The Board Rotation Principle

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Abstract

The notion that members of a decision making group may become overly cohesive and suffer from so-called "groupthink" is commonplace in psychology and management. Equally, the recent corporate scandals in both US and UK have drawn attention to the role of hubris in distorting decision making. Despite this, little attention has been devoted to assessing how corporate boards can guard against groupthink. This paper uses data on a sample of US consumer firms to assess the link between performance and board rotation. The basic hypothesis is that low levels of board rotation may increase the chances of groupthink and, subsequently, poor performance. Clearly, intuition would suggest that high board rotation may also have adverse effects, as experience and continuity may be disrupted. The empirical results confirm these thoughts: performance appears to be higher for those firms that have intermediary levels of board rotation. However, a key finding of the analysis is that if we use Tobin's q to proxy future performance we do not find such a relationship. In contrast, when we use future profitability to assess performance the data suggest that firms with intermediary levels of board rotation have higher profitability.

Keywords: board rotation, groupthink, performance

J.E.L. Classification: G30, M14

1. Introduction

The possibility that decision making by committees can be influenced by "groupthink" – the idea that members of a decision making group may become overly cohesive – is commonplace in psychology and management textbooks. Most famously, in his study of US foreign policy, Ivring Janis (1972) noted that some of the worse decisions appeared to be linked to groupthink.[1] Groupthink occurs when the members of the group become overly concerned about cohesiveness, rejecting dissent within the group and paying little attention to external views. In some ways, therefore, groupthink is 'hubris' of the group, rather than an individual. The recent corporate scandals, in both the US and UK, have led to a vigorous debate over the role of corporate governance. Given this background, it is surprising how little attention has been focused on analysing the role of groupthink in company performance. This paper provides a simple way of testing the impact of groupthink and, as a result, puts forward the idea of the optimal rate of board turnover: the board rotation principle.

How can one prevent groupthink in executive boards? The existing literature, although it does not frame the question in this way, might suggest an important role for independent or non-executive directors. By ensuring that the board has external views represented, the assumption is that decision making will be improved, especially if the independent directors truly represent the interests of shareholders. However, it is the latter issue, motivated by the extensive theoretical work on the principal-agent problem, which is paramount in discussion about, and analysis of, the role of independent directors. When considered from the perspective of groupthink, the proportion of independent directors is, ultimately, of little importance. The stark fact is that groupthink could affect any group of decision makers, whatever their reasons for being part of the group. Preventing groupthink, therefore, is not simply a matter of ensuring a sufficient proportion of independent directors.

The most straightforward way of preventing groupthink is to regularly expose the group to external views, ideally by rotating members of the group. In the extreme case a perfect solution is to replace the entire board at regular intervals – achieving a 100% rotation. Clearly,

the major drawback of 100% rotation is that all prior experience would be lost and that the quality of decision making would suffer as a result. Consider the opposite extreme of zero board rotation. While this maximises board experience it also raises the chances of groupthink, which may, in turn, harm corporate performance.

While we have motivated our discussion using the idea of groupthink, it is clear that rotating board members could also provide a stream of new ideas and management skills which, in themselves, could lead to improved performance. Again, it appears self-evident that 100% board rotation would place far too much weight on new ideas and skills at the expense of experience. These ideas suggest that the optimal annual rate of board rotation will lie somewhere between the extremes of zero and 100%. Since it is not clear *a priori* what this optimal rate might be, there is a strong case for empirical analysis to investigate the issue.

To the best of our knowledge, the issue of the optimal rate of board rotation has not been highlighted or empirically investigated. While there are a large number of studies that focus on CEO turnover, board size and board structure, the issue of board rotation appears strangely absent. Given the paucity of prior research this paper provides a concise initial study on a well-defined set of firms. The firms are S&P500 consumer firms for the period 1994 to 1998. These firms are chosen since they represent a relatively stable set of firms operating in well-established markets. Our research deliberately avoids industries that have experienced rapid change, since the firms in these industries may have diverse reasons for board rotation, for example the recruitment of new executives with specialised technology skills. Concentrating our research on a single, relatively stable, group of firms increases the likelihood of detecting any potential relationship between board rotation and performance attributable to the idea of groupthink. The board rotation data are for the years 1994 to 1998, representing the mid-years of the long boom in the US economy and prior to the most dramatic increases in stock prices. Lastly, the 1998 cut-off for board rotation data allows use to analyse profitability data for the period 1999-2002 as a performance measure.

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[1] Janis (1982) has defined groupthink as the "deterioration of mental efficiency, reality testing, and moral judgment in the interest of group solidarity". A special edition of the journal of *Organizational Behavior and Human Decision Processes* (Vol. 73, Issues 2-3, 1998) summarises the work done since the Janis (1972) study.

The structure of the paper is as follows. The next section provides a short review of previous research into corporate governance. The main issue underlying this research is the debate over whether management acts to maximise shareholder value and how board composition and governance can affect the outcome. We provide a short review of the literature on board composition, CEO turnover and performance although, as noted above, there is no direct evidence of the influence of board rotation. The third section takes an initial look at the data. Since there is little prior research, there is a need to understand the extent and nature of board rotation. The average board size for the 37 firms in the data is 12 and, on average, one board member leaves each year (a board rotation rate of 8.3%). There is, however, a wide variation in board rotation experience: around 40% of firms maintain the same board membership over the year, although one firm in our data had a single year where eight board members left. There is also variation in the rate of board rotation of individual firms through time. The differences across firms and through time prompt the basic question: does board rotation matter for corporate performance?

Section 3 provides an initial answer to this question by using Tobin's *q*, current EBDIT margin and future EBDIT margin as proxies for performance. The mean and median of these performance measures are compared across firms with different rates of board rotation. The basic result is that stock markets appear to place a higher valuation on firms with low board rotation, whereas the profitability data suggest firms with intermediate levels of board rotation may perform better. This is an unexpected results and suggests that markets may overlook the benefits of board rotation. However, it turns out that the pattern of results found in section 3 are not statistically robust, suggesting the use of more formal statistical analysis. This is carried out in section 4.

Section 4 uses a number of modelling approaches to investigate board rotation and performance. Initially, the modelling approach allows for the possibility of reverse causation (i.e. the fact that performance may *affect* board rotation). Initial results, using annual data, and imposing a monotonic relationship between rotation and performance, suggest that higher board rotation is negatively correlated with performance. However, further investigation suggests that this result is entirely driven by firms with very high rates of board rotation, namely those in the top 20% of the distribution. It is these firms that drive the negative relationship between board rotation and performance. This result prompts a second modelling approach that investigates possible non-linearities in the board rotation and performance

relationship. This analysis offers support for the idea that firms with intermediary levels of board rotation – between 8.6% and 14.6% – have higher rates of future profitability. Interestingly, this results does not occur when Tobin's q is used as a measure of performance. In this case there appears to be no relationship between board rotation and performance.

2. Corporate governance and performance

There is an extensive theoretical literature on how different aspects of corporate governance may affect performance. One central theme relates to the principal-agent problem, which is based on the assumption that owners and managers have different information sets (asymmetric information). The presence of asymmetric information suggests that different governance structures affect managers' effort levels and, in turn, the performance of the firm. This has led to a focus on the involvement of shareholders, the extent of debt and the ability of shareholders to compare managers' performance across similar firms. The presence of asymmetric information suggests that poor management, including the possibility of groupthink, cannot be immediately be detected by the shareholders.

Existing empirical research focuses attention on the characteristics of the board, such as size, number of external directors, managerial ownership and executive remuneration and CEO turnover. For example, Barnhart and Rosenstein (1998) analyse various issues, including how the proportion of external directors and board size affect Tobin's q, finding some evidence of an optimal proportion of external directors (around 40%). However, a meta-analysis of 54 previous empirical studies on these issues concludes that there is little consistency in results, suggesting that overall there are few exploitable opportunities to improve board governance (Dalton et al, 1998). Put another way, while these types of studies are based on the assumption that board structure may not always be at the optimal level, the findings tend to suggest that this is not the case. While this may be true to some extent, there is the possibility that researchers have been looking at the wrong indicators.[2] This paper pursues this idea by considering the extent of board rotation.

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[2] A recent newspaper article by Sumantra Ghoshal puts forward this view (Financial Times, 9th September, 2003). A recent example of such an approach is Gompers et al (2003) who analysis the effect of a range of a 'governance index', which comprises of 24 different aspects of shareholder rights (e.g. director protection, shareholding voting rules), finding that firms with weak shareholder rights perform worse. Also of interest here

Although this paper is concerned with how board rotation may affect decision making and thereby performance, it is vital to consider the possibility of reverse causation. It would be common to assume that relatively poor performance would increase board rotation. The empirical literature on CEO turnover confirms this, finding that poor past performance tends to increase CEO turnover (e.g. Conyon and Florou, 2002, Lausten, 2002). These papers are interested in whether previous and current performance impact on the probability of executives losing their jobs, rather than on any reverse link. Although this literature is focused on CEOs only, it is clearly related to the issue of board rotation, hence it suggests the need to control for the possibility that past performance influences board rotation in our econometrics. A recent paper by Fee and Hadlock (2004) adds to this literature by looking at the turnover of 'senior' executives, some of which will be board members, in S&P 500 companies from 1993 to 1998. They find that forced non-CEO turnover is as high as CEO turnover.

3. Does Board Rotation Matter for Performance?

This section takes an initial look at how the extent of board rotation is related to their performance. Corporate performance is assessed by using Tobin's *q* and both current and future EBDIT margin. The sample contains 37 consumer firms from the S&P500 for the period 1995 to 1998. The firms vary substantially in size, with total sales varying between $1.4bn and $168bn (see Appendix 1). Similarly, there is a substantial variation performance with, for example, the EBDIT margin varying between 4% and 35%. Turning to board structure, for this sample of firms as a whole, the mean number of directors leaving in a given year is around one. However, the range of experiences is wide: 40% of firms leave the board unchanged in a given year, while there is one firm where eight directors vacated in a single year (Archer-Daniels in 1996-97). Converting these numbers to the percentage of directors vacating in a given year, we find that the mean board rotation is 8.6%, with the range of values between 0% to 61.5%. Figure 1 shows a histogram of the ratio of vacations to total board size, which clearly shows a skewed distribution. These basic statistics show that there is considerable variation across firms and through time. The question is whether this variation has any relationship with the firm's performance?

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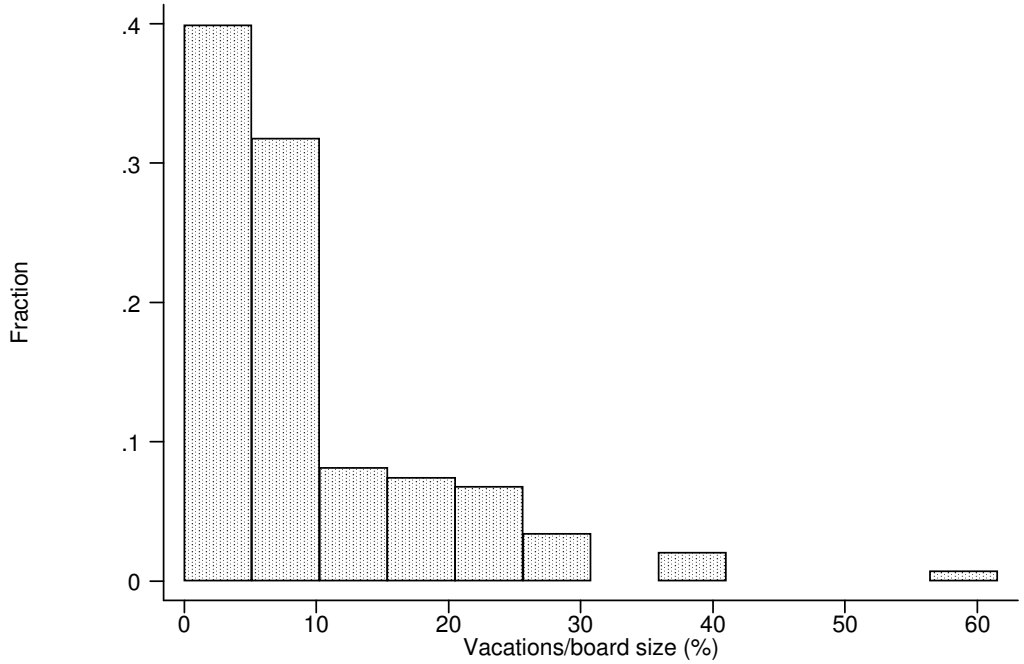
is a paper by Bebchuk and Cohen (2004), which considers the role of 'staggered board' provisions that protect the incumbent management term in the event of a hostile takeover. They find that US firms with such provisions have lower Tobin's *q* than other firms.

Figure 1 Histogram of board rotation (as proportion of board size)



A common measure of performance is Tobin's *q*, which is calculated as the ratio of market value to total assets. Although this measure can be criticised on various grounds, it still widely used as a summary measure of how the stock market assesses the future performance of a firm. The second column of Table 1 shows how Tobin's *q* varies across firms with different levels of board rotation. Specifically, firms with the same number of board vacations are grouped together (the sample sizes for each sub-group are shown in the first column in Table 1). The first row shows those firms with zero board rotation in the year (n=59) had a mean *q* of 2.20. The mean *q* is similar for firms with a board rotation of one, but then tends to be lower for firms that have two or more directors leaving in a given year. These results suggest that high rates of board rotation are inversely related to performance, although it appears that there may be non-linearities in the relationship.

Table 1 also shows how the EBDIT margin varies with extent of board rotation. The mean of the current EBDIT margin is shown in the third column of results. The highest mean EBDIT margin is for firms that had three directors leave in a given year. It is clear, however, that annual profitability data are a poor gauge of expected future profitability. One solution to this is to average the profitability data over subsequent years, something which is possible here since the board rotation data ends in 1998. This reduces the influence of any unusual years

and also captures, to some extent, the impact of current decisions on future performance. Hence the last column of Table 1 uses the mean of the EBDIT margin across the subsequent four years.[3] The results show that firms with three directors vacating have the highest (future) profitability, again in contrast to the results for Tobin's *q*.

Table 1 Board rotation and mean performance (annual data)

Board turnover (annual data)	Number of firms	Mean Tobin's q	Mean EBDIT margin	Mean EBDIT margin (next 4 years)
None	59	2.20	17.40	18.14
One director	54	2.18	15.94	16.10
Two directors	20	1.62	16.33	17.07
Three directors	9	1.92	18.68	19.15
Four or more	6	1.82	14.13	14.23
Total	148	2.08	16.67	17.16

The simple summary statistics shown in Table 1 suffer from a number of drawbacks. Most importantly, in a test of whether the sub-group means are statistically different from the mean of the whole sample, we find that they are not. In other words, although the means may look different there is substantial variance in the sample that creates (statistical) uncertainty about the true underlying values. Given that there is no control for other determinants of firm performance, this is not altogether surprising. The next section uses a multivariate regression model to try to explain the variance in firm performance.

A second issue concerns causality. While the central hypothesis of this paper is that board rotation may affect performance, the simple statistics above cannot be taken as evidence of causation. It is possible that past performance may affect board rotation. For example, in a poorly performing firm there may be shareholder pressure for the board to restructure, implying higher rates of board vacations. The use of a forward-looking performance measure in Table 1 goes some way to address this concern. However, to the extent that firm performance is persistent through time, then this mechanism would imply a negative relationship between board rotation and future performance. The possibility of causation

[3] As an example, a firm with a board rotation of two in 1995 means two directors have left over the period 1994 to 1995. The forward-looking EBDIT margin for this observation is the mean over 1996, 1997, 1998 and 1999.

running in both directions suggests the use of a more sophisticated modelling approach and this is tackled in the next section.

A third issue is that using the mean as a summary statistics may be misleading if the underlying distributions are skewed (as implied by Figure 1). To address this concern, Appendix 2 shows an equivalent table using the median as a summary measure of central tendency. The results indicate a similar pattern of results as shown in Table 1. In fact, for Tobin's *q* the median value declines steadily as board rotation increases, suggesting that board rotation is inimical to performance.

A final issue concerning Table 1 is that it uses annual observations and this may introduce substantial noise into the board rotation data. For example, while a firm may record no board rotation in, say, 1995, suggesting an increased likelihood of groupthink, it may have high board rotation in 1996 or 1997. Since it is unclear whether groupthink, and the associated poor decisions, occurs quickly (i.e within a year), there is an argument for looking at the average board rotation for each firm across the four years of data. This provides a better indication of how firms vary in their approach to board rotation. Table 2 shows firms grouped by quintile according to the mean level of board rotation (expressed as a percentage of total board size; see Appendix 1 for full data).

Table 2 shows that Tobin's *q* is substantially higher for firms with the lowest levels of board rotation and that increases in board rotation reduce Tobin's *q*: stock markets appear to value continuity and experience, at least for this sample of firms. In contrast, the profitability measures suggest that performance and board rotation do not have such a straightforward relationship. The forward-looking EBDIT margin, which is now for the period 1999-2002, is highest for the fourth quintile of firms (representing mean board rotation between 8.6% and 14.6%). These results are also supported if the median is used as a measure of typical performance (see Appendix 2).

Table 2 Board rotation and performance (four year averages)

Board turnover (b) (four year averages)	Number of firms	Mean Tobin's q	Mean EBDIT margin	Mean EBDIT margin (1999-2002)
Lowest quintile ($b \leq 3.9\%$)	7	2.83	18.46	19.06
2nd quintile ($3.9\% < b \leq 5.3\%$)	8	2.34	15.75	15.06
3rd quintile ($5.3\% < b \leq 8.6\%$)	7	1.97	16.38	16.53
4th quintile ($8.6\% < b \leq 14.6\%$)	8	1.63	18.13	21.69
Highest quintile ($14.6\% < b$)	7	1.41	14.56	12.64
Total	37	2.03	16.67	17.07

This section has used some basic summary statistics to show that higher rates of board rotation appear to reduce Tobin's q. In contrast, if the EBDIT margin is used as a measure of performance the relationship is not so clear cut. Specifically, using a forward-looking, four year mean EBDIT margin the evidence suggests that firms with relatively high board rotation have higher profitability. Although the results are thought provoking, as discussed above, there is a requirement to use some more advanced techniques to check the robustness of these results and this is done in the next section.

4. Modelling Board Rotation and Performance

The section sets out a more formal analysis of the role of board rotation. The initial approach, in section 4.1, is to treat both board rotation and firm performance as endogenously determined (i.e. allowing for the possibility that past performance may affect board rotation). This approach necessitates using annual data to ensure a sufficiently large sample. While there are some insights from this analysis, a major conclusion is that the annual data, and the explanatory variables available, do not provide a robust method of modelling the mechanisms at work. For this reason, section 4.2 uses the average performance and board rotation over a four year period.

4.1. A simultaneous equations model

The framework for the analysis can be summarised by the following two equations:

$$P_{it} = \beta R_{it} + X_{it}\phi + \varepsilon_{it} \quad [1]$$

$$R_{it} = \alpha P_{it} + Z_{it}\gamma + v_{it} \quad [2]$$

where P is a performance measure, R is board rotation, X is a set of other variables that may affect performance, and Z is a set of variables that may affect board rotation. The parameters β, ϕ, α and γ are to be estimated and represent the marginal impacts of the various variables on either P or R. The ε and v are error terms, which are assumed to be $N(0, \sigma^2)$. Equations [1] and [2] allow firm performance to be influenced by other factors (the variables in X) and also for board rotation to be influenced by performance. Together they represent a simultaneous system of equations that can be estimated with 2SLS or 3SLS. At the outset, it is worth noting that these estimators are not without their drawbacks. Although 2SLS and 3SLS are consistent, their properties in small samples are not well determined, and specification errors in either equation [1] or [2] can affect all parameter estimates (see, for example, Kennedy, 1992, p.157-175). Given this, some argue that straightforward OLS on [1] or [2] may yield more useful parameter estimates.

While these econometric issues are valid in the current context, there is also a further concern that the relationship between board rotation and performance may be non-monotonic, suggesting the simple linear relationships in [1] and [2] are inappropriate. Holding all these concerns in mind, we initially use 3SLS to estimate equations [1] and [2] as shown in Table 3. Performance is assessed by Tobin's *q*. The set of variables X are: board rotation, the proportion of external (independent) directors; log of assets; the ratio of selling and general expenses to total assets[4]; the ratio of intangible assets to total assets; and the growth of sales over the last two years. These variables are included on the basis of previous empirical analysis on the determinants of Tobin's *q* (e.g. Hall, 1993, Barnhart and Rosenstein, 1998).

The results from estimating equation [1] are shown in the top panel of Table 3. The first column of results uses the full sample and shows that board rotation has a negative partial correlation with performance, although the coefficient is not statistically significant at conventional levels. The second column of results only differs in that the lagged EBDIT margin has been included as an explanatory variable in equation [2]. This variable is inversely and significantly associated with board rotation, and also raises the significance of the (negative) association between board rotation and Tobin's *q*. However, further investigation shows that the latter result is driven by the firms with high board rotation. The last two

[4] Selling and general expenses includes a wide range of expenses including R&D, advertising and marketing which are often included in such models.

columns of results in Table 3 show regressions on a sample that excludes the 15 observations with the highest board rotation (i.e. those with 3 or more directors leaving in a given year, see Table 1). These regressions indicate that it is the small number of firms with very high rates of board rotation that drive the result for the full sample. These results suggest that the relationship between board rotation and performance may be non-monotonic – exactly as the analysis in section 3 indicated.

The lower panel of Table 3 shows the coefficient estimates on the four variables used to proxy Z in equation [2]. The results indicate that only lagged EBDIT margin has consistent explanatory power. The negative coefficient indicates that poor performance last year tends to raise board rotation, although the implied magnitude of 0.2% is small. Consider, for example, the hypothetical case where the EBDIT margin fell by 6.6% in the previous two years (a one standard deviation change). The coefficient in Table 3 implies that board rotation would rise, on average, by only 1.3% (note that the mean value for board rotation is 8.6% and the standard deviation is 10.2% for this sample). This result should be interpreted carefully. If asked to consider the issue of how performance may influence board rotation, many people would focus on cases when extreme poor performance resulted in dramatic changes. However, on average across all firms, we might not expect to find a large impact – board rotation is unlikely to be driven by normal fluctuations in performance – and this is exactly what the data indicate.

Table 3 3SLS estimate of board rotation and performance

	Full sample		Omits highest board rotation	
Dependent variable: Tobin's *q*				
Vacations/board size (%)	-0.082	-0.143	-0.075	-0.132
	(1.40)	(1.71)*	(0.52)	(0.80)
Externals/board size (%)	0.008	0.010	0.000	0.007
	(1.31)	(1.38)	(0.01)	(0.39)
Log of Total Assets	-0.122	-0.114	-0.080	-0.104
	(2.05)**	(1.69)*	(0.69)	(0.81)
S&G expenditure/Total assets	1.122	0.955	1.531	1.572
	(2.78)***	(1.96)**	(2.32)**	(2.21)**
Growth in sales (%), previous 2 years	-0.004	-0.009	0.000	0.000
	(0.71)	(0.96)	(0.04)	(0.03)
Intangibles/Total assets	0.488	-0.286	0.981	0.053
	(1.45)	(0.80)	(0.92)	(0.04)
Constant	1.255	1.643	1.051	1.102
	(1.76)*	(2.02)**	(1.11)	(1.07)
Dependent variable: board rotation / size (%)				
Log of Tobin's q	-1.212	-2.725	-0.565	-1.068
	(0.51)	(1.55)	(0.36)	(0.93)
Board size	-0.555	-0.242	-0.475	-0.320
	(1.68)*	(0.77)	(2.23)**	(1.52)
Growth in sales (%), previous 2 years	-0.073	-0.070	-0.005	-0.008
	(1.59)	(1.53)	(0.15)	(0.26)
EBDIT margin (average of previous two years)		-0.236**		-0.207***
		(2.05)		(2.55)
Constant	16.386	17.102	12.169	13.868
	(3.95)***	(3.96)***	(4.53)***	(5.05)***
Observations	148	148	133	133

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level (two tailed tests). Estimation method is 3SLS. The top panel in the table shows the results from estimating equation [1]; the lower panel from estimating equation [2]. None of the regressions include time dummies (these were included in the full sample regression but they were not significantly different from zero as a group).

4.2. A simplified model

The previous section indicated that the issue of endogeneity does not appear critical: there was little indication of simultaneous causation when using Tobin's *q*. Similarly, even when past profitability was included as an explanatory, the effect was low in magnitude. The analysis also suggested that the relationship between board rotation and performance is non-monotonic. This suggests the use of dummy variable analysis to identify critical thresholds in the relationship.

In this section we use average performance over four years as the dependent variable. In parallel with this we also take the average rate of board rotation over four years as the explanatory variable. As discussed above, annual data allow substantial noise to enter the measurement of these variables, hence there is a strong argument for using averages.[5] Table 4 shows the results of regressing performance on a set of five dummy variables for the percentage of board turnover. Each dummy variable represents a quintile in the distribution (see Table 2). The first column of results uses Tobin's *q* as a dependent variable. The results show that board rotation appears to have no relationship with performance: all of the coefficients on the dummy variable are insignificantly different from zero. In contrast to the simple statistics in Table 1, when we control for other determinants of Tobin's *q*, low board rotation appears not to increase market valuations. Of the other control variables, only the growth in sales and the ratio of S&G expenditure to assets have significant coefficients, both with the expected positive sign.

The second column of results uses average EBDIT margin as the dependent variable (averaged over 1999-2002). Here we find that the coefficient on the 4th quintile dummy variable, which represents firms with average board rotation between 8.6% and 14.6%, is positive. In contrast, the coefficient on the dummy for the 5th quintile is negative, indicating these firms have poorer future profitability. Since the sum of the coefficients on the dummy variables have been constrained to equal zero, the coefficients indicate the difference in profitability from the overall sample average (Suits, 1984). However, in both cases the

[5] In fact, we have run various regressions using annual data (e.g. those in Table 4). In almost all cases we find most coefficients are insignificantly different from zero, indicating that measurement error is a problem in the annual data.

coefficients are not statistically different from zero at conventional significance levels. The third column in Table 4 merges the 2nd and 3rd quintiles into one group (we cannot reject the null hypothesis that the two coefficients are the same) and then re-runs the regression. Now the coefficient on the 4th quintile dummy becomes significant at the 10% level. The final regression in Table 4 does not enter all the dummy variables, only those for the 1st and 4th quintile. The results indicate that it is only those firms with relatively high board rotation that have a profitability premium. The magnitude of the coefficient suggests that firms in the 4th quintile have an EBDIT margin around 6% higher than the mean (which is 17% for the sample).

Table 4 Regression analysis of four year averages

Explanatory variables	Dependent variable: Tobin's q	EBDIT margin (1999-2002)	EBDIT margin (1999-2002)	EBDIT margin (1999-2002)
Board rotation dummy variables				
Lowest quintile	0.194	3.070	4.976	5.034
	(0.93)	(1.17)	(1.44)	(1.16)
2nd quintile	-0.078	-1.986		
	(0.37)	(0.74)	-8.860	
			(1.15)	
3rd quintile	0.093	-1.187		
	(0.44)	(0.45)		
4th quintile	-0.098	4.075	5.971	6.089
	(0.46)	(1.52)	(1.68)*	(2.08)**
Highest Quartile	-0.111	-3.971	-2.087	
	(0.53)	(1.50)	(0.60)	
Externals/board size (%)	0.005	0.123	0.111	0.032
	(0.53)	(0.95)	(0.89)	(0.22)
Log of Total Assets	-0.073	0.727	0.660	-0.467
	(0.89)	(0.71)	(0.67)	(0.48)
S&G expenditure/Total assets	1.305	-8.811	-9.288	-12.536
	(2.22)**	(1.19)	(1.28)	(1.53)
Intangibles/Total assets	1.058	23.661	23.471	22.362
	(1.43)	(2.54)**	(2.57)**	(2.84)***
Growth in sales (%), previous 2 years	0.026	0.148	0.139	0.083
	(1.75)*	(0.80)	(0.80)	(0.52)
Observations	37	37	37	37

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level (two tailed tests). Regressions (1) and (2) include a full set of dummy variables for each quintile of board rotation (taken as an average over four years). In order to estimate the regression we impose the constraint that the coefficients on the dummies sum to zero and omit the constant from the regression. Regression (3) collapse quintiles 2 and 3 into a single dummy variable (imposing the same condition). The final regression estimates a simple OLS (with robust standard errors) and only includes a dummy variable for quintile 1 and 4. Re-estimating the regressions in the Table after omitting insignificant explanatory variables makes little difference to the results.

5. Conclusions

This paper has analysed the link between board rotation and performance in a sample of 37 consumer firms in the S&P 500. Motivation for the analysis comes from the idea of groupthink, the situation where a board can become overly cohesive, rejecting external input, and leading to poor business decisions. Psychologists, consultants and management scientists consider groupthink a serious problem for organisations. This paper presents an empirical method of testing such a view. The test is motivated by the most basic solution to groupthink, namely, to regularly introduce new group members, which in the present context means new board members. Using data on board size and board turnover, we construct a measure of board rotation (the proportion of the board that is replaced each year). Since the possibility of groupthink should be lower when board rotation is higher, this provides a method of testing for the influence of groupthink.

Since there appears to be no previous empirical analysis on the link between board rotation and performance, the paper has proceeded in a specific way. First, we consider only S&P500 consumer firms as these represent firms in an established and relatively stable industry, which attract substantial stock market analysis. Second, we analyse the period between 1995 and 1998, prior to the period of most rapid growth in share prices. Third, we consider both a stock market measure of performance (Tobin's q) and a forward looking profitability measure (the average EBDIT margin over the next four years). Lastly, we take care to use a range of empirical methodologies, varying from simple summary statistics to simultaneous equation models.

The data show that the mean board rotation across all firms and years is 8.6%, or one director, in any given year. However, there is substantial variation across firms, with around 40% of firms maintaining the same board over two years and one firm where 60% of directors left within a year. The large variation in board rotation across firms and years is thought provoking, since one might expect such large differences in board structures to have some effect on decision making and, in turn, performance.

An analysis of the mean and median Tobin's q across firms reveals that firms with the lowest board rotation have the highest q. This is most striking when we take a four

year average of q for each firm, finding that firms in the lowest quintile of board rotation have a q of 2.8, while firms in the top quintile have a q of 1.4. This suggests that the share market places a premium on board continuity, with the implication being that experience and stability are dominant factors in achieving optimal business decisions. Put another way, the share market appears unconcerned about the possibility of groupthink, at least to the extent that board rotation may be necessary to prevent its effects. The situation is, however, considerably different if we use future profitability as a performance measure. In this case the analysis shows that firms with relatively high board rotation, namely three directors a year or between 8.6% and 14.6% (when taken as an average over the four years of data), achieve the highest EBDIT margin (as measured by the mean or median). Thus there is some evidence that the lack of board rotation, and by assumption the presence of groupthink, may adversely affect profitability.

A drawback of the simple statistical analysis discussed above is that it cannot control for third factors or potential reverse causation. The latter may be particularly important since, although this paper is based on the hypothesis that board rotation can affect firm performance, it is clearly possible that performance could affect rotation. In fact, there is a literature that finds that poor performance raises CEO turnover (although this literature does not analyse the overall impact on board rotation). We test for a performance to board rotation effect in our sample and find that some reverse causation does occur, with poor profitability in previous years raising board rotation. However, the magnitude of this effect is relatively small. In addition, if reverse causation is present it will tend to reduce the magnitude of any positive effects running between board rotation and performance that we do find (since the negative performance-to-rotation mechanism would tend to offset any positive board rotation-to-performance relationship).

The regression analysis finds that a simultaneous equations model performs poorly with the limited data available, although it does indicate that reverse causation is not an important mechanism. Given this, the analysis utilises a simple OLS regression analysis in which we control for other potential determinants of performance (such as the number of external directors, firm size, intangibles and past growth). The results indicate that there is no significant partial correlation between Tobin's q and board

rotation. However, using future profitability as a performance measure the analysis again finds that firms with relatively high board rotation between 8.6% and 14.6% perform better than average. The magnitude of the effect suggests that such firms have a 6% higher EDBIT margin than average. This gives rise to the idea of a 'board rotation principle' where firms endeavour to replace board members at this rate.

While this paper has provided some important evidence of the role of board rotation in performance, it is important to acknowledge that this represents an analysis on a relatively small set of firms over only a four year period. Future research should aim to expand the data set to a much wider group of firms. This said, the analysis suggests that, in the mid-1990s and in one industry at least, the stock market may have overlooked the importance of board rotation.

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Appendix 1 Data description

Summary Statistics

Annual data (n=148)	Mean	Std. Dev.	Min	Max
Variable				
Log of Tobin's q	0.49	0.70	-1.09	2.24
EBDIT margin	16.67	6.96	4.04	34.24
EBDIT margin (next four years)	17.16	7.73	5.53	34.97
Board vacations	1.01	1.21	0.00	8.00
Vacations/board size (%)	8.57	10.23	0.00	61.54
Board size	12.24	2.52	6.00	19.00
Externals/board size (%)	79.92	10.45	53.85	93.75
Log of Total Assets	8.64	1.16	6.29	12.54
S&G expenditure/Total assets	0.32	0.20	0.00	0.93
Intangibles/Total assets	0.12	0.15	0.00	0.54
Growth in sales (%), previous 2 years	5.94	18.21	-110.03	90.76

Averaged data (n=37)	Mean	Std. Dev.	Min	Max
Variable				
Log of Tobin's q	0.49	0.68	-1.01	1.99
EBDIT margin	16.16	6.49	4.71	30.90
EBDIT margin (1999-2002)	17.01	8.41	5.83	34.23
Vacations/board size (%)	8.57	6.13	0.00	23.19
Board size	12.24	2.41	6.20	18.20
Externals/board size (%)	79.25	9.88	58.30	93.67
Log of Total Assets	8.52	1.18	6.20	12.34
S&G expenditure/Total assets	0.33	0.20	0.00	0.90
Intangibles/Total assets	0.11	0.14	0.00	0.47
Growth in sales (%), previous 2 years	6.38	7.19	-10.19	25.80

Tobin's q is defined as 'market value + long run debt + current liabilities – current liabilities' divided by total assets, as reported in balance sheet. This is based on Chung and Pruitt (1994) definitions. The balance sheet, profit and loss and share market data come from COMPUSTAT. The board information – including size, number of board members vacating and number of independent external directors – were found by searching the Security and Exchange Commission's website and specifically 10K annual reports. One issue concerns the accuracy of board information in these reports. An order of the SEC pursuant to Section 21(a) of the Securities Exchange Act of 1934 was issued on 2002 which stated "[now], under current requirements, the CEO, the CFO, the principal accounting officer and at least a company's board of directors must sign annual reports on Form 10-K, while the CFO or principal accounting officer must sign its quarterly reports on Form 10-Q. […] This is required both actively and retroactively through 1993" (SEC Release No. 34-46079). Thus, we consider the board information on 10-K reports to be accurate.

Data sample

Name	Board vacations (95-98)	Board rotation (%) (95-98)	Sales Billions (95-98)	Tobin's q (95-98)	EBDIT margin (%) (99-02)
AMERICAN GREETINGS -CL A	0.25	2.78	2,058	0.99	11.3
ANHEUSER-BUSCH COS INC	0.75	5.00	10,884	1.99	27.1
ARCHER-DANIELS-MIDLAND	3	22.21	14,390	0.88	7.4
BLACK & DECKER CORP	0.5	6.25	4,795	0.91	13.7
BRUNSWICK CORP	1.25	10.93	3,451	0.84	28.9
CAMPBELL SOUP CO	1	6.25	7,191	3.15	24.6
CARNIVAL CORP	0.25	1.79	2,417	2.45	32.9
CLOROX CO/DE	0.5	4.01	2,881	2.31	23.6
COCA-COLA CO	0.5	3.71	18,561	7.29	30.2
COLGATE-PALMOLIVE CO	0.25	2.50	8,784	2.28	23.3
CONAGRA INC	0.25	1.67	24,193	1.21	7.7
COOPER TIRE & RUBBER	1.75	18.61	1,701	1.34	13.9
COORS (ADOLPH) -CL B	0	0.00	1,782	0.73	12.7
CVS CORP	2.5	19.16	10,807	1.29	6.8
DANA CORP	0.5	5.28	9,271	0.73	9.6
DILLARDS INC -CL A	0.75	5.00	6,264	0.61	5.8
DOLLAR GENERAL	0.5	5.28	1,994	4.13	9.9
DOW JONES & CO INC	2.75	23.19	2,374	2.08	20.5
EASTMAN KODAK CO	1	9.75	14,723	1.49	18.5
FORD MOTOR CO	2	15.90	145,543	0.46	11.8
FORTUNE BRANDS INC	1	8.90	5,226	0.93	17.3
GANNETT CO	1	9.58	4,570	2.15	34.2
GAP INC	0	0.00	4,978	4.89	15.2
GENERAL MILLS INC	1.75	14.10	5,521	3.16	21.1
GENERAL MOTORS CORP	0.75	5.41	163,186	0.36	10.4
GENUINE PARTS CO	1.5	15.00	5,900	1.56	8.5
GILLETTE CO	0.75	7.08	9,153	3.64	27.5
HASBRO INC	0.75	5.01	3,088	1.06	13.1
HEINZ (H J) CO	1.25	7.57	8,941	2.09	18.2
HERSHEY FOODS CORP	2	18.03	4,104	2.22	19.7
HILTON HOTELS CORP	1.25	10.80	3,154	1.47	33.5
HOME DEPOT INC	0.5	4.77	17,910	4.49	10.6
KELLOGG CO	0.5	4.01	6,818	3.37	20.8
KROGER CO	1.25	8.59	25,970	1.76	6.9
LIMITED INC	0.75	6.09	8,374	1.39	11.7
LIZ CLAIBORNE INC	1.25	14.31	2,312	1.21	13.1
LOWES COS	1	8.43	7,981	2.26	9.7

Appendix 2 Summary statistics

Table A1 Board rotation and median performance (annual data)

Board turnover (annual data)	Number of firms	Median Tobin's q	Median EBDIT margin	Median EBDIT margin (next 4 years)
None	59	1.75	16.21	17.36
One director	54	1.62	15.18	13.57
Two directors	20	1.62	16.68	16.96
Three directors	9	1.31	18.98	19.07
Four or more	6	1.57	15.05	13.9
Total	148	1.63	16.15	16.31

Table A2 Board rotation and median performance (four year averages)

Board turnover (four year averages)	Number of firms	Mean Tobin's q	Mean EBDIT margin	Mean EBDIT margin (1999-2002)
Lowest quintile	7	2.28	17.29	15.22
2nd quintile	8	2.15	14.08	11.83
3rd quintile	7	2.09	13.89	13.72
4th quintile	8	1.48	19.10	19.78
Highest quintile	7	1.34	16.22	11.78
Total	37	1.56	16.22	13.87