors, we unify and reexamine many of the prior results in the literature using proxies based on other characteristics of merging firms and the nature of the underlying deals. Third, we investigate the relations between initial market revaluations of the merger partners, operating performance changes and post-merger returns of the new firm. Our intention is to assess how well the market does at predicting performance changes and how the market revalues the merged firm following the consummation of the merger.[2]

We present results indicating that corporate governance profiles of acquiring firms have an economically and statistically significant impact on operating performance changes following mergers. We observe that operating performance effects are curvilinear to directors' aggregate stockholding, with the alignment threshold sooner breached the less dispersed are intra-board ownership stakes. Furthermore, operating performance outcomes suffer under the influence of larger corporate boards, but benefit from more concentrated outside block-holdings. These

[2] Studies of long-term stock returns show that the market significantly revises its expectations about value gains from corporate mergers over time and that post-merger revaluations are strongly connected to characteristics describing the firms involved and the merger deal (see, e.g., Loughran and Vijh, 1997; Rau and Vermaelen, 1998).

observations accord with--and in the case of board ownership, extend--much-cited results in the broader corporate governance literature (e.g., Morck et al., 1988, and Stulz, 1988, for managerial ownership; Yermack, 1996, for board size; Shleifer and Vishny, 1986, for large stockholders). The results are robust to controls for other characteristics of merging firms and the nature of the underlying deals; after addressing endogeneity concerns; and after recognizing the possible existence of unobserved factors reflected in initial market expectations.

In addition, we report results showing that post-merger operating performance changes are strongly determined by other characteristics of merging firms and the nature of the underlying deals. We find that operating performance effects are adversely affected by a mismatch of managerial quality. The higher is the valuation ratio (as a proxy for managerial quality) for the acquiring firm relative to the firm being acquired, the smaller is the change in operating performance. Operating performance outcomes are also worse when the acquiring firm has greater excess cash in combination with fewer growth opportunities compared with the firm being acquired; when the size of the firm being acquired is large relative to the acquiring firm; and when the method of payment is common stock only. A larger absolute difference in leverage ratios between merging firms, however, has a positive impact on operating performance effects.

We also provide evidence on the relations between the initial market revaluations of the merger partners, changes in operating performance for the merger, and post-merger revaluations of the merged firm. Our evidence suggests that the initial revaluations are related to subsequent revaluations in a manner consistent with the market under- or overreacting at the outset but correcting any miscalculation following the consummation of the merger. This evidence is in line with our finding no significant relation between initial revaluations and changes in operating performance associated with the merger. The latter result is consistent with results reported by

Ghosh (2001), but is in contrast to results reported by Healy et al. (1992) who find a positive relation. Our evidence may explain these divergent findings as the results for any particular sample may depend upon the mix of cases in which the market under- or overreacts.

The paper is organized as follows: Section 2 describes the sample and how we measure the change in operating performance for a merger. Section 3 highlights extant hypotheses about factors driving operating performance changes in mergers with special emphasis on corporate governance. Section 4 discusses results from cross-sectional analyses of operating performance changes associated with the sample mergers. Various robustness tests are reported in section 5. Section 6 presents an analysis of the relation between initial market revaluations of the merger partners, changes in operating performance for the merger, and post-merger revaluations of the merged firm. Section 7 presents a summary and our conclusions.

2. Sample of corporate mergers and estimation of operating performance changes

2.1. Sample

The sample of corporate mergers is drawn from completed, domestic deals in the UK during the period 1985-94. The period leading up to 1994 was characterized by increasing scrutiny of corporate governance practices within UK domiciled companies. This resulted in numerous subsequent practices shaped significantly by regulatory and institutionally promoted changes that have tended to promote a one-size-fits-all model. The first such recommendations appeared in what is commonly referred to as the *Cadbury Report* (http://rru.worldbank.org/Documents/PapersLinks/1253.pdf), a document which then became a basis for listing requirements on the London Stock Exchange in 1993-1994. Hence, ending at 1994 provides a platform for our analysis that is not contaminated by forced changes which may be suboptimal. The sample period also covers a period overlapping several related studies based

on U.S. data such as Healy et al. (1992).

Corporate mergers are identified from the *Securities Data Company* (SDC) database. A completed merger is defined as one where the listed and independent firm being acquired is fully merged with a listed and independent acquiring firm. The first offer made is not always from the eventual acquiring firm. We verify both the announcement date of the originating offer for the firm being acquired and the effective date of corporate merger, using the *Regulatory News Service* of the London Stock Exchange (LSE). Both merging firms must be listed on the LSE for at least five years before the merger, and afterwards the merged firm must continue to be listed for a minimum of five years. This listing condition is necessary because of the chosen timescale for wholly capturing operating performance changes following corporate mergers (discussed below), and because we scale our measure of operating performance by market value. None of the acquiring firms, nor the firms being acquired, was either privately owned or a subsidiary of another company at the time of the bid nor does the sample include partial acquisitions.[3]

UK mergers provide a cleaner experimental setting for the examination of how corporate governance characteristics of acquiring firms influence operating performance outcomes. More stringent stockholder approval requirements for adoption of poison pills and other antitakeover measures make recommendation of all such provisions extremely rare in the UK compared to in the U.S. The restriction imposed on adoption of antitakeover provisions by UK companies therefore potentially sets the stage for the economic incentives of acquiring firm managers to be

[3] See Akhigbe, Martin and Whyte (2007) for recent evidence on partial acquisitions.

as non-mitigated as possible.[4] Empirically, this allows such incentives to more directly influence the management of the acquiring firm, the choice of the acquired firm, and ultimately the operating performance outcome of the corporate merger. *Datastream* is the source for the accounting data used to construct our measure of operating performance. Both merging firms must have end-of-year accounting data available for at least five years before that of the merger, and afterwards the merged firm must continue to have end-of-year financial data available for a minimum of five years. A representative pre-merger benchmark to use as a baseline for measuring operating performance changes is a core ingredient in the analysis of such performance effects. Another fundamental measurement issue involves the uncertainty about the actual time it takes after the corporate merger has become effective for the operating performance change to fully materialize. The choice of the length of before-and-after time periods for evaluation therefore has important implications for the interpretation of the estimated change in operating performance accompanying a corporate merger. Clearly, using shorter before-and-after periods will guarantee a larger sample than that based upon longer pre- and post-merger data requirements. However, a shorter pre-merger period may not provide an operating performance benchmark that is sufficiently representative, and a shorter post-merger period may not capture the full consequences of the corporate merger.[5] We are cognizant of the

[4] For evidence on the influence of antitakeover provisions on merger choices in the U.S., see Masulis et al. (2007). Cremers and Nair (2005) and Core et al. (2006) show that, in general, U.S. firms with stronger stockholder protection (defined as firms facing fewer restrictive antitakeover provisions) are associated with better stock and operating performance. See also Bebchuk and Cohen (2005) for a study of entrenched U.S. boards.

[5] For instance, it took beyond three years for Wm Morrison Supermarkets PLC to successfully integrate Safeway PLC after their substantial corporate merger in 2003. During the lengthy integration period all of the performance signs and commentary pointed to Morrison having disastrously bitten off more than it could chew.

tradeoff and have opted for the more conservative choice of a longer rather than shorter measurement period. Yet in spite of this, our primary results also tend to meet the relatively more demanding standard of being statistically significant at p-values of 0.01 or lower.

We exclude corporate mergers involving firms operating in highly regulated industries, such as the financial (including real estate) and utility sectors. *Datastream* is used to establish the primary industry in which merging firms operate. Also excluded are cases in which the acquiring firm completes another acquisition during the five years before or after the year of its sample corporate merger. Finally, as one of our principal interests is how the incentives faced by acquiring firm managers influence the operating performance consequences of corporate mergers, mergers of equals (resulting in the creation of newly listed firms) are removed because the acquiring firms are not always clearly defined in such situations. We use the *Regulatory News Service* to identify all confounding corporate acquisitions and mergers of equals.

Our final sample comprises eighty-one corporate mergers that meet all of the necessary conditions described above, and that have data available for constructing the corporate governance and other explanatory variables used in the analysis (discussed in section 3).

2.2. Operating performance changes

An estimate of the actual performance effect of a corporate merger must be capable of revealing a change in operating efficiency. Following Healy et al. (1992), we define operating cash flow in any financial year as operating income before depreciation and nonrecurring items. By construction, this proxy for operating cash flow is neither affected by the method of accounting for the corporate merger, nor influenced by its choice of financing. We deflate our measure of operating cash flows by an estimate of the market value of assets, defined as stock price times the number of shares outstanding, plus the book value of preferred stock and long-

and short-term debt, all measured at the end of the relevant financial year. This scaling produces an operating cash-flow return that is comparable across corporate mergers.

In the ensuing analysis, the actual performance effect of a corporate merger is estimated as the change in median industry-adjusted operating cash-flow return for the five years post-merger compared to the five years pre-merger. We exclude the year of the corporate merger because this is considered to be a transition period and therefore not representative of the operating performance effects. The post-merger industry-adjusted operating cash-flow return is for the merged firm, while the pre-merger abnormal performance estimate is a value-weighted average for the pseudo-merged firm. The weight for the acquiring firm is its market value of assets divided by the sum of the market value of assets for the pseudo-merged firm, leaving the weight for the firm being acquired as one minus the weight for the acquiring firm. We construct primary industry portfolios for each acquiring firm and firm being acquired (in each case excluding the relevant sample firm) for each of the five years before and after the year of corporate merger. The operating cash-flow return for each of these ten years around the year of the corporate merger is industry-adjusted by subtracting the median performance for the relevant industry benchmark. Median values are used instead of averages because the number of firms used to compute the industry benchmarks varies across time and the sample, and also because we want to avoid the influence of outliers. The relevant performance benchmark for the merged firm is computed as the value-weighted average of the industry median operating cash-flow returns for the acquiring firm and firm being acquired, where the weights are again as previously described. The pre-merger operating cash-flow returns of the pseudo-merged firms are not significantly different from the performance of the benchmark firms in line with a recommended condition proposed by Barber and Lyon (1996) and Ghosh (2001) for benchmark companies. A

technical appendix describing the particulars of the calculations is available from the authors upon request.

Panel A of table 1 presents descriptive statistics for the median annual industry-adjusted operating cash-flow returns either side of the corporate mergers in the sample. The pre-merger returns have a mean and median of -0.9 percent, neither of which are different from zero at conventional levels of statistical significance. Overall therefore, the pseudo-merged firms are neither superior nor inferior performers relative to their industry counterparts.[6] However, in the post-merger period the merged firms significantly outperform their industry benchmarks by 9.7 percent on average. Notwithstanding that the post-merger returns are skewed, the median of 4.3 percent is significantly different from zero at the 0.01 level or lower. Furthermore, 77 percent of the corporate mergers in the sample have positive operating returns in the post-merger period, a result that is significantly different from the proportion expected in the absence of such an event (p-value 0.01 or better).

Given the results for the separate periods surrounding the corporate mergers, it is not surprising that the results for the change in industry-adjusted operating cash-flow returns from the pre- to post-merger period provide strong support for the conclusion that the sample mergers are associated with positive operating performance effects. The median of the changes in industry-adjusted operating cash- flow returns across the sample mergers is a positive 6.3 percent, and the percentage of cases registering positive changes in performance is 81 percent. Both of these results are significant at the 0.01 level or lower. The operating performance effects for the sample of corporate mergers corroborate, in particular, those of Healy et al. (1992).

[6] In results not reported, we also find that the pseudo-merged firms are indistinguishable from industry counterparts based on operating performance for each of the five pre-merger years.

In panel B of table 1, we present cross-sectional results from an examination of the association between the medians of the pre- and post-merger industry-adjusted operating cash-flow returns for the sample cases. We transform the median industry-adjusted operating cash-flow returns to continuously compounded returns by taking the natural log of one plus the return. The transformation reduces skewness, but does not materially affect the results. We use the notation $OPCFRET_{Pre,i}$ and $OPCFRET_{Post,i}$ to define the pre- and post-merger values for merger i, respectively, and for convenience refer to these as the median industry-adjusted operating cash-flow returns. The first regression reveals an almost perfect positive correlation between post- and pre-merger industry-adjusted operating performance. Recall we define the change in performance as the difference between the five-year post-merger median for merger i and the associated five-year pre-merger median. We use the notation $\Delta OPCFRET_i$ to represent the natural log of one plus the change for merger i. In the second regression, $\Delta OPCFRET_i$ is regressed on the pre-merger value $OPCFRET_{Pre,i}$ revealing no association. These results are consistent with those reported by Healy et al. (1992) and Ghosh (2001). Based upon these results, the variable $\Delta OPCFRET$ is used in all subsequent analyses as our measure of performance change.

3. Determinants of operating performance changes resulting from corporate mergers

3.1. Motives for corporate mergers

Broadly speaking, there are two primary motives for corporate mergers. The first of these arises from expected synergies or efficiency-enhancing reasons, with the principal motive being to create value (see, e.g., Weston et al. 2004, ch. 6). The incentives that induce such behavior are not uniquely specified under this hypothesis, but one argument is that the incentives allow managers to share in the value created. The second motive arises from acquiring firm managers

pursuing their own interests. The personal interests of managers can manifest themselves in several forms, such as empire building, growth in asset size, and real asset diversification. Corporate mergers motivated by managers' self-interests do not necessarily create value, and may even destroy value if these choices waste assets.[7] Corporate mergers driven by the former motive should be associated with superior operating performance effects relative to those influenced by the latter motive.

We accordingly propose a set of explanatory factors that are correlated with the divergent motives described above, and which are therefore intended to capture the potential incentive forces influencing managerial choice in corporate mergers. Many of these factors have been found to explain the cross-sectional variation in the abnormal stock returns of acquiring firms, while some have also been linked to post-merger, long-term stock return performance.

3.2. Factors influencing merger operating performance

We classify potential determinants of merger performance into four categories: (1) factors associated with the corporate governance profiles of the acquiring firms; (2) factors associated with the managerial quality and financial standing of the acquiring firm; (3) factors associated with the acquiring firm relative to the firm being acquired; and, (4) factors associated with the nature of the underlying deal. Table 2 presents the labels, definitions, and hypothesized

[7] See, e.g., Jensen and Meckling (1976), Williamson (1985), Shleifer and Vishny (1988, 1989), and Morck et al. (1990). Acquiring firm managers may also pursue corporate mergers because of mistaken, inflated estimates of the operating performance benefits (see, e.g. Roll (1986), Malmendier and Tate (2008). However, as with the merger motive concerned with managers' pursuit of personal interests, if scarce resources are used up in effecting the corporate merger without any consequent return for their use, then operating performance will also suffer in such instances. As such, and because it is almost impossible to define and measure hubris, we do not attempt to differentiate between the managerial self-interest and the hubris explanations for corporate mergers.

effects of the explanatory variables employed in the analysis, together with descriptive statistics for each variable.[8] For the sake of compactness and clarity, we have elected not to review in detail the motivations and expected effects of these variables, but to instead return to a discussion of the important factors when reviewing the empirical results (in section 4).[9] However, we do comment next on the motivation and measurement of a variable that has heretofore not been considered in the literature.

This paper measures directors' influence on corporate strategy and the outcomes of those decisions somewhat differently than previously seen in the literature. The primary focus in the literature has been on aggregate officer and director stock ownership and its association with corporate decision-making. Evidence suggests that the positive effects of increased ownership by officers and directors may be attenuated at high levels of ownership; that is, a curvilinear relation may exist between firm value and ownership.[10] We suggest that an overlooked dimension of board ownership, the dispersion of ownership stakes across board members, may potentially influence the incentives of the board as a whole and contribute to the attenuation of the positive

[8] The correlations between the explanatory variables for our sample cases reveal no surprises in that all of the more extreme correlations are consistent with elements of existing corporate finance theory. For brevity, the table of correlations is not reported, but we comment on some of the more significant correlations in section 4. The table is available from the authors upon request.

[9] A detailed appendix available from the authors upon request presents a table with the corresponding motivation and a brief review of the extant literature for each of the explanatory variables.

[10] Stulz (1988) suggests that firm value is curvilinear to ownership. Several authors have explored the relation empirically (see, e.g., Morck et al., 1988; McConnell and Servaes, 1990; Hubbard and Palia, 1995). Many studies have also suggested the relation between insider ownership and either firm value or the stock market's reaction to some event (notably a merger announcement) is spurious, and once endogeneity of the ownership choice is accounted for, the relation vanishes (see, e.g., Loderer and Martin, 1997; Cho, 1998; Palia, 2001). Later we test for the endogeneity of board ownership and conclude that we can reliably treat it as an exogenous variable.

benefits associated with larger levels of ownership. Suppose the total number of shares held by a group of officers and directors is fixed, but the holdings of individual directors are unequal. The greater the inequality of board ownership the more the shares are concentrated in the hands of a relatively small number of officers and directors. Two polar extremes are the cases in which, first, one board member owns all the shares held by the board as a whole, and, second, all of the board members hold an equal number of shares. Clearly, these cases represent significantly different structures and could, ceteris paribus, lead to significantly different decision-making histories.

In the context of mergers, several outcomes are possible as a result of the inequality of ownership across board members. Greater inequality implies that a relatively larger number of board members have low levels of ownership and thus arguably have less incentive to expend effort on value-maximizing corporate decisions. This may lead to greater abuse of power and the wasting of corporate assets, especially if those who hold this power gain utility (private benefits of control) from overseeing larger firms assembled through mergers. Hence, for a given level of total holdings by the board, those firms with greater inequality of stockholdings within the group of officers and directors may be associated with poorer decisions and thus poorer outcomes. On the other hand, cases in which officer and board ownership is more equally distributed give no single individual undue power and hence the negative consequences of large aggregate ownership are likely to be mitigated.

We therefore explore the relation between officer and director ownership within the acquiring firm's board and the operating performance changes observed for the corporate merger after controlling for the distribution of stockholdings across officers and directors. Ownership here is equal to direct stock ownership. We examine the influence of ownership because

consistent corporate disclosure of managerial compensation was not available for UK companies during the time period covered by our study. Specifically, we examine the impact of the aggregate level of board ownership (as captured by the variable BOARDOWN). However, in a departure from previous studies, the relation between board ownership and performance is not modeled as a one-dimensional factor. We also incorporate the distribution of board ownership across the individual board members in our analysis (as captured by the variable DISPBOARDOWN). The dispersion of board ownership across the individual board members is measured using the Theil index of dispersion, which is the preferred measure when dealing with variables having decreasing marginal effects, such as BOARDOWN. The Thiel index value (T) for the dispersion of BOARDOWN across the acquiring firm's board is defined in the notes to table 2. A T-value of zero indicates BOARDOWN is uniformly dispersed across the acquiring firm's board. DISPBOARDOWN is interacted with $BOARDOWN^2$ in the models we estimate to capture the hypothesized multidimensional curvilinear effect of BOARDOWN. The variable DISPBOARDOWN approaches zero as ownership becomes equally distributed across board members, and conversely increases as ownership becomes concentrated in the hands of a few. The quantity T has an upper bound of ln(n) in finite samples where n is the sample size. Therefore, when ownership is uniform, the curvilinear effect of ownership is attenuated, while it is maximized when ownership is concentrated.

A second specific comment on the explanatory variables relates to director independence and corporate governance regulation. The potential importance of board structure for the effective monitoring of managerial decisions is emphasized by, in particular, Fama and Jensen (1983) and Jensen (1993). However, the empirical evidence does not suggest overwhelming support for the hypothesis that firms with more independent boards perform better (e.g., Bhagat

and Black, 1999; Hermalin and Weisbach, 2003). In the specific context of corporate acquisitions, although Byrd and Hickman (1992) find that acquirer stock returns are positively influenced by outsider-dominated boards, Masulis et al. (2007) find no statistically significant association between such a board structure and acquirer returns. For much of the time period of this study, UK company boards were dominated by insiders and there was not an active market for outside directors. Moreover, nonexecutive director status (yet alone independent-outside director status) was not consistently disclosed in UK company annual reports in the earlier half of our sample period. As we felt the data were unreliable in this regard, we decided against including a measure of the fraction of the board represented by outside directors.

That said, approximately half of the corporate mergers in the sample occurred at a time when there was increasing activism in the UK for improved corporate governance regulation. As indicated earlier, the period leading up to 1994 was characterized by increasing scrutiny of corporate governance practices within UK domiciled companies. This resulted in numerous subsequent practices shaped significantly by regulatory and institutionally promoted changes that have tended to promote a one-size-fits-all model, beginning with the *Cadbury Report* (http://rru.worldbank.org/Documents/PapersLinks/1253.pdf). Ending our sample period at 1994 provides some relief from the concern that we not include forced changes that may be suboptimal. Nevertheless, to be safe we account for the general trend in corporate governance change, and especially the increased emphasis on board independence, by including a control variable YEAR, which equals the year of the merger announcement. One prediction is that the increase in corporate governance activism intensity, which arose chronologically in time during the sample period, will be associated with better performing mergers because enhanced governance results in better decisions. On the other hand, if firms anticipated forced changes in

governance practices (a one-size-fits-all regulatory environment) and moved in that direction for political reasons, and if such movement was not optimal, then such changes could have led to suboptimal merger decisions.

4. Cross-sectional analysis of operating performance changes following corporate mergers

The full model in table 3, column (1), presents the results of a cross-sectional linear regression of the change in industry-adjusted operating cash-flow returns on all of the hypothesized determinants discussed in section 3 and presented in table 2. We use the natural log of one plus the change in industry-adjusted operating cash flow returns as the dependent variable for all of the results reported in table 3 and the remainder of the paper. The transformation reduces skewness, but results using the untransformed data (not reported) are qualitatively similar. We begin with a discussion of the role that corporate governance plays in how operating performance changes for the mergers in the sample. We then turn to the influence of other characteristics of the merging firms and characteristics of the underlying deals.

4.1. Corporate governance profiles of acquiring firms

The change in industry-adjusted operating cash-flow returns is significantly related to both the level and distribution of board ownership for the acquiring firm. The coefficient on aggregate board ownership (BOARDOWN) is positive and statistically different from zero at the 0.01 level or lower. This result is consistent with the hypothesis proposed by Jensen and Meckling (1976) and explored by many others that board members with positive incentives to create value will make merger decisions that result in performance benefits (see, e.g., Llewellen et al., 1985, for direct stock ownership; Datta et al., 2001, for equity-based compensation). However, we also find that the overall impact of aggregate board ownership is conditional on how such ownership is dispersed across board members. The negative and statistically

significant (p-value 0.01 or better) coefficient for the interaction between aggregate board ownership (squared) and the level of dispersion ($BOARDOWN^2 \times DISPBOARDOWN$) implies that for the interests of the board to be aligned with those of stockholders, board ownership needs to be relatively equally dispersed across board members. At the one extreme, if board ownership is high and uniformly dispersed across the board members then the beneficial effects of aggregate board ownership manifest themselves fully in better operating performance outcomes. At the other extreme, if board ownership is high, but concentrated in the hands of one board member, then the negative effects of high board ownership will overpower the positive effects, resulting in merger decisions that do not necessarily further the best interests of stockholders. These results suggest that the negative effects of high board ownership (entrenchment and private benefits of control) are conditional on the distribution of ownership across officers and board members. This specification of the board ownership/performance relation provides an alternate interpretation of the curvilinear association originally suggested by Morck et al. (1988) and Stulz (1988).[11]

The size of the acquiring firm's board (BOARDSIZE) has a negative and significant (p-value 0.05 or better) association with the operating performance effects of corporate mergers, which is a result consistent with the predictions and general findings of Yermack (1996).[12] The sign of the estimated coefficient on the CEOCHAIR dummy variable is negative, but the estimate is not statistically significantly different from zero. We infer that, on average, top managers of acquiring firms who also chair their boards neither enhance nor impair operating

[11] See also Demsetz and Villalonga (2001).
[12] The natural logarithm of BOARDSIZE is used to capture a decreasing marginal effect for this explanatory variable.

performance changes following the mergers in the sample. The results indicate that the presence of outside voting blocks in the acquiring firm is associated with superior operating performance outcomes. The estimated coefficient on the variable BLOCKVOTES is positive and statistically significant at the 0.05 level or lower. This result is consistent with the general hypothesis that block-holders bring important influence to bear on operating decisions (see, in particular, Shleifer and Vishny, 1986). Furthermore, the results on the positive association between large outside block-holdings and changes in operating performance suggest strategic activism on the part of block-holders not generally identified in studies of block-holder influence (see, e.g., Holderness and Sheehan, 1988; Parrino et al., 2003), but that is broadly consistent with the beneficial effects of large holdings suggested by Hotchkiss and Strickland (2003) and Cornett et al. (2007). Attenuating these influences, we find that mergers occurring later in the sample period (captured by the variable YEAR) are associated with significantly (p-value 0.01 or better) worse operating performance changes. This result suggests that the effect of increasing emphasis and support for imposing governance rules on firms was negative, consistent with greater pseudo-regulation imposing costs on performance. Finally, regulated acquiring firms (the variable REGULATED) are associated with marginally better operating performance outcomes compared to lesser regulated firms.[13]

4.2. Other characteristics of merging firms and the merger deals

Explanatory variables capturing the acquiring firm's asset size (SIZE), managerial quality (QRATIO), agency costs of free cash flow (CASHLIQ), and industry-adjusted leverage

[13] Although not significant at conventional levels in the full model, the variable REGULATED has a statistically significant (p-value 0.05 or better) positive relation with operating performance changes in the adjacent reduced model in table 3 (discussed in section 4.3). This result may be due to the franchise granted by regulation to some firms.

(LEV) have no statistically significant association with the change in industry-adjusted operating cash-flow returns.[14] Also, the change in industry-adjusted operating cash-flow returns are not, on average, influenced by whether the merging firms operate in the same primary industry (captured by the variable FOCUS).[15]

However, the coefficient on the variable RELQRATIO is negative and statistically different from zero at the 0.01 level. The variable RELQRATIO is the ratio of the acquiring firm's value for QRATIO to that of the firm being acquired, and is intended to reflect the relative differences in managerial quality between the two firms. If operating improvements come primarily from better management teams taking control of firms that have been managed poorly, then we would expect the coefficient on RELQRATIO to be positive (consistent with, in particular, Lang et al., 1989). The negative sign on the coefficient suggests that this disciplinary motive is not supported for our sample of corporate mergers. Two potential explanations for the negative coefficient present themselves. The negative and significant coefficient on RELQRATO could be consistent with the hypothesis that operating performance changes are adversely affected by a mismatch of managerial quality because poorly managed firms are difficult to assimilate into well-managed firms. Alternatively, the result could be consistent with the view that acquiring managers are inflicted with hubris (Roll, 1986) associated with the belief that they can turn around poorly performing firms when the chance of this occurring is small. The

[14] The natural logarithm of SIZE is used to capture a decreasing marginal effect for this explanatory variable, and to give it a more symmetrical distribution. QRATIO and LEV are negatively correlated (ρ = -0.48). However, removing either variable from the multivariate analysis does not change the conclusion about the influence of the other variable in the regression.

[15] Our sample includes only domestic mergers and therefore the results are not influenced by cross-border effects, see e.g. Dos Santos et al. (2008).

coefficient on the variable RELCASHLIQ (intended to capture when the acquiring firm has greater excess cash in combination with fewer growth opportunities compared with the firm being acquired) is also negatively related to the operating performance effects of corporate mergers, but is significant only at the .10 level. Taken together, these results suggest the possibility that as the mismatch in managerial quality--which, in turn, is highly correlated with the mismatch in cash liquidity--between the merging firms becomes more pronounced, the managers of acquiring firms become overly optimistic about their abilities to turn around poorly performing firms. The variables RELQRATIO and RELCASHLIQ are highly correlated. The results presented in table 3 remain qualitatively the same, however, when we exclude either variable from the regression and retain the other.

The coefficient on the variable RELLEV (the absolute difference in relative debt-use between the acquiring firm and the firm being acquired) has a positive and statistically significant (p-value 0.01 or better) relation with the operating performance effects of corporate mergers. This finding is consistent with the conjecture that a mismatch in relative debt allows the possibility of new debt and consequent operating improvements from a reduction in the agency cost of free cash flow (Jensen, 1986), and/or the ability to exploit growth opportunities that had been restricted due to a lack of funding, a coinsurance-type effect (Kim and McConnell, 1977). Arguably, the former interpretation is also related to the corporate governance of the merged firm, assuming that debt is intentionally used to reduce the agency costs of free cash flow. The result is also in line with the findings of Ghosh and Jain (2000) and Heron and Lie (2002), who find that acquiring firms tend to take on more debt following corporate mergers. The relation between the relative size of the mergers in the sample (RELSIZE) and their operating performance changes is negative and statistically significant (p-value 0.01 or better) in the

regression results. This result is consistent with post-merger integration difficulties being related to the size of the firms involved (firm being acquired relative to the acquiring firm). This result potentially accords with Williamson (1985), who hypothesizes that inefficiencies can arise in larger firms due to diminishing returns to management.

Corporate mergers for which the method of payment is a pure exchange of stock (STOCK) are negatively and statistically (p-value 0.05 or better) associated with the change in industry-adjusted operating cash-flow returns. This result is consistent with the results reported in Linn and Switzer (2001) and the theory proposed by Fishman (1989). Mergers that are hostile (HOSTILE) do not have a significant impact on performance. We also control for multiple bidders with the variable CONTEST and find that competition for the firm being acquired has no effect on subsequent operating performance. Finally, we control for cases in which the acquiring firm owned stock in the firm being acquired prior to the initial offer announcement (TOEHOLD). We find no statistically significant relation between these holdings and the change in operating performance. This result is unchanged if, instead of using the dummy variable specification for this variable (as defined in table 2), we use the actual percentage of stock held by the acquiring firm.

4.3. Economic significance of the results

The adjusted R-squared for the full model shown in column (1) of table 3 is about 31 percent. Moreover, the null hypothesis that the coefficients across the model are jointly equal to zero is rejected at the 0.01 level. However, because many of the variables have little explanatory power, their inclusion in the model depresses the adjusted R-squared of the regression and the magnitude and hence significance of the F-statistic. We therefore present the results from a regression of the change in industry-adjusted operating cash-flow returns on only those variables

that add explanatory power to the model (the Reduced Model, column (3) of table 3). Notwithstanding that the adjusted R-squared and F-statistic increase in magnitude, the coefficients and standard errors for the explanatory variables included in the reduced model are qualitatively the same as those for the full model.

We present results on the economic significance of changes in the statistically significant factors for the reduced model shown in column (3) of table 3. The change induced for each applicable explanatory variable is assessed by computing the predicted operating performance change using the values of the explanatory variable at the 10th and 90th percentiles of the sample empirical distribution for the variable, holding the other variables fixed at their respective mean levels. The results of these calculations are presented in table 4 and reveal that a change in each of the variables from their level at the 10th percentile to the 90th percentile causes an average absolute change in the operating cash-flow return of roughly 780 basis points. The effect of a change in conventionally specified board ownership (BOARDOWN) is to induce a 740 basis point change, while a change in board size (BOARDSIZE) induces a -1050 basis point change. The largest influence arises from a change in the relative size of the firm being acquired to the acquiring firm (RELSIZE), which induces a -1250 basis point change.

We have intentionally excluded an assessment of the dispersion of board ownership from the results in table 4. The influence of ownership dispersion across board members depends upon the level of total board ownership and is better illustrated graphically over a range of values for board ownership. Total board ownership for the sample ranges from close to 0 to roughly 50 percent. In figure 1, we illustrate the curvilinear relationship between the change in industry-adjusted operating cash-flow returns and board ownership, as predicted by the reduced model in table 3. We plot three curves in figure 1. One of the curves holds the level of ownership

dispersion (DISPBOARDOWN) at its sample mean level, while the other two curves hold the variable at its 10th percentile and 90th percentile levels based upon the variable's empirical distribution. The value of DISPBOARDOWN at its 90th percentile represents the case in which dispersion is at its lowest amongst the three cases (ownership is concentrated in the hands of a few). Conversely, the 10th percentile case represents the most dispersed board ownership case. The figure clearly shows that the negative consequences of higher levels of ownership are reached more quickly when ownership across the board is concentrated in the hands of one or a relatively small number of directors. Accounting for this effect may therefore be a partial explanation for the vast array of curvilinear relationships between ownership and firm value or performance that have been documented in the literature (see Demsetz and Villalonga , 2001, for a graphical illustration).

5. Robustness tests

5.1. Endogeneity

Diagnostic tests (not reported) on the models in table 3 reveal that the results are not unduly influenced by outliers, that variance inflation factors pertinent for assessing multicollinearity are within acceptable limits, and that the model residuals are linearly related to the change in industry-adjusted operating cash-flow returns. However, the coefficients for the corporate governance variables could be biased if unobserved factors related to these variables are also influential in determining the operating performance effects of mergers; that is, if corporate governance choices and firm performance are jointly endogenously determined. We test the null hypothesis that the estimated coefficients on the corporate governance variables are unbiased using the Durban-Wu-Hausman test. Following the results, in particular, of Demsetz and Lehn (1985) and Yermack (1996), we use firm size and the volatility of stock returns to

model aggregate board ownership, block-holder control, and board size in independent regressions. The dispersion of board ownership is not modeled, and is therefore excluded from the tests, because it is uncorrelated with aggregate board ownership and with the instruments. Based upon our tests (not reported), we do not reject the null hypotheses that the coefficients on corporate governance variables are unbiased in the results shown in table 3.

5.2. Unobserved factors

The analysis has so far ignored the possible existence of unobserved factors associated with operating performance changes. We conjecture that such factors, if present, will be reflected in initial market revaluations around merger announcements. This issue is addressed in the following two-stage manner. The first stage of the analysis involves estimating a model in which initial asset revaluations of the pseudo-merged firms are regressed on the same variables used to explain operating performance changes in the full model shown in column (1) of table 3.[16] The second stage of the analysis involves tests of whether the residuals from the estimated stage-one model are associated with operating performance changes.

We measure the market's initial revaluations of the merging firms by computing an abnormal asset return for the pseudo-merged firm. All return and market value data are obtained from *Datastream*. We first compute abnormal stock returns as continuously compounded market model adjusted total returns from five days, for acquiring firms, and thirty days, for the firms being acquired, preceding the announcement dates of the offers to five days following the corporate mergers being declared effective. Market model parameters are estimated using stock return data from 500 to 101 days before the relevant announcement dates, and using the FT-SE

[16] For brevity, details on the estimated revaluation models are not reported, but are available from the authors upon request.

All Share index total returns as the proxy for the market return. We also computed abnormal stock returns for the acquiring firms and for the firms being acquired using a simple, market-adjusted model (that is, ignoring beta). The results using this approach are almost identical to those found using market model residuals. Abnormal stock returns for the firm being acquired are measured relative to the earliest offer announcement date, which, if the acquiring firm faced competition from a would-be acquiring firm, could have been the date of a rival's first offer if it preceded the acquiring firm's first offer. A longer pre-announcement run-up for the firms being acquired is used to capture the well-documented leading revaluation effects associated with such firms. Abnormal stock returns are measured to beyond the effective merger dates because we want the initial revaluations to reflect the market's overall beliefs about the completed deals.[17] We then use the market value weighted approach of Bradley et al. (1988), and others, to compute pseudo-combined stock returns. Finally, because the operating performance measure used in the analysis is an "unlevered" cash flow, we convert the abnormal stock returns into unlevered returns, as described in Healy et al. (1992).[18] We label the resulting variable ASSETREV. ASSETREV is regressed on the explanatory variables used in the estimation of the full model presented in column (1) of table 3. The residuals from this regression are labeled

[17] Loughran and Vijh (1997) conclude that the market revaluation effects of corporate mergers should be measured over a timeframe extending into the post-acquisition period to incorporate what are found to be significant revisions in value gain expectations. We specifically address the issue of post-merger market correction in Section 6.

[18] The mean and median initial market revaluations are 3.3 percent and 2.3 percent, respectively, both of which are significantly different from zero at the 0.01 level or lower. Moreover, a significantly greater number of pseudo-merged firms than would be expected by chance have positive revaluations. The magnitudes of the initial market revaluations for the sample of corporate mergers are comparable to those reported by Moeller et al. (2005) for the U.S. market over the time period we study.

$ASSETREV_{Residual}$.[19]

At the second stage, we use the residuals from the asset revaluation regression as estimates of the aggregate effect of any unobserved factors. If there are unobserved--and hence omitted--factors captured by the aforementioned residuals, then we would expect to observe a statistically significant relation between the residuals from the asset revaluation regression and the changes in operating performance returns. However, the sign of the relation is indeterminate.

In table 5, we present coefficient estimates for models in which we regress the change in industry-adjusted operating cash-flow returns on the residual asset revaluations ($ASSETREV_{Residual}$) obtained from the model just described. Column (1) of table 5 presents results from estimating a regression for the change in industry-adjusted operating cash-flow returns that includes the residual asset revaluation only. The coefficient for the residual asset revaluation is not significantly different from zero at conventional levels in both models. Column (3) presents results for the complete set of operating performance determinants including the variable $ASSETREV_{Residual}$. The estimated coefficient on $ASSETREV_{Residual}$ is not statistically different from zero. The estimated coefficients for the remaining variables presented in column (3) are almost identical to the results presented for the full model shown in column (1) of table 3, both in size, sign, and statistical significance (column (4)).

The asset revaluation residual also has an insignificant coefficient in the reduced model results presented in column (5) of table 5. Once again, results for the other variables are of comparable magnitudes and significance levels as for the reduced model presented in column (4) of table 3. We therefore conclude that any unobserved factors driving initial market revaluations

[19] The regression results are available from the authors upon request.

around merger announcements are not associated with subsequent changes in operating performance.

6. Post-merger market value corrections and operating performance changes

Abnormal asset revaluations at the time of the merger announcement should arguably reflect the market's consensus expectations of the net future operating cash-flow benefits associated with the merger. Healy et al. (1992) find that the asset revaluations for their sample of corporate mergers are positively and systematically related to operating performance effects. In contrast, Ghosh (2001) finds no relation for the sample of mergers he studies. We now investigate the relation between initial market revaluation and merger operating performance change in an attempt to better understand these opposing results from regressing ASSETREV on ΔOPCFRET.

We begin by establishing the relation between the initial abnormal asset revaluation when the merger is announced and the measure of the change in industry-adjusted operating cash-flow return. Panel A of table 6 presents the regression results. We find no statistically significant relation between the two variables. One potential explanation for the result is that the market under- or overreacts to news about the merger such that any relation is being swamped by mistakes. In results suggestive of this conjecture (not reported), we find that initial asset revaluations of the merger partners (ASSETREV) are not consistently associated with the variables which explain the variation in ΔOPCFRET in table 3.[20] We do find that ASSETREV is related to board ownership in the same fashion as ΔOPCFRET, but not with the other factors which explain ΔOPCFRET. Such results could be consistent with the market not fully accounting for factors that explain the change in operating performance. This conjecture would,

however, have more merit if it can be shown that the market later adjusts the valuation of the merger to account for the omissions.[21] We turn to such an analysis next.

If the market does indeed make mistakes when initially assessing corporate mergers, but recognizes those mistakes later on and corrects the valuations accordingly, then we should observe a relation between the initial revaluations at the time of the merger announcement and the subsequent revaluation after the merger is completed and in operation. To examine this conjecture we first compute abnormal buy-and-hold equity returns for the four-year period from the effective date of the merger onward.[22] The returns are adjusted for size, book-to-market, and industry effects in line with standard convention (Barber and Lyon, 1996). For comparability with the initial market revaluations (discussed in section 5.2), we convert these buy-and-hold post-merger returns to asset returns.

We posit that the post-merger abnormal returns can be decomposed into two primary pieces. The first piece is any adjustment that arises from new information about the merger once it has become effective and is in operation, and the second piece is any adjustment that the market makes to correct an error in valuation at the time the merger is announced. Using the change in operating cash-flow return ΔOPCFRET as a proxy for new information, we estimate a regression of the long-run abnormal post-merger returns on ΔOPCFRET. We then use the

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[20] The results are available from the authors upon request.

[21] We are grateful to the referee for recommending this analysis. See Kadiyala and Rau (2004) and the references therein for a further discussion of under- and overreaction and discussion of a similar empirical method of analysis.

[22] As stock returns are forward looking, we compute buy-and-hold abnormal returns over a four-year post-merger period to lag them somewhat with the change in operating performance returns, which are estimated using a five-year period after that of corporate merger. However, the results to follow remain unchanged when we instead measure the buy-and-hold returns over either a three- or five-year period.

estimated residuals from this (unreported) model as our proxy for that part of the market's revaluation that is *not* due to new information. We label this variable MKTCORRECTION. ASSETREV should be related to MKTCORRECTION if the market corrects valuation mistakes expost. Panel B of table 6 presents the regression results for a model relating ASSETREV and MKTCORRECTION. The results indicate that there is a positive and marginally statistically significant relation between these variables.

Underreaction followed by a correction should manifest itself in a positive relation between announcement revaluations and the variable MKTCORRECTION. In contrast, overreaction should manifest itself in an inverse relation. On the other hand, if the market never under- or overreacts then we should observe no such connection between announcement returns and MKTCORRECTION. The results in panel B of table 6 suggest that underreaction is a possibility, but we have no a priori reason to expect that underreaction will occur more frequently than overreaction. We pursue this further by splitting the sample into what empirically we regard as cases consistent with under- and overreaction.

The classification method is simple. Each case is categorized as a potential overreaction if the sign of ASSETREV is opposite the sign for the variable MKTCORRECTION (thirty-eight cases from the eighty-one sample mergers). All remaining cases are classified as underreaction. We then perform two separate regressions, one for each category in which ASSETREV is regressed on MKTCORRECTION. Panel C of table 6 presents the results. We find that the under-reaction group displays a positive relation between abnormal announcement returns and MKTCORRECTION, whereas the overreaction group displays a negative relation. Moreover, both of these associations are statistically significant at the 0.01 level or lower. These results tend to reinforce the conclusion that the market initially omitted using some relevant information

about what would determine the operating performance changes for the mergers in our sample. However, when an omission occurred the market later corrected the valuation of the merger to account for the initial belief.

7. Summary and conclusions

Mergers are among the most economically significant decisions made by corporate managers. It is therefore surprising that, in spite of the intensity of focus on the association between corporate governance and managerial decisions practically no attention has been devoted to how corporate governance directly impacts the operating performance effects of mergers. This paper distinguishes itself from the prior literature devoted to the operating performance outcomes of corporate mergers by explicitly examining how corporate governance characteristics of acquiring firms impact merger performance. In addition we present new results which help to reconcile the conflicting findings of, in particular, Healy et al. (1992) and Ghosh (2001) regarding the relation between changes in operating performance associated with mergers and the initial market revaluations of the merging firms.

This paper presents results indicating that corporate governance profiles of acquiring firms have an economically and statistically significant impact on operating performance changes following mergers. In particular, we find a curvilinear and multidimensional relation between board ownership of acquiring firms and operating performance effects. We show that the attenuation of the positive benefits of control falls as ownership becomes concentrated in the hands of only a few directors. Our results extend and provide additional insight into the empirical relation between ownership and performance or value documented elsewhere.

In the general spirit of, in particular, Yermack (1996), we find that larger boards overseeing the acquiring firms can be an impediment to efficient operating strategy. In addition,

we present evidence consistent with outside block-holders in acquiring firms playing an important monitoring role (broadly consistent with, especially, Shleifer and Vishny, 1986). Our results are robust after controlling for other observable characteristics of merging firms and the nature of the underlying deals; after investigating endogeneity concerns; and after accounting for the possible existence of omitted factors reflected in initial market expectations.

We find that post-merger operating performance changes are also strongly determined by some of these other factors. Specifically, operating performance effects are adversely affected by a mismatch of managerial quality. Operating performance outcomes are also worse when the acquiring firm has greater excess cash in combination with fewer growth opportunities compared with the firm being acquired; when the size of the firm being acquired increases relative to the acquiring firm; and when the method of payment is common stock only. A larger absolute difference in leverage ratios between merging firms, however, has a positive impact on operating performance effects. In spite of the sample median change in operating performance being significantly in excess of zero, we conclude that the potential for managerial shortcomings are real and depend importantly on corporate governance..

Finally we also provide evidence on the relations between the initial market revaluations of the merger partners, changes in operating performance for the merger, and post-merger revaluations of the merged firm. Our evidence suggests that the initial revaluations are related to subsequent revaluations in a manner consistent with the market under- or overreacting at the outset but correcting later. This evidence is in line with our finding no significant relation between initial revaluations and changes in operating performance associated with the merger. The latter result is consistent with results reported by Ghosh (2001), but is in contrast to results reported by Healy et al. (1992), who find a positive relation. Our evidence may explain these

divergent findings as the results for any particular sample may depend upon the mix of cases in which the market under- or overreacts.

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Table 1
Operating performance of merger partners pre- and post-merger

Panel A: Descriptive statistics for operating performance around merger

Industry-adjusted operating cash flow return	**Mean**	**Median**	**Proportion positive**
Pre-merger period	-0.009	-0.009	0.42
Post-merger period	0.097***	0.043***	0.77***
Merger-related change	0.106***	0.063***	0.81***

Panel B: Linear regressions for operating performance around merger

The change in industry-adjusted operating cash flow return for merger i, $\Delta OPCFRET_i = \ln\left(1 + \left\{OPCFRET_{Post,i} - OPCFRET_{Pre,i}\right\}\right)$. Numbers in parentheses are t-statistics computed using White (heteroskedasticity-adjusted) standard errors.

	Dependent variable	
	$\ln\left(OPCFRET_{Post,i}\right)$	$\Delta OPCFRET_i$
Constant	0.092***	0.093***
	(5.72)	(5.58)
$\ln\left(OPCFRET_{Pre,i}\right)$	0.976***	0.090
	(2.93)	(0.78)
F	13.49***	0.11
Adj. R^2	0.135	-0.011

This table presents descriptive statistics on the industry-adjusted operating performance pre-and post-merger for the sample of UK mergers in our sample. Tests of mean and median equality are presented along with regression results for models relating pre- and post-merger performance. Operating performance is computed as the value-weighted average industry-adjusted operating cash flow returns for the acquiror and acquired firm using 5 year medians pre and post the merger year. The merger-related operating performance change is the difference between the post- and pre-merger industry-adjusted operating cash flow returns. ***, **, * Values are significantly different from zero (for means, medians and regression coefficients), and significantly different from 0.5 for proportions, at the 1%, 5% and 10% level respectively.

Table 2
Hypothesized determinants of operating performance changes following corporate mergers

Explanatory variable: Definition [Data Source]	**Predicted relation to operating performance changes**	**Mean**	**Median**
BOARDOWN: Proportion of acquiring firm's outstanding common stock held by its board of directors in aggregate before merger [London Stock Exchange (LSE) filings]	Positive	0.062	0.009
DISPBOARDOWN: Theil index value for dispersion of acquiring firm's intra-board ownership stakes before merger[a] [LSE filings]	-	1.02	0.96
$BOARDOWN^2$ × DISPBOARDOWN: Measure of potential for BOARDOWN to facilitate consumption of private benefits of control conditioned on DISPBOARDOWN	Negative	0.0149	0.0001
BOARDSIZE: Number of directors comprising acquiring firm's board before merger[b] [LSE filings]	Negative	9	9
CEOCHAIR: Dummy variable = 1 if acquiring firm's Chief Executive Officer has also been its chair for at least 2-years before merger; zero otherwise [LSE filings]	Negative	0.26	0.00
BLOCKVOTES: Herfindahl index value for concentration of acquiring firm's proportional common votes controlled by outside block-holders (stockholders not included in BOARDOWN or TOEHOLD with stakes of at least 5%) before merger[c] [LSE filings]	Positive	0.014	0.000
YEAR: Year of merger announcement capturing chronological increase in activism intensity for reform of corporate governance practice culminating in *Cadbury Report* 'Code of Best Practice' [*Regulatory News Service* (RNS)]	Positive or Negative	1989	1989
REGULATED: Dummy variable = 1 if acquiring firm's industry is public transport, broadcasting, cable and satellite provision, newspaper publishing, or telecommunication services; zero otherwise [*Datastream*]	Positive or Negative	0.12	0.00
SIZE: Market value of acquiring firm's assets (market value of common stock combined with book values of other stock and total debt) before merger[d] [*Datastream*]	Positive or Negative	£1589m	£421m
QRATIO: Valuation ratio (SIZE relative to book value of total assets) before merger adjusted for median industry value [*Datastream*]	Positive or Negative	-0.05	-0.03
CASHLIQ: Cash liquidity ratio (book value of cash and equivalents relative to SIZE) of acquiring firm before merger conditioned on QRATIO being negative; zero otherwise [*Datastream*]	Negative	0.0467	0.0008
LEV: Leverage ratio (book value of total debt relative to SIZE) of acquiring firm before merger adjusted for median industry value [*Datastream*]	Positive	-0.022	0.000

Table 2
Hypothesized determinants of operating performance changes following corporate mergers (cont.)

Explanatory variable: Definition [Data Source]	Predicted relation to operating performance changes	Mean	Median
FOCUS: Dummy variable = 1 if merging firms are in same industry; zero otherwise [*Datastream*]	Positive	0.32	0.00
RELQRATIO: Valuation ratio for acquiring firm relative to firm being acquired (valuation ratios computed as for QRATIO without industry adjustment) before merger [*Datastream*]	Positive or Negative	1.21	1.15
RELCASHLIQ: Product of difference in cash liquidity ratios of acquiring firm and firm being acquired (cash liquidity ratios computed as for CASHLIQ without QRATIO conditioning) and reverse difference in firms' valuation ratios (valuation ratios computed as for QRATIO without industry adjustment) before merger [*Datastream*]	Positive or Negative	-0.0085	-0.0001
RELLEV: Absolute difference in leverage ratios of merging firms (leverage ratios computed as for LEV without industry adjustment) before merger [*Datastream*]	Positive	0.168	0.142
RELSIZE: SIZE of firm being acquired relative to acquiring firm before merger [*Datastream*]	Positive or Negative	0.297	0.221
STOCK: Dummy variable = 1 if common stock only is form of payment for merger; zero otherwise [RNS]	Negative	0.11	0.00
HOSTILE: Dummy variable = 1 if there is opposition to merger from board of firm being acquired; zero otherwise [RNS]	Positive or Negative	0.23	0.00
CONTEST: Dummy variable = 1 if third party competes with acquiring firm for merger; zero otherwise [RNS]	Positive or Negative	0.17	0.00
TOEHOLD: Dummy variable = 1 if proportion of common votes in firm being acquired controlled by acquiring firm before merger is at least 1%[e] [RNS]	Positive or Negative	0.20	0.00

[a]Theil index value (T) for DISPBOARDOWN is computed as: $T = \frac{1}{n}\sum_{j=1}^{n}\left(\frac{x_j}{\mu}\right)\ln\left(\frac{x_j}{\mu}\right)$, where n is the number of directors; x_j is the number of outstanding stock units held by the j^{th} director; μ is the mean number of stock units for the n directors; and ln is natural logarithm. A T-value of zero indicates BOARDOWN is uniformly dispersed across the acquiring firm's board. In finite samples, T has an upper bound of ln(n). BOARDOWN is included along with its higher order term $BOARDOWN^2$ interacted with DISPBOARDOWN in the models we estimate to capture the hypothesized multi-dimensional curvilinear effect of BOARDOWN.

[b]Natural logarithm of BOARDSIZE is used in the models we estimate to account for a potentially decreasing marginal effect from adding more directors to the board.

[c]Herfindahl index value (H) for BLOCKVOTES is computed as: $H = \sum_{j=1}^{J} x_j^2$, where x_j is the proportion of votes controlled by the j^{th} outside block-holder. Larger is the value of H the greater is the concentration of votes controlled by outside block-holders.

[d]Natural logarithm of SIZE per se (Consumer Price Index adjusted to 1994 values) is used in the models we estimate to account for a potentially decreasing marginal effect and to give it a more symmetrical distribution.

[e]Mean toehold across all sample mergers is 4.3%. TOEHOLD is truncated to remove negligible toeholds and although this is imposed at 1% the smallest included stake is 2.9%. TOEHOLD is therefore effectively capturing mergers where the acquiring firm was a block-holder in the firm being acquired.

Table 3
Factors influencing merger-related operating performance changes: Linear regression coefficient estimates and model summary statistics

Explanatory variable	Full model		Reduced model	
	(1)	(2)	(3)	(4)
Constant	37.298**	(2.12)	34.041**	(2.03)
BOARDOWN	0.780***	(2.85)	0.698***	(2.83)
$BOARDOWN^2$ × DISPBOARDOWN	-1.725***	(-3.51)	-1.601***	(-4.18)
BOARDSIZE	-0.148**	(-2.52)	-0.136***	(-2.93)
CEOCHAIR	-0.009	(-0.41)		
BLOCKVOTES	0.529**	(2.51)	0.580***	(2.83)
YEAR	-0.019**	(-2.10)	-0.016**	(-2.01)
SIZE	0.011	(0.93)		
QRATIO	0.004	(0.74)		
CASHLIQ	-0.065	(-0.47)		
LEV	-0.154	(-1.53)		
REGULATED	0.066	(1.57)	0.098**	(2.19)
FOCUS	-0.007	(-0.31)		
RELQRATIO	-0.084***	(-3.26)	-0.061**	(-2.65)
RELCASHLIQ	-0.325*	(-1.80)	-0.310*	(-1.88)
RELLEV	0.363***	(3.68)	0.332***	(3.47)
RELSIZE	-0.174***	(-3.08)	-0.181***	(-3.83)
STOCK	-0.076**	(-2.62)	-0.081***	(-3.27)
HOSTILE	-0.012	(-0.42)		
CONTEST	0.012	(0.38)		
TOEHOLD	0.040	(1.46)		
F	2.77***		4.69***	
Adj. R^2	0.307		0.336	

This table reports OLS estimation statistics. Dependent variable: The change in industry-adjusted operating cash flow return for merger i, $\Delta OPCFRET_i = \ln\left(1 + \left\{OPCFRET_{Post,i} - OPCFRET_{Pre,i}\right\}\right)$. All other variables are defined in table 2. Estimated coefficient t-statistics are computed using White (heteroskedasticity-adjusted) standard errors and are reported in columns (2) and (4) in parentheses. ***, **, * Values are significantly different from zero at the 1%, 5% and 10% level respectively.

Table 4
Predicted values of the merger-related change in the industry-adjusted operating cash flow return

Explanatory variable	10^{th} percentile	90^{th} percentile	Difference
BOARDOWN	0.074	0.148	0.074
BOARDSIZE	0.158	0.052	-0.105
BLOCKVOTES	0.102	0.122	0.019
YEAR	0.157	0.072	-0.084
REGULATED	0.098	0.197	0.098
RELQRATIO	0.143	0.076	-0.067
RELCASHLIQ	0.126	0.099	-0.026
RELLEV	0.063	0.167	0.103
RELSIZE	0.158	0.032	-0.125
STOCK	0.119	0.038	-0.081

This table reports predictions of the change in industry-adjusted operating cash flow return associated with changes in specific variables. Predictions are based upon evaluating the estimated model shown in column (3) of table 3. Each row of the table shows the prediction computed using either the level of the respective variable at the 10^{th} or 90^{th} percentile of the variable's empirical sample distribution while fixing all other variables in the model at their sample mean values. The column labelled Difference reports the difference between the value reported for the 90^{th} percentile and the value reported for the 10^{th} percentile.

Table 5
Determinants of operating performance changes following corporate mergers revisited: Impact of unobserved factors reflected in initial market revaluations

Explanatory variables	Univariate model		Full model		Reduced model	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.092***	(6.36)	37.298**	(2.18)	34.041**	(2.07)
$ASSETREV_{Residual}$	0.221	(0.95)	0.221	(1.33)	0.221	(1.42)
BOARDOWN			0.780***	(2.90)	0.698***	(2.88)
$BOARDOWN^2 \times$ DISPBOARDOWN			-1.725***	(-3.69)	-1.601***	(-4.32)
BOARDSIZE			-0.148**	(-2.58)	-0.137***	(-3.01)
CEOCHAIR			-0.009	(-0.41)		
BLOCKVOTES			0.529**	(2.53)	0.581***	(2.90)
YEAR			-0.019**	(-2.17)	-0.017**	(-2.05)
REGULATED			0.066	(1.54)	0.099**	(2.17)
SIZE			0.011	(0.90)		
QRATIO			0.004	(0.73)		
CASHLIQ			-0.065	(-0.48)		
LEV			-0.154	(-1.57)		
FOCUS			-0.007	(-0.31)		
RELQRATIO			-0.084***	(-3.32)	-0.061***	(-2.77)
RELCASHLIQ			-0.325*	(-1.84)	-0.311*	(-1.95)
RELLEV			0.363***	(3.74)	0.332***	(3.52)
RELSIZE			-0.174***	(-2.85)	-0.181***	(-3.70)
STOCK			-0.076**	(-2.49)	-0.081***	(-3.25)
HOSTILE			-0.012	(-0.43)		
CONTEST			0.012	(0.40)		
TOEHOLD			0.040	(1.47)		
F	0.79		2.70***		4.41***	
Adj. R^2	-0.003		0.309		0.338	

This table reports ordinary least squares regression coefficient estimates and model summary statistics. Dependent variable is the change in industry-adjusted operating cash-flow return for merger i, $\Delta OPCFRET_i = \ln\left(1 + \left\{OPCFRET_{Post,i} - OPCFRET_{Pre,i}\right\}\right)$. Operating performance is computed as the value-weighted average industry-adjusted operating cash-flow returns for the acquiring firm and firm being acquired using 5-year medians pre and post the merger year. Merger-related operating performance change is the difference between the post- and pre-merger industry-adjusted operating cash-flow returns. $ASSETREV_{Residual,i}$ is the residual for merger i from an (unreported) ordinary least squares regression of the value-weighted average announcement period abnormal asset return of the acquiring firm and firm being acquired on the same explanatory variables as for the full model shown in table 3, column (1). Definitions and hypothesized effects for all the other explanatory variables are provided in table 2. Numbers in parentheses are t-statistics computed using White (heteroskedasticity-adjusted) standard errors. ***, **, * Values significantly different from zero at the 0.01, 0.05, and 0.1 levels, respectively.

Table 6
Asset revaluation of the merger partners pre and post merger

Panel A: Linear regression of the announcement abnormal asset revaluations on the change in industry-adjusted operating cash flow return
Numbers in parentheses are t-statistics computed using White (heteroskedasticity-adjusted) standard errors.
***,**,* Values significantly different from zero at the 1%, 5% and 10% level respectively.

$$ASSETREV_i = 0.030^{***} + 0.027\ \Delta OPCFRET_i \quad F: 0.15 \quad Adj.\ R^2: -0.010$$
$$(2.70) \qquad (0.52)$$

Panel B: Linear regression of the announcement abnormal asset revaluations on the market revaluation correction MKTCORRECTION *(refer to Section 6.)*
Numbers in parentheses are t-statistics computed using White (heteroskedasticity-adjusted) standard errors.
***,**,* Values significantly different from zero at the 1%, 5% and 10% level respectively.

$$ASSETREV_i = 0.032^{***} + 0.058^{*}\ MKTCORRECTION_i \quad F: 2.25 \quad Adj.\ R^2: 0.015$$
$$(3.66) \qquad (1.79)$$

Panel C: : Linear regression of the announcement abnormal asset revaluations on the market revaluation correction MKTCORRECTION *(refer to Section 6 of the text.) for two groups classified by return reversal (over reaction) or non-reversal (under reaction)*
Numbers in parentheses are t-statistics computed using White (heteroskedasticity-adjusted) standard errors.
***,**,* Values significantly different from zero at the 1%, 5% and 10% level respectively.

Under-reaction

$$ASSETREV_i = 0.023^{**} + 0.182^{***}\ MKTCORRECTION_i \quad F: 14.70 \quad Adj.\ R^2: 0.246$$
$$(2.01) \qquad (4.76)$$

Over-reaction

$$ASSETREV_i = 0.025^{**} - 0.180^{***}\ MKTCORRECTION_i \quad F: 11.51 \quad Adj.\ R^2: 0.221$$
$$(2.50) \qquad (-6.46)$$

The change in industry-adjusted operating cash flow return for merger i is equal to $\Delta OPCFRET_i = \ln\left(1 + \left\{OPCFRET_{Post,i} - OPCFRET_{Pre,i}\right\}\right)$. The announcement abnormal revaluation for merger i, $ASSETREV_i$ is the value-weighted average announcement period abnormal asset return of the acquiror and acquired firm. $ARLR_i$ equals the post merger 4-year abnormal asset holding period return for merger i. Using the change in operating cash-flow return ΔOPCFRET as a proxy for new information, we estimate a regression of the long-run abnormal post-merger returns on ΔOPCFRET. We then use the estimated residuals from this (unreported) model as our proxy for that part of the market's revaluation that is *not* due to new information. We label this variable MKTCORRECTION.

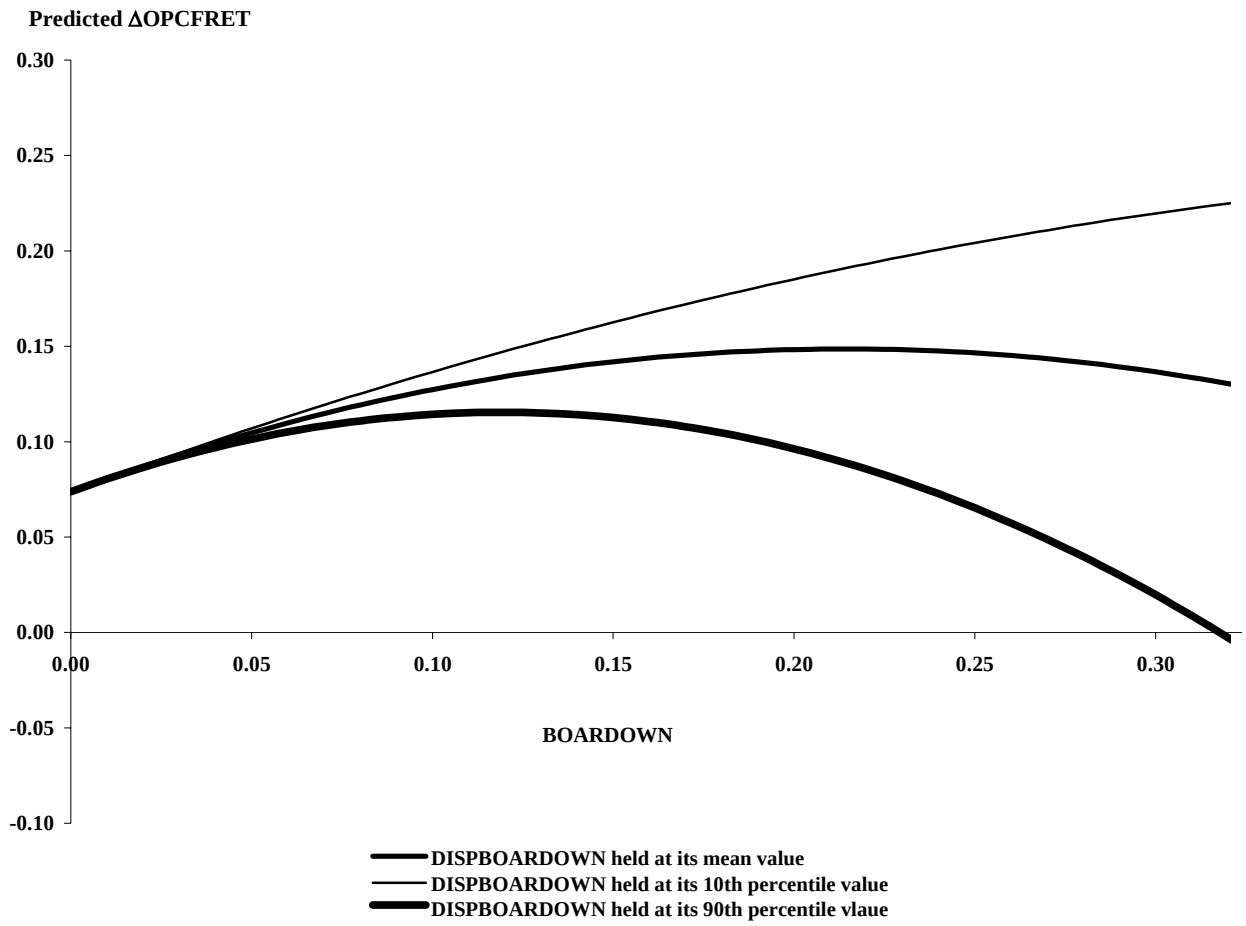

Fig. 1. Relation between predicted operating performance changes following corporate mergers and board ownership of acquiring firms

Predictions for the change in industry-adjusted operating cash-flow return are based upon evaluating the estimated reduced model shown in Table 3, column 3. Predictions are made using a range of levels for the explanatory variable BOARDOWN, using the level of the interaction variable DISPBOARDOWN at the mean, 10th, and 90th percentiles of its sample distribution, and fixing all other variables in the model at their sample mean values.

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