Estimating the effect of board independence on managerial ownership using a quasi-natural experiment

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Research Objectives

- To gain more understanding on how board independence affects managerial ownership

- A *clean* test of "the effect of board independence on managerial ownership" by using a quasi-natural experiment:-

  - The results are more likely to show a causal effect than what has been documented in the literature, most likely plagued by endogeneity problems

  - Our study is the first to apply this approach to managerial ownership.

Motivation

Why do we need the results from a (quasi-)natural experiment?

In corporate finance, empirical studies often suffer seriously from endogeneity problems, for instance,
- Omitted Variables

$$y = \alpha + \beta x + \gamma z + \epsilon \qquad \text{where } x \text{ and } z \text{ are correlated}$$

if z is omitted, x won't be exogenous

$$y = a + bx + u$$

the OLS estimate will be *biased*!

- Simultaneity

$$y = \alpha + \beta x + \gamma z_1 + \epsilon$$
$$x = c + by + \delta z_2 + u$$

Motivation

Why do we need the results from a (quasi-)natural experiment?

Natural experiment will ensure the exogeneity of the independent variable of interest, thus less troubles from omitted variables and simultaneity

$$y = \alpha + \beta x + \epsilon$$

Unfortunately, natural experiment is difficult in social science. A quasi-natural experiment is possible --- in this research, *a exogenous regulatory shock from outside the firms*

The Sarbanes-Oxley Act of 2002 and the new exchange listing requirements

In 2002,
- First, the Sarbanes-Oxley Act was enacted, intended to raise director accountability in the protection of shareholders.

- Second, to help improve board oversight,
  - NYSE & NASDAQ issued new listing requirements:-
    all listed firms have a majority of independent directors on their board.

➔ This led to an exogenous shock to the internal governance.

Related Studies

Several recent studies exploit this exogenous shock as a natural experiment to examine the impact of board independence on other internal governance mechanisms, such as director characteristics, director costs, CEO compensation, CEO turnover, and CEO power

This empirical strategy seems to be well-accepted in the literature

Engel, Hayes, and Wang, 2007; Leuz, Triantis, and Wang, 2008; Piotroski and Srinivasan, 2008; Chhaochhaoria and Grinstein, 2009; Guthrie, Sokolowsky, and Wan, 2012; Kamar, Karaca-Mandic, and Talley, 2009; Linck, Netter, and Yang, 2009; Guo and Masulis, 2014; Guo, Lach, and Mobbs, 2015; Jiraporn et al., 2016

Motivation

In this study, we focus on two of the most critical governance mechanisms:-
- board independence
- managerial ownership

Independent directors tend to be more objective and less beholden to the CEO. Therefore, board independence is often cited as crucial mechanism that rigorously monitors managers and alleviates the agency conflict between managers and shareholders.

Managerial ownership is also an important governance device. Managers holding large ownership stakes in the firm are less likely to expropriate from shareholders (Jensen and Meckling, 1976).

Hypotheses

Based on agency theory, we advance two competing hypotheses that potentially explain the effect of board independence on managerial ownership:-

The outcome hypothesis:

- Board independence aims to help reduce the agency conflict.
  - more likely to act in the best interests of shareholders than managers
  - to advocate other effective governance mechanisms.

- Managerial ownership is used as a governance mechanism to alleviate agency problems.

- Hypothesis predicts that higher board independence leads to *higher* managerial ownership.

Hypotheses

The substitution hypothesis:

- Governance mechanisms interact and substitute for one another

- Both board independence and managerial ownership help mitigate agency problems

- This view predicts that higher board independence leads to **lower** managerial ownership

Data Samples

1. **Board independence** (% of independent directors on the board) from the Institutional Shareholder Services (ISS) database

2. **Managerial ownership** (% equity ownership of the top-5 executives) is from the EXECUCOMP database

3. **Firm Characteristics** are from the COMPUSTAT database

➔ Final sample consists of 9,286 observations from 1996 to 2010

Data Samples

A number of control variables likely related to managerial ownership
- ➤ firm size (log of sales)
- ➤ leverage (total debt/total assets)
- ➤ free cash flow ((EBITDA-capital expenditures)/total assets)
- ➤ firm value (Tobin's q)
- ➤ profitability (EBITDA/total assets)
- ➤ dividend payouts (dividends/total assets)
- ➤ firm growth (sale growth)
- ➤ firm age
- ➤ industry dummies (based on first two-digit SIC)
- ➤ Year dummies

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Median	25th	75th
% Independent Directors	72.942	15.006	75.000	63.636	85.714
Board Size	10.516	2.551	10.000	9.000	12.000
% Managerial Ownership	1.437	3.637	0.000	0.000	1.230
Sales	7741	21466	2012.000	765.000	6157.000
Total Debt/Total Assets	0.210	0.166	0.200	0.063	0.318
Free Cash Flow/Total Assets	0.094	0.077	0.088	0.047	0.134
EBITDA/Total Assets	0.139	0.094	0.132	0.086	0.187
Tobin's q	1.995	1.394	1.565	1.190	2.279
Dividend/Total Assets	0.013	0.025	0.006	0.000	0.019
R&D/Total Assets	0.026	0.048	0.000	0.000	0.032
Sale Growth	1.102	0.262	1.079	0.999	1.172
Firm Age	28.694	16.929	24.000	14.000	45.000

Difference-in-difference (DID) estimation

	Pre-SOX	Post-SOX
Compliant	(0,0)	(0,1)
Non-compliant	(1,0)	(1,1)

Goal: want to see how the difference of managerial ownership between compliant and non-compliant firms changes after 2002 when SOX was enacted

Empirical Model

Managerial Ownership (%) = β_0 + β_1(Post-SOX) + β_2(Non-compliant) + β_3(Post-SOX × Non-compliant) + Controls

"Post-SOX" = 1 after 2002 because SOX was passed in 2002; and 0 otherwise.

"Non-compliant" = 1 for firms that did not have a majority of independent directors on the board; and 0 otherwise.

The interaction term = "Post-SOX" x "Non-compliant" --- *capture the DID estimate*

	(1)	(2)	(3)
	OLS	**Fixed-effects**	**Random-effects**
	Managerial	Managerial	Managerial
	Ownership	Ownership	Ownership
Non-compliant × Post-SOX	0.329**	0.408**	0.342*
	(2.112)	(2.025)	(1.667)
Non-compliant	-0.636***		-0.270
	(-6.221)		(-0.816)
Post-SOX	1.104***	-1.548***	0.321***
	(20.583)	(-13.914)	(3.470)
Ln(Board Size)	-0.826***	0.065	-0.257
	(-4.303)	(0.292)	(-1.206)
Ln(Sales)	-0.338***	0.070	-0.129**
	(-10.833)	(0.670)	(-2.020)
Total Debt/Total Assets	-0.936***	0.593*	-0.162
	(-3.589)	(1.761)	(-0.512)
Free Cash Flow/Total Assets	2.015**	1.667***	2.626***
	(1.982)	(2.717)	(4.215)
EBITDA/Total Assets	-1.496	-3.101***	-3.002***
	(-1.563)	(-4.863)	(-4.871)
Tobin's q	-0.152***	-0.127***	-0.221***
	(-4.405)	(-3.953)	(-7.010)
Dividends/Total Assets	4.027*	3.545**	5.844***
	(1.920)	(2.163)	(3.597)
R&D/Total Assets	0.717	3.364**	4.016***
	(0.687)	(2.357)	(3.131)
Sales Growth	-0.367***	-0.131	-0.294***
	(-2.962)	(-1.222)	(-2.706)
Firm Age	-0.011***	0.319***	0.044***
	(-4.091)	(23.454)	(6.889)
Constant	4.359***	-6.725***	1.507
	(7.875)	(-8.467)	(0.592)
Industry Dummies	Yes	No	Yes
Firm fixed-effects	No	Yes	No
Observations	9,286	9,286	9,286
R-squared	0.128	0.671	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2:
Estimating the effect of board independence on managerial ownership using a quasi-natural experiment

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Results

Model 1

- the coefficient of the interaction term is *positive and significant*
- The evidence is in favor of the **outcome** hypothesis effect of board independence on managerial ownership

It may be argued that the results are spurious and is simply driven by certain unobservable characteristics that are omitted in the model. To alleviate this omitted-variable bias, we execute a fixed-effects analysis.

Model 2 shows the fixed-effects result

- the coefficient of the interaction term is *positive and significant*.
- board independence leads to significantly **higher** managerial ownership.

Results (cont.)

- The coefficient for Post-SOX in Model 2 is -1.548. So, after the passage of SOX, managerial ownership within compliant firms declines.

- Nevertheless, for the non-compliant firms, the decline is much smaller than that for compliant firms. The coefficient of the interaction term is 0.408. Therefore, the drop in managerial ownership for the non-compliant firms is 26.36% (=0.408/1.548) lower than that for the compliant firms.

- R^2 in Model 2 is high, 67.1%, our model explains most of the variation in managerial ownership

Model 3 shows the random-effects result

- The result remains consistent, reinforcing the ***outcome*** hypothesis. Board independence leads to ***higher*** managerial ownership.

Robustness Check

Placebo Tests

- Use 2005 for SOX instead of 2002 → insignificant results
- Use top-quartile firms by alphabets as non-compliant firms → insignificant results
➔ Our results are unlikely due to chance

More stringent criterion

- Rather than move from <50% to >50% board independence, we apply more stringent criterion.
- We redefined our treated firms to move from <40% to >60% after SOX → consistent results

Consider only firms exist both pre- and post-SOX

- Obtain similar results

Concluding remarks

- The endogeneity problem between managerial ownership and board independence has been well-known and notoriously difficult to solve in the literature
  - can influence each other at the same time
  - can be influenced by a third unobservable variable that may be omitted in the model

- Unlike the results in most prior research, our study employs a quasi-natural experiment based on an exogenous regulatory shock to circumvent endogeneity.

Concluding remarks (cont.)

- Our results show that firms forced to raise board independence show a much higher level of managerial ownership relative to those not required to raise board independence. Our robustness tests also confirms the results.

- Although this empirical method has been used in a number of prior studies, ours is the first to apply it to managerial ownership.

Q & A