INTERTEMPORAL ENDOGENEITY IN BOARD COMPOSITION AND FINANCIAL PERFORMANCE*

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Abstract

The impact of board composition on overall financial performance is not at all clear. One problem with measuring their relation may be that board of director composition and financial performance are endogenously determined. A second problem may be that due to fixed board terms and periodic financial reporting, the relation may be intertemporal. We develop a theory of intertemporal endogeneity of board composition and financial performance. Using causality tests in panel regressions with three years of data for 130 closed-end mutual funds, we find only minimal evidence of intertemporal endogeneity. The evidence that board composition influences financial performance is not very strong and depends on the definitions of financial performance and board composition as well as the type of statistical model employed. We do find somewhat stronger evidence that prior financial performance impacts board composition, but the relation depends on how we define board composition.

Keywords: board of directors, financial performance, board composition

Introduction

Does the composition of a board of directors influence firm performance, or does firm performance influence the composition of the board? Perhaps both forces are at work simultaneously, implying that financial performance and board of director composition are endogenously determined. Prior research on the relation between board composition and financial performance has yielded mixed results. In a meta-analysis, Dalton, Daily, Ellstrand & Johnson (1998) find no overall support for the hypothesis that board composition significantly influences financial performance.

The idea that board composition and financial performance may be endogenously related is not new (Hermalin & Weisbach, 2000). However, due to fixed board terms and periodic financial reporting, the relation may be intertemporal as well. We, therefore, propose a theory of intertemporal endogeneity. Intertemporal endogeneity is the idea that board composition in one period influences financial performance in later periods, and financial performance in one period influences board composition in later periods. Thus, board composition and financial performance influence each other but the effect is delayed.

There are several measurement issues (such as differences in accounting and reporting across industries) that may make finding a relation between board composition and financial performance difficult at best. To mitigate these measurement problems, we utilize a sample of closed-end mutual funds, an industry with very standardized measures of performance.

We find some evidence that performance influences board composition across time, but only very limited evidence that board composition influences performance across time. Given that the stronger causal link goes from financial performance to board composition than from board composition to financial performance, we cannot conclude that the relation between them is intertemporally endogenous. In addition, our findings are sensitive to the type of econometric model as well as the definitions of financial performance and board composition.

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Intertemporal endogeneity

There has been considerable research in several disciplines on how boards of directors and their composition influence outcomes for corporations.

Hermalin and Weisbach (2000) argue that the two important questions related to board of director research are:

- How do board characteristics affect the observable actions of the board?
- How do board characteristics such as composition affect profitability?

A considerable body of research appears to indicate that in specific situations with agency-related implications, board composition makes a difference. In general, studies on board composition and director decisions in specific situations find that more independent boards better serve shareholder interests. This relation between board decisions in specific situations and board composition has been found, for example, in takeovers (Byrd & Hickman, 1992; Cotter, Shivdasani & Zenner, 1997); management buyouts (Lee, Rosenstein, Rangan, & Davidson, 1992); bankruptcy (Daily & Dalton, 1994); management compensation decisions (Conyon & Peck, 1998; Core, Holthausen, & Larcker, 1999); CEO turnover (Weisbach, 1988); and poison pill adoption (Brickley, Coles & Terry, 1994).

Research on the second question has generally found an insignificant relation between board composition and overall longer-term corporate performance (Baysinger & Butler, 1985; Hermalin & Weisbach, 1991; Mehran, 1995; Dalton, Daily, Ellstrand, & Johnson 1998; Klein, 1998; and Bhagat & Black, 2000). These insignificant results occur with either accounting measures of performance or Tobin's q.

Hermalin and Weisbach (2000) point out that insignificant results could be caused by an incomplete understanding of the equilibrium relation or determinants of board composition and performance in that "some other factor is causing" them (p. 3).

In addition, if there are many factors that influence financial performance, then the marginal impact of board composition may be small. Similarly, if there are many determinants of board composition, the impact of financial performance may, at the margin, be small.

Figure 1 contains a diagram showing the traditionally assumed relation between board composition and financial performance. In the transitional model, we assume that board composition (greater independence of board members) would lead to better financial decisions and reduced agency problems. The implications of the traditional model are that companies with greater board independence would have better financial performance.

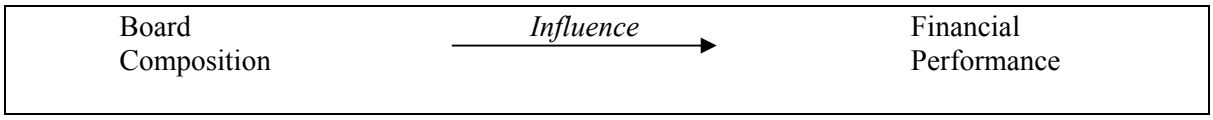

Fig. 1. Traditional hypothesized relation between board composition and financial performance

Hermalin and Weisbach (2000) argue further that the relation could be endogenous. That is, rather than board composition influencing performance, or performance influencing board composition, board composition and performance jointly influence each other. Figure 2 demonstrates the endogenous relation between board composition and financial performance. In the endogenous model, the influence between financial performance and board composition works both ways. Intuitively, the endogenous relation would work as follows. Poor performance would cause shareholders to elect a more independent board. The independent board would have a positive influence on financial performance. Thus, board composition and performance jointly influence each other.

Empirical work addressing the endogeneity issue has not yielded significant findings. Hermalin and Weisbach (1991) and Bhagat and Black (2000) find no relation between performance and board composition and are not able to conclude an endogenous relation.

Whether the lack of significance implies that there is no relation or whether it implies that measurement problems and determination of the factors affecting equilibrium make the relation too difficult to measure suggests a need for continued research with other approaches.

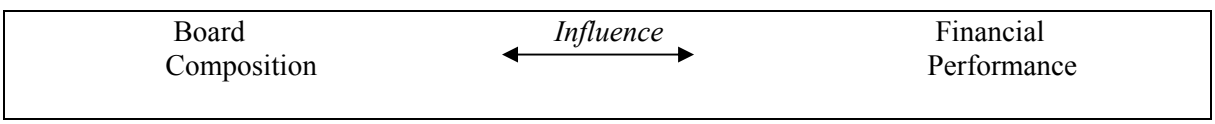

Fig. 2. Endogenous relation between board composition and financial performance

An additional problem in developing a model to test endogeneity is that the variables do not adjust to a new equilibrium instantaneously. While actual financial performance is determined across time, operating performance is only measured and reported periodically. Companies publish quarterly and annual reports and rarely report results more frequently. There may be a lag in the impact of the published reports on board composition. Market-based performance measures, on the other hand, can adjust and be measured nearly continually when financial markets are open. Board membership, however, is typically static for at least a year. Once board members are elected, they normally serve a term of one to three years. Rarely, is a board member replaced early. Thus, there may be lags in any movement toward equilibrium. Poor performance this year may not affect board composition until later years and board composition changes may not impact performance immediately. Staggered board terms can exacerbate this measurement problem.

This provides us with the theory of intertemporal endogeneity. Figure 3 depicts the intertemporal endogenous relation between board composition and financial performance. In time period 1, board composition would influence company decisions. With the delay in how these decisions impact performance and the delays in financial reporting, the results might not be apparent until period 2. The relation may be endogenous so the influence works in the other direction as well. Financial results in period 1 may lead to board changes. Given fixed board terms, these changes would not affect board composition until time period 2, at the earliest. Similarly, board structure in period 2 would likely not impact financial performance until at least period 3. Financial performance in period 2 would not affect board composition until a later time period, and so on.

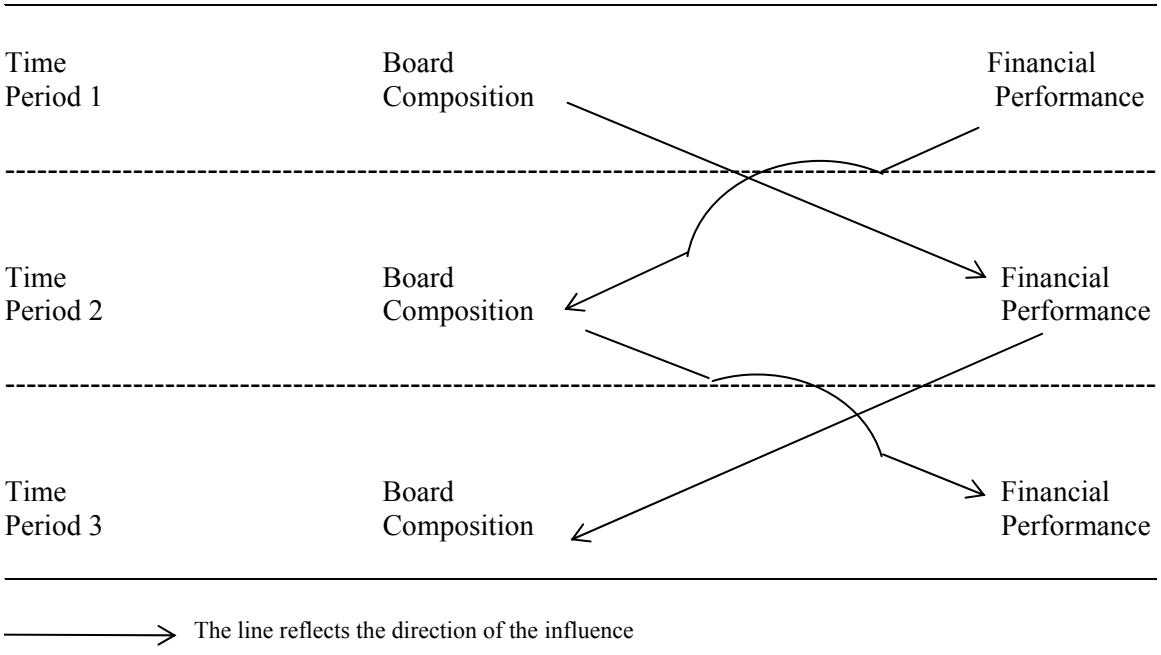

Fig. 3. Intertemporal endogeneity between board composition and financial performance

Our hypothesis then is:
H: *Financial performance in one period will influence board composition in later time periods, and board composition in one period will influence financial performance in later time periods.*

Methodology

Our choice of sample and statistical procedure represent attempts to improve the analysis of the performance-board composition endogeneity question. One problem in understanding the relation between financial performance and board composition is that identifying the determinants of board composition is not easy. Ideally, shareholders elect board members who best serve their interests. When a company has performed poorly, shareholders may be inclined to make a board more independent. In practice, however, a company through the nominating committee of the current board generally proposes board candidates, and shareholders vote to affirm the slate of candidates or not. The causal link from board composition to financial performance may be weak and influenced by many factors including past and current directors.

Another problem in measuring the link between board composition and performance is that financial performance is also probably a function of many factors (Hermalin & Weisbach, 2000). These factors may be external to a firm or may be internal (e.g., management performance). Moreover, the factors influencing performance may be difficult to measure and control in a study and may vary across company types and industries. We hope to mitigate the measurement problems inherent in this type of research by focusing on one industry, closed-end mutual funds.

Sample

We use closed-end mutual funds to test the relation between firm performance and board composition. We examine the intertemporal endogeneity issue in the closed-end mutual fund industry for several reasons. First, performance measurements in this industry are relatively standardized, so we do not have to address issues concerning accounting differences among sample firms. Second, closed-end mutual funds have shares that trade, so we can measure stock market performance as well as accounting performance. Third, because mutual fund assets are primarily financial assets, asset homogeneity permits relatively easy comparisons of performance across the sample. Fourth, closed-end funds specify their type of investments, making an investment objective-controlled comparison relatively straightforward. Finally, closed-end mutual funds have been characterized as an industry with severe agency problems (Barclay, Holderness, & Pontiff, 1993). If agency problems are indeed severe in this industry, a board may play an important role in resolving them. We might be able to observe a relation in closed-end funds that would be too small to observe in other industries.

We obtain our sample from the 263 closed-end funds covered by CDA/Wiesenberger over the years 1994, 1995, and 1996. We include both equity and bond funds as well as domestic and foreign funds. We have excluded funds that invest primarily in municipal securities. Since we are using balanced panel data regressions and need continuous data, we exclude 63 funds whose inception dates occurred after 1994. We then attempted to obtain proxy statements for the remaining closed-end funds for each of the three years. With balanced panel data, if a proxy statement is not available in one year, we must eliminate the company from the entire sample. We were able to obtain proxy statements for 130 funds for each of the three years (for a total of 390 proxies). Our sample represents 63% of the total closed-end fund market capitalization as of the end of 1996.

Our sample includes 23 domestic equity funds, 43 foreign equity funds, 39 domestic bond funds, and 25 foreign bond funds. Domestic equity makes up 22.8% of the sample by asset size, foreign equity 24.7%, domestic bonds 21.0%, and foreign bonds 31.5%.

Director Classification

Following Baysinger and Butler (1985), most board studies categorize directors into three groups. The first group is inside directors, who are employed by the firm in some capacity other than as a director. The second group of directors is affiliated directors. These directors are not employees but have a relationship with the firm, such as a family member of an employee, previous employment with the firm, or a consultant, supplier, banker or lawyer of the firm. The third group consists of all other directors, who are considered to be independent outsiders.

Table 1. Director classifications

Boards of directors are first classified into two main categories: "interested directors" vs. "disinterested directors" as classified under the 1940 Investment Company Act. They are also the "inside directors" vs. "outside directors" as defined by the traditional two-way classification framework. The outside directors are further classified into three types according to their degree of independence. Affiliated outside directors, independent outside directors who also sit on other boards within the same fund family, and independent outside directors whose only contact with the fund is as a director.

Director Type	Director Definition
Inside Directors (Interested)	Directors who are also fund executives and serve in at least one of the following categories: Management of the fund Management of the investment advisor
Outside Directors (Disinterested) 1. Affiliated Outside Directors	Directors who are not fund executives Outside directors in at least one of the following categories: Management or employee of other mutual funds under the same investment advisor Former manager or employee of the fund

Table 1 continued

	Relatives of current or former management Lawyers/investment bankers/consultants whose firm has business transactions with the fund
2. Fund Family Directors	Outside directors who also sit on other boards within the same fund family but has no other contact with the fund
3. Independent Directors	Outside directors sitting on the board of only one fund whose only contact with the fund is as a director

We follow this conventional board classification scheme as well, but we further divide the independent outsiders into those that sit on multiple boards within a family of funds and those that do not. When directors sit on multiple boards in a fund family, they often draw substantial salaries. There is some evidence to suggest that these large salaries can compromise their independence. Hence, we define the independent directors in this way. The fund family-outside director category in our board classification is only relevant for mutual funds. While closed-end fund shareholders may question the true independence of directors who sit on multiple boards and collect large amounts of compensation from the fund family, others argue that multiple directorships may actually benefit shareholders through reduced director compensation costs as the result of economies of scale. Since the independence and benefits of fund family directors can be questioned, we use this additional director classification scheme as well as the more traditional approach.

Table 1 describes our specific director classification scheme. We analyze three combinations of director classification.

First, we divide directors into insiders and outsiders to be consistent with director classification for investment companies under securities laws. Inside directors are called "interested directors"; outsiders are called "disinterested" directors following section 2 (a) (19) (A) (vi) of the 1940 Investment Company Act.

Thus, our first classification is consistent with this law, and outside directors include directors that are normally classified as independent and affiliated.

Second, we use the traditional classification as in Baysinger and Butler (1985). Here, we group affiliated outsiders with insiders, leaving the fund family directors and independent directors together. In our third and final grouping, we consider only the independent directors as outsiders, dropping the fund family directors from the second grouping procedure.

Table 2. Board composition

Summary statistics of board composition characteristics for the full sample of 390 fund-year observations for the period of 1994-1996; Board of director data come from a fund's annual proxy statement.

Variable	Fund Type	Mean	Median	Std.Dev.	Minimum	Maximum	N
Board Size	All Funds	8.8	8.0	2.7	4.0	16.0	390
Percentage of Inside (Interested) Directors	All Funds	19.8%	18.2%	11.9%	0.0%	62.5%	390
Percentage of Outside (Disinterested) Directors	All Funds	80.2%	81.8%	11.8%	37.5%	100.0%	390
Percentage of Affiliated Directors	All Funds	10.4%	8.3%	12.3%	0.0%	41.7%	390
Percentage of Fund Family Directors	All Funds	53.8%	63.6%	28.6%	0.0%	91.7%	390
Percentage of Independent Directors	All Funds	16.0%	0.0%	27.1%	0.0%	87.5%	390

Table 2 shows summary statistics for board of director categories in our sample. The average board in the sample has 8.8 members. Inside directors average 19.8% of the boards, and outsiders 80.2%. Outsiders can be affiliated directors (10.4% of total board), fund family directors (53.8% of the total board), or independent directors (16.0% of the total board).

Director shareholdings may help directors to be better monitors, since ownership ties a director's personal wealth to the performance of a company. Hence, we control for director shareholdings.

Table 3 shows ownership for each category of directors. The median ownership for most categories of directors is 0%.

Table 3. Board ownership

Summary statistics of board ownership characteristics for the full sample of 390 fund-year observations for the period of 1994-1996. Board ownership come from a fund's annual proxy statement.

Variable Name	Fund Type	Mean	Median	Std.Dev.	Minimum	Maximum	N
Percentage of Shares Owned by Inside (Interested) Directors	All Funds	0.06%	0.00%	0.18%	0.00%	2.08%	390
Percentage of Shares Owned by Outside (Disinterested) Directors	All Funds	0.10%	0.00%	0.29%	0.00%	3.15%	390
Percentage of Shares Owned by Affiliated Directors	All Funds	0.03%	0.00%	0.21%	0.00%	2.46%	390
Percentage of Shares Owned by Fund Family Directors	All Funds	0.04%	0.01%	0.11%	0.00%	0.94%	390
Percentage of Shares Owned by Independent Directors	All Funds	0.03%	0.00%	0.09%	0.00%	0.70%	390

Statistical Procedure

Endogeneity implies that causality runs both ways between corporate performance and board composition. If causality runs in only one direction, then we would conclude that the relation is not endogenous.

To test for intertemporal causality with panel data, we use a simple cross-lagged regression model as in Rogosa (1980), Bateman and Strasser (1983), and Davidson, Rangan, and Rosenstein (1997):

$$performance_{i,t} = \delta_0 + \delta_1\, performance_{i,t-1} + \delta_2\, board\ composition_{i,\,t-1} + E_{i,t} \quad (1a)$$

$$board\ composition_{i,\,t} = \delta_0 + \delta_1\, performance_{i,t-1} + \delta_2\, board\ composition_{i,\,t-1} + E_{i,t} \quad (1b)$$

In equation 1a, we regress year t financial performance against lagged values of itself and the lagged values of board composition. In equation 1a, we would conclude that there is a causal relation, with board composition causing performance, if δ_2 is statistically significant. In equation 1b, we regress year t board composition against the lagged values for financial performance and the lagged value for board composition.

We would conclude that there is a causal relation, with performance causing board composition, if δ_1 is statistically significant. To reach a conclusion of endogeneity between financial performance and board composition requires examining both equations. A significant value for both cross-lagged parameters would imply reciprocal causality, which would be consistent with endogeneity. If there is endogeneity, we would expect both δ_2 in equation 1a and δ_1 in equation 1b to be significant; that is, there would be reciprocal intertemporal causality. This would be evidence consistent with our hypothesis.

Green (1997) maintains that panel data sets allow researchers to capture both time series and cross-sectional relations. There are both fixed-effects and random-effects panel models. The fixed-effects model assumes "that differences across units can be captured in differences in the constant term" (Green, 1997, p. 615). The fixed-effect model would be appropriate when a study includes the full set of possible sample points (Green, 1997, p. 623). If the constant term is randomly distributed when sample points are drawn from a much larger population, the random effects model is appropriate.

Hsiao (1986) argues that when "inferences are going to be confined to the effects of the model, the effects are more appropriately considered fixed" (p. 43). In our study, this would imply that we are trying to determine only how our 130 sample funds behave, and that we are not trying to extend our results by drawing conclusions about other firms.

Hsiao (1986) continues, "when inferences will be made about a population of effects from which those in the data are considered to be a random sample, then the effects should be considered random" (p. 43). For completeness, and since Hsiao maintains that choice of the model depends on the inference

that the investigator wishes to draw, we report results of both types of statistical models.

Measuring Financial Performance

We measure financial performance in several ways. First, we obtain each fund's one year raw return from CDA/Wiesenberger for each sample year. Following the industry adjustments suggested by Barber and Lyon (1996) when examining operating performance, we subtract the returns of one of four indices from each fund's raw return. For domestic equity funds, we control for market performance with the S & P 500 Composite Index return for that same year. For foreign equity funds, we use the Morgan Stanley Capital International EAFE Index return. For domestic bond funds, we use the Lehman Brother Corporate/Government Index return, and for foreign bond funds we use the Saloman Brothers Non-U.S. Government Bond Index return. This gives us the fund objective-adjusted returns. Objective adjusted returns are appropriate because they let us measure performance that is better or worse than average for the type of security in the mutual funds portfolio.

For our second measure of financial performance, we use the premium/discount ratio. This ratio is the fund's market price less its net asset value divided by net asset value. A positive value indicates that the fund is trading at a premium, while a negative value indicates that it is trading at a discount. For our purposes, we measure the premium/discount ratio at the end of each month in a year and average these twelve values. The premium/discount ratio is a measure of financial performance that includes market data, the funds stock price, as well as accounting information, the book value of assets.

We also measure performance using Jensen's (1968) alpha. This measure is commonly used to measure the stock market performance of a company over time. Jensen's alpha, α_{jt}, can be computed as:

$$a_{jt} = \left(R_{jt} - R_{ft}\right) - \left[\hat{\beta}_j \left(R_{mt} - R_{ft}\right)\right] \quad (2)$$

where:

R_{ft} = return on T-bills measured separately for each of the three years;

$\hat{\beta}_j$ = the systematic risk estimate computed from daily returns for firm j; and

R_{mt} = return on the market as proxied by the CRSP equally weighted index.

If α_{jt} is positive, then we would conclude that after adjusting for risk and market movement, the closed-end fund has positive abnormal performance.

Results

Table 4 provides panel regression results for the models in equations 1a and 1b. We show results for both fixed-effects and random-effects models. Here, financial performance is the objective-adjusted return for each fund.

In Panel A, we define the board composition variable to be the proportion of outside (non-employee) directors of the fund pursuant to the Investment Company Act definition for investment company directors as either "interested" and "disinterested" directors.

Table 4. Panel regression results for the models in equations 1a and 1b

Panel Regression results relating closed-end fund operating performance to board composition. Financial performance is measured as each fund's annual return less an objective-related benchmark return. This is the objective-adjusted return. We measure board composition in Panel A as the board's proportion of outside (non-employee) directors. In Panel B, we measure board composition as the board's proportion of fund family directors (directors on more than one board in a family of funds) plus independent directors. In Panel C, we measure board composition as the board's proportion of independent directors. The ownership variable is the proportion of the funds common stock owned by the category of outside directors defined differently in each of the three panels. A variable labeled t is the contemporaneous value of this variable while t-1 refers to the lagged value of the variable. We also control for the natural log of fund size. In parenthesis below each coefficient is the corresponding t-statistic.

Panel A: Board Composition Based on Percentage of Outside Directors

Model Type	Dependent Variable (year t)	Intercept	Objective-Adjusted Return (t-1)	Board Composition (t-1)	Ownership (t)	ln size of fund	Regression Statistic
(fixed)	Obj.-Adj. Return	1.1971	-0.3659	0.0033	12.8847	-0.2449	F = 2.17***
		(2.56)*	(-5.73)***	(0.01)	(0.97)	(-3.21)**	
(random)	Obj.-Adj. Return	-0.1128	-0.1869	0.1485	2.2169	-0.0020	M = 88.65
		(-1.37)	(-3.51)***	(1.90)†	(0.68)	(-0.17)	
(fixed)	Board Comp.	0.5384	-0.0931	0.2055	-1.9364	0.0312	F = 2.52***
		(3.58)***	(-4.53)***	(2.13)*	(-0.45)	(1.27)	
(random)	Board Comp.	0.1287	-0.0807	0.8572	-0.5275	-0.0014	M = 70.31***
		(4.42)***	(-4.50)***	(30.94)***	(-0.45)	(-0.36)	

Table 4 continued

Panel B: Board Composition Based on Percentage Fund Family and Independent Directors							
(fixed)	Obj.-Adj. Return	1.2567	-0.3644	-0.0579	13.2228	-0.2464	F = 2.19***
		(2.77)**	(-5.79)***	(-0.22)	(0.98)	(-3.22)**	
(random)	Obj.-Adj. Return	-0.0910	-0.1818	0.1174	4.3528	0.0008	M = 93.21***
		(-1.09)	(-3.41)***	(1.44)	(0.63)	(0.07)	
(fixed)	Board Comp.	0.8159	-0.0549	0.1135	-8.7547	-0.0078	F = 2.02***
		(4.18)***	(-2.03)*	(1.02)	(-1.51)	(-0.24)	
(random)	Board Comp.	0.1635	-0.0621	0.8332	-1.9449	-0.0074	M = 52.31***
		(4.70)***	(-2.72)**	(24.43)***	(-0.67)	(-1.57)	
Panel C: Board Composition Based on Percentage of Independent Directors							
(fixed)	Obj.-Adj. Return	1.1489	-0.3857	0.5369	21.0102	-0.2294	F = 2.25***
		(3.14)**	(-6.11)***	(1.48)	(0.28)	(-3.03)**	
(random)	Obj.-Adj. Return	-0.0008	-0.1912	-0.0282	15.5151	-0.0003	M = 90.15***
		(-0.01)	(-3.58)***	(-0.66)	(1.20)	(-0.02)	
(fixed)	Board Comp.	-0.0453	0.0114	0.2327	17.4147	0.0094	F = 1.99***
		(-0.34)	(0.41)	(1.86)†	(0.66)	(0.35)	
(random)	Board Comp.	0.0170	-0.0080	0.9859	1.6281	-0.0031	M = 37.78***
		(0.87)	(-0.39)	(70.51)***	(0.38)	(-0.83)	

*** Significant at 0.001 or better. ** Significant at 0.01 or better. * Significant at 0.05 or better. † Significant at 0.10 or better.

In regressions 1 and 2, we regress year t objective-adjusted return against its lagged value and the lagged value of board composition. The coefficient for the lagged value of objective adjusted return is highly significant. The coefficient for the lagged board composition variable is insignificant in the fixed-effects model and only marginally significant (at 0.10) in the random effects model.

In regressions 3 and 4, we regress board composition as measured by the percent of outside directors in year t against the lagged value of the objective-adjusted returns and lagged board composition. The coefficient for the lagged objective-adjusted return is negative and highly significant in both models. Poor performance in year t-1 is associated with greater year t board independence. The Panel A results suggest that the relation between financial performance and board composition has reciprocal causality. This evidence is consistent with the hypothesis that financial performance and board composition are endogenously determined. The causal relation from board composition to performance, however, is weak and occurs in only one model. There appears to be a stronger relation that performance affects board composition. Panel B repeats regressions 1-4, using a new definition for board composition. Here, we define the variable, board composition, as the sum of the proportions of fund family and independent directors, eliminating affiliated directors. In regressions 5 and 6, we find that the coefficients for lagged board composition, when regressed against contemporaneous objective-adjusted returns, are statistically insignificant. In regressions 7 and 8, the coefficients for lagged objective-adjusted are negative and statistically significant when regressed against board composition.

The Panel B results indicate no reciprocal causality. There is evidence instead that causality goes from financial performance to board composition. Here, lagged board composition does not influence (cause) financial performance.

In Panel C, we now define the board composition variable as only independent directors, eliminating the fund family directors. Here, the coefficient for lagged board composition is insignificant when regressed against contemporaneous objective-adjusted returns. Furthermore, when we regress lagged objective-adjusted returns against contemporaneous board composition, these coefficients are also insignificant. In this panel, with board composition defined very strictly, there are no causal relations found. As comparison of the three panels in Table 4 indicates, our results are sensitive to the measure of board composition. When we define the variable, board composition, based on the "interested" and "disinterested" categories as specified in the Investment Company Act of 1940, there is some weak evidence of endogeneity but considerable evidence that board composition depends on performance. When we define board composition in other ways, endogeneity disappears. That is, we find no significant evidence that board composition influences performance. When we eliminate fund family directors from independent outsiders, we show neither endogeneity nor that performance influences board composition.

Table 5. Panel regression results relating closed-end fund premium/discounts to board composition

Financial performance is measured as the premium/discount ratio. We compute this monthly as the closed-end fund's market price less its net asset value divided by net asset value. We then average this over 12 months to obtain the average premium/discount ratio. We measure board composition in Panel A as the Board's proportion of outside (non-employee) directors. In Panel B, we measure board composition as the board's proportion of fund family directors (directors on more than one board in a family of funds) plus independent directors. In Panel C, we measure board composition as the board's proportion of independent directors. The ownership variable is the proportion of the funds common stock owned by the category of outside director defined differently in each of the three panels. A variable labeled t is the contemporaneous value of this variable while t-1 refers to the lagged value of the variable. We also control for the natural log of fund size. In parenthesis below each coefficient is the corresponding t-statistic.

Panel A: Board Composition Based on Percentage of Outside Directors

Model Type	Dependent Variable (year t)	Intercept	Premium/ Discount Ratio (t-1)	Board Composition (t-1)	Ownership (t)	ln size	Regression Statistic
(fixed)	Prem/Disc.	-0.2963	0.1668	-0.0703	-2.7357	0.0900	F = 3.27***
		(-191)†	(2.17)*	(-0.70)	(-0.60)	(3.51)***	
(random)	Prem/Disc.	-0.0779	0.6532	0.0095	-1.0409	0.0057	M = 88.02***
		(-2.15)*	(15.51)***	(0.28)	(-0.72)	(1.15)	
(fixed)	Board Comp.	0.7055	0.1379	0.1243	-0.9290	0.0080	F = 2.17***
		(4.56)***	(1.79)†	(1.23)	(-0.20)	(0.31)	
(random)	Board Comp.	0.1316	0.0601	0.8599	-0.6125	-0.0018	M = 60.01***
		(4.53)***	(1.72)†	(31.35)***	(-0.53)	(-0.46)	
Panel B: Board Composition Based on Percentage of Fund Family and Independent Directors							
(fixed)	Prem/Disc.	-0.2387	0.1641	-0.1186	-1.9503	0.0864	F = 3.32***
		(-1.56)	(2.14)*	(-1.35)	(-0.42)	(3.37)***	
(random)	Prem/Disc.	-0.0794	0.6519	0.0098	-0.7588	0.0060	M = 90.66***
		(-2.17)*	(15.39)***	(0.28)	(-0.26)	(1.20)	
(fixed)	Board Comp.	0.9788	-0.0949	0.0829	-7.8907	-0.0354	F = 2.01***
		(5.03)***	(-0.97)	(0.74)	(-1.34)	(-1.08)	
(random)	Board Comp.	0.1672	0.0169	0.8354	-2.3316	-0.0082	M = 55.12***
		(4.77)***	(0.41)	(24.17)***	(-0.79)	(-1.69)†	
Panel C: Board Composition Based on Percentage of Independent Directors							
(fixed)	Prem/Disc.	-0.3515	0.1650	-0.1274	1.3099	0.0879	F = 3.28***
		(-2.80)**	(2.14)*	(-1.03)	(0.05)	(3.43)***	
(random)	Prem/Disc.	-0.0722	0.6556	-0.0145	1.5400	0.0062	M = 88.55***
		(-2.72)**	(15.57)***	(-0.78)	(0.28)	(1.27)	
(fixed)	Board Comp.	-0.0512	-0.0950	0.2213	18.3648	0.0124	F = 2.00***
		(-0.41)	(-1.07)	(1.77)†	(0.70)	(0.48)	
(random)	Board Comp.	0.0179	0.0291	0.9865	1.6787	-0.0029	M = 39.22
		(0.91)	(0.83)	(70.48)***	(0.40)	(-0.78)	

*** Significant at 0.001 or better. ** Significant at 0.01 or better. * Significant at 0.05 or better. † Significant at 0.10 or better.

Table 5, repeats the tests in Table 4, with a different definition of financial performance, the monthly average premium/discount ratio. The definition of the board composition variable in each panel corresponds to the definitions in Table 4.

In Panel A, we find no evidence that the lagged board composition (inside vs. outside directors) influences the premium/discount ratio. The same result holds in Panels B and C under different definitions of board composition. The lagged premium/discount ratio in Panel A, however, has a positive coefficient when regressed against board composition. The implication is that a higher premium/discount ratio in year t-1 causes greater board independence in year t. This is somewhat counter-intuitive, but the result disappears in Panels B and C.

Table 6 measures the relation between board composition and financial performance using Jensen's alpha as the measure of performance. The board composition variable definition is consistent with that in Tables 4 and 5.

Table 6. Panel regression results relating Jensen's alpha to board composition

Financial performance is measured as each fund's alpha (Jensen, 1968). We measure board composition in Panel A as the boards proportion of outside (non-employee) directors. In Panel B, we measure board composition as the board's proportion of fund family directors (directors on more than one board in a family of funds) plus independent directors. In Panel C, we measure board composition as the board's proportion of independent directors. The ownership variable is the proportion of the funds common stock owned by the category of director, outside directors in Panel A, independent plus fund family directors in Panel B, and independent directors in Panel C. A variable labeled t is the contemporaneous value of the variable while t-1 refers to the lagged value of the variable. We also control for the natural log of fund size. In parenthesis below each coefficient is the corresponding t-statistic.

Panel A: Board Composition Based on Percentage of Outside Directors

Model Type	Dependent Variable (year t)	Intercept	Alpha (t-1)	Board Composition (t-1)	Ownership (t)	ln size	Regression Statistic
(fixed)	Alpha	0.6481	-0.55550	-0.2603	7.5053	-0.0726	F = 3.85***
		(1.35)	(-8.97)***	(-0.84)	(0.54)	(-0.92)	
(random)	Alpha	-0.0944	-0.2464	0.0927	5.2924	-0.0004	M = 490.70***
		(-0.73)	(-4.34)***	(0.82)	(1.11)	(-0.02)	
(fixed)	Board Composition	0.6140	-0.0639	0.1812	-1.0976	0.0199	F = 2.33***
		(3.98)***	(-3.22)**	(1.81)†	(-0.25)	(0.79)	
(random)	Board Composition	0.1253	-0.0517	0.8582	-0.4255	-0.0016	M = 63.06***
		(4.20)***	(-3.22)**	(31.09)***	(-0.37)	(-0.41)	
Panel B: Board Composition Based on Percentage of Fund Family and Independent Directors							
(fixed)	Alpha	0.7037	-0.5549	-0.2900	10.1869	-0.0799	F = 3.86***
		(1.49)	(-9.05)***	(-1.08)	(0.73)	(-1.01)	
(random)	Alpha	-0.0870	-0.2507	0.0548	15.0401	0.0040	M = 551.21***
		(-0.67)	(-4.42)***	(0.47)	(1.62)	(0.24)	
(fixed)	Board Composition	0.8310	-0.0446	0.1192	-8.2909	-0.0118	F = 2.01***
		(4.24)***	(-1.75)†	(1.06)	(-1.42)	(-0.36)	
(random)	Board Composition	0.1558	-0.0533	0.8359	-1.3082	-0.0071	M = 51.25***
		(4.39)***	(-2.67)**	(24.60)***	(-0.45)	(-1.50)	
Panel C: Board Composition Based on Percentage of Independent Directors							
9. (fixed)	Alpha	0.3398	-0.5730	0.5050	-54.8853	-0.0517	F = 3.85***
		(0.90)	(-9.45)***	(1.55)	(-0.70)	(-0.66)	
10. (random)	Alpha	-0.0115	-0.2578	0.1255	41.3796	0.0004	M = 492.37***
		(-0.11)	(-4.56)***	(2.04)*	(2.22)*	(0.02)	
11. (fixed)	Board Composition	-0.0356	0.0086	0.2329	18.3494	0.0074	F = 1.98***
		(-0.28)	(0.38)	(1.86)†	(0.69)	(0.29)	
12. (random)	Board Composition	0.0172	-0.0124	0.9848	193.56	-0.0031	M = 37.93***
		(0.88)	(-0.75)	(70.01)***	(0.45)	(-0.84)	

***Significant at 0.001 or better. **Significant at 0.01 or better. *Significant at 0.05 or better. †Significant at 0.10 or better.

In Panel A, we first regress alpha from year t against its lagged value and the lagged board composition variable in regressions 1 and 2. We find a significant and negative relation between alpha and its lagged value, but the lagged value of board composition is unrelated to the performance measure. In regressions 3 and 4, year t board composition is the dependent variable. The lagged alpha variable has a significant and negative coefficient in both the fixed and random effects models. Under this definition of board composition, the percentage of outside directors, board composition does not influence performance, but performance influences composition.

The results in Panel B, where we define board composition as the percentage of independent plus fund family directors, are very similar. Performance has a

significant impact on board composition, but the converse is not true.

Finally, in Panel C, where board composition is the percentage of independent directors, we find with the random model, but not the fixed, that board composition positively influences financial performance. Financial performance in this case does not influence board composition.

Conclusion

We propose a theory that the relation between board composition and financial performance is both endogenous and intertemporal. Intertemporal endogeneity predicts that financial performance in one period will impact board composition in a later period which in turn influences financial performance in subsequent periods. Because operating performance and board composition impact each other, the relation is endogenous since financial performance is often measured only periodically and since board composition changes only periodically, the endogenous relation is predicted to be intertemporal. We use causality tests in balanced panel regressions with three years of financial performance and board of director data, for 130 closed-end mutual funds, to address the intertemporal endogeneity issue.

We define financial performance three different ways, objective-adjusted return on assets, an average of 12 month-end premium/discount ratios, and Jensen's (1968) alpha. We also define board of director composition in three ways: by percentage of outside directors, by percentage of independent directors plus fund family directors, and by percentage of independent directors. Overall, we find very limited evidence of endogeneity. The strongest relation appears to be that financial performance is a determinant of board composition, and there is only some very limited evidence that board composition influences performance.

The results are sensitive to the definition of board composition. The significant causal impact of financial performance on board composition is strongest for all measures of financial performance when we measure board composition as percentage of all outside directors, that is when we include affiliated, fund family, and independent directors. The results become insignificant for all three measures of performance when we measure board composition as only independent directors. These findings generally occur for both the fixed and random effects models and across all three measures of financial performance. If we interpret these results that financial performance influences board composition, then it appears that poor financial performance for closed-end funds causes the funds to increase the proportion of outside directors. This relation appears when we consider all outside directors (the disinterested directors as specified in the Investment Company Act) not just independent outsiders.

When we attempt to determine whether board composition influences performance, the results are mixed and rarely significant. In the 18 regressions conducted, we find significance two times, once at the 5% level and once at the 10% level. Given this extremely weak relation, it is difficult to make strong conclusions that the relation between board composition and financial performance is endogenous.

Future research ought to be directed at other industries. That is, if intertemporal endogeneity occurs in closed-end mutual funds (recall, we found only very limited evidence of endogeneity) in which performance measurement problems are minimized, it is important to know if the results can be generalized to other types of companies. In studies such as this, researchers will perhaps need to overcome the performance measurement problems that have little impact on closed-end funds.

In addition, intertemporal endogeneity may apply to other issues as well. For example, Dalton, Daily, Johnson, & Ellstrand (1999) find a positive relation between board size and performance in meta-analysis of 131 samples. Yet others, such as Yermack (1996) find that smaller boards produce better results. It may be that these mixed results occur because the relation between board size and financial performance is endogenous and intertemporal. Future research could be directed at this and other corporate governance issues to see if they conform to intertemporal endogeneity.

We found a much stronger causal relation from financial performance to board composition than the opposite. We may need to redirect the research focus on boards and performance. If board composition does not significantly influence performance, perhaps the opposite is true, performance influences board composition. When we recognize the intertemporal nature of the relation, our results suggest that this may be causal direction. Thus we may need to reevaluate prior board composition and performance studies in light of the evidence that causality seems to go in the opposite direction of prior predictions.

The results of this paper suggest that the debate over the relation between board composition and financial performance is not over. There is an apparent relation between them, but it appears as though the causal effect goes primarily from financial performance to board composition. The effect may also be intertemporal.

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