

“Why Are CEOs Rarely Fired? Evidence from Structural Estimation”

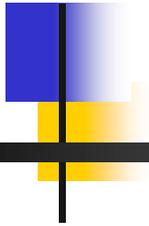
The Journal of Finance (2010)

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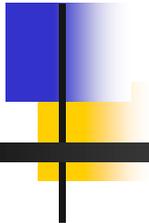
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May 2014



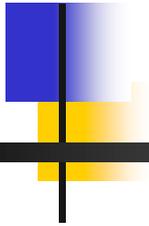
Overview

- Introduction
- Model
- Estimation
- Empirical Results
- Robustness
- Conclusion & Further Areas of Research



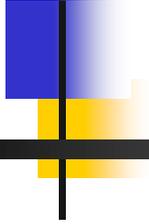
Introduction

- Huson, Parrino, and Starks (2001), and Kaplan and Minton (2006)
 - On Average, 2% of CEOs at large U.S. corporations are fired each year
- Difficult to judge whether 2% is low or high
- Not clear what rate of forced CEO turnover we should expect from a well-functioning board



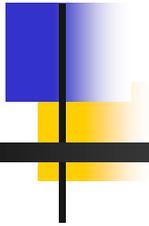
This Paper's Goals

- Provide a benchmark for the CEO firing rate
 - Benchmark is a dynamic model featuring a rational board that maximizes shareholder value
- Quantify the shareholder value at stake



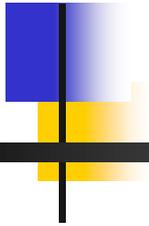
Reasons for Rarely Firing CEOs

- The cost to shareholders may be large
- Not much difference between good CEO and bad CEO
- Boards may learn slowly about CEO ability
- CEO entrenchment
 - Hermalin and Weisbach (1988)



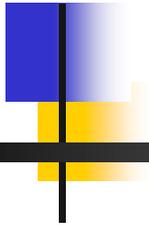
Why SMM Used?

- Measuring relative importance of previous 4 reasons for infrequent firings presents a challenge
- Boards' turnover decisions are endogenous
- No obvious instruments
- Structural Estimation Approach should be used!
 - First study to estimate a structural model of CEO turnover
 - Simulated Method of Moments (SMM)



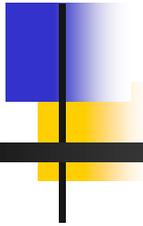
Main Estimated Parameters

- The real cost of CEO turnover to shareholders, $c^{(firm)}$
- The effective personal turnover cost, $c^{(pers)}$
- The variation in ability across new CEOs, σ_0
- The volatility of profitability, σ_ϵ
- The persistence of profitability, ϕ
- The precision/volatility of boards' additional information about CEO ability, σ_z



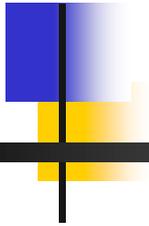
Related Literature

- Hermalin and Weisbach (1998)
 - Most closely related model, but no dynamic setup and persistent performance signal
- Eisfeldt and Rampini (2008)
 - Focused on CEOs' incentives for revealing private information
- Dangl, Wu, and Zechner (2008)
 - Purely theoretical, and focused on mutual fund managers
- Miller (1984)



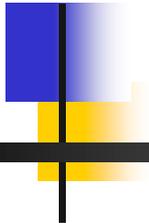
Model Assumptions

- Within-industry variation in long-run average profitability is due entirely to variation in CEO ability
- The firm turnover cost shows up in realized profits in the 2 years around a succession
- Boards take into account only (1) shareholder value and (2) personal turnover costs when firing CEO
- CEOs retire if they complete 15 years, but not before then



Model Assumptions

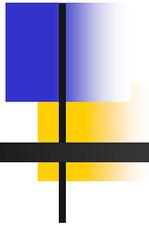
- Going concern firms & Large pool of potential CEOs
- Board makes CEO firing decisions
- One period = 1 year
- Board can fire the CEO and hire new one at the beginning of each period
- CEO, already served τ , voluntarily leaves the firm with exogenous probability of $f(\tau)$



Model

$$Y_t = v_t + y_t - \mathbf{1}(turn_t)c^{(firm)}$$

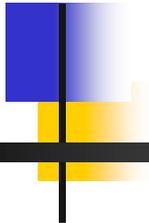
- Y_t : Rate of firm profitability
- $\mathbf{1}(turn_t)$: 1 if CEO turnover occurs in period t, and 0 otherwise
- $c^{(firm)}$: Cost of CEO turnover to shareholders
- y_t : Firm-specific profitability mean-reverts around α
- v_t : Industry profitability



Model

$$y_t = y_{t-1} + \phi(\alpha - y_{t-1}) + \epsilon_t$$

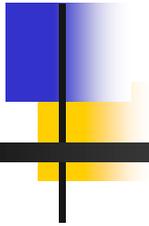
- α : CEO's ability $\sim N(\mu_0, \sigma_0^2)$
- ϕ : Persistence parameter (Random walk if $\phi = 0$)
- ϵ_t : Shock $\sim N(0, \sigma_\epsilon^2)$
- z_t : Additional signal $\sim N(\alpha, \sigma_z^2)$



Model

$$\max_{\{d_{t+s}\}_{s=0}^{\infty}} U_t = E_t \left[\sum_{s=0}^{\infty} \beta^s u_{t+s} \right]$$

- U_t : Board's lifetime utility
- β^s : Discount factor
- $c^{(pers)}$: Additional personal cost to the board



Model

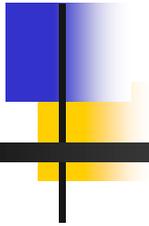
$$u_t = \kappa B_t Y_t - \mathbf{1}(turn_t) B_t c^{(pers)}$$

- u_t : Per-period utility
- κ : Degree to which the board internalizes shareholder value
- B_t : Firm's book value of assets at the beginning of t
- $B_t Y_t$: Firm's dollar profits (Y_t : Rate of profitability)

Final Model

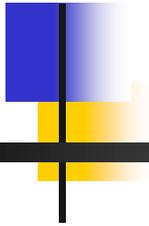
$$U_t = \kappa E_t \left[\sum_{s=0}^{\infty} \beta^s B_{t+s} Y_{t+s} \right] - E_t \left[\sum_{s=0}^{\infty} \beta^s \mathbf{1}(\text{turn}_{t+s}) B_{t+s} c^{(pers)} \right]$$

- First term - κ times the board's assessment of shareholder value
- Second term - NPV of personal turnover costs
- The board maximizes shareholder value when and only when there is no personal cost ($c^{(pers)} = 0$)



Model Specifications

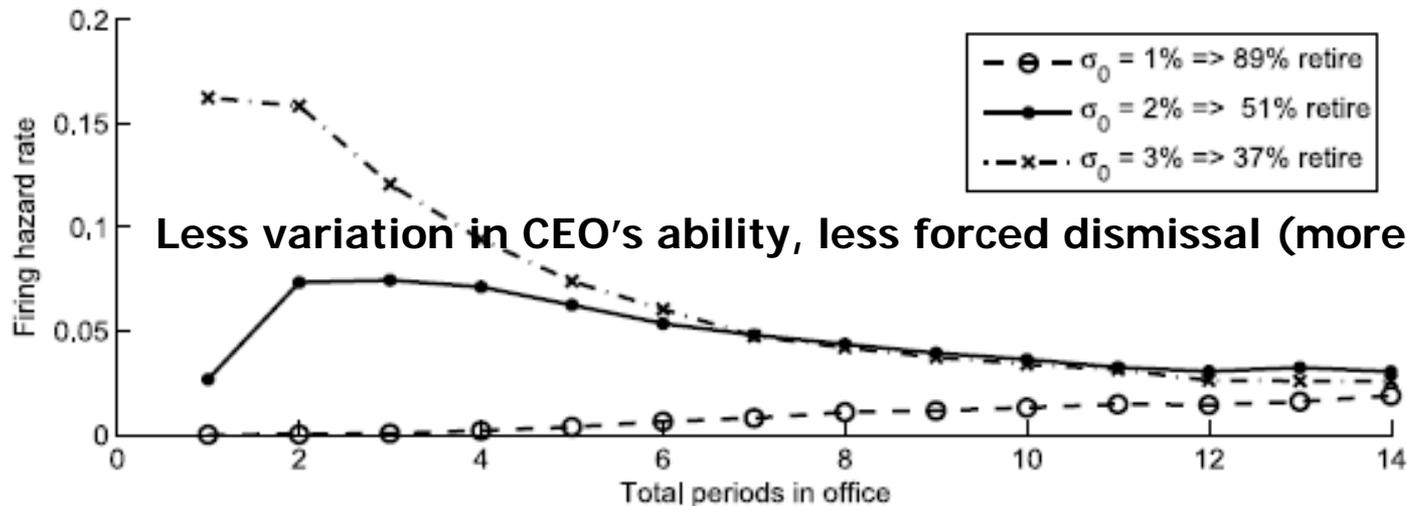
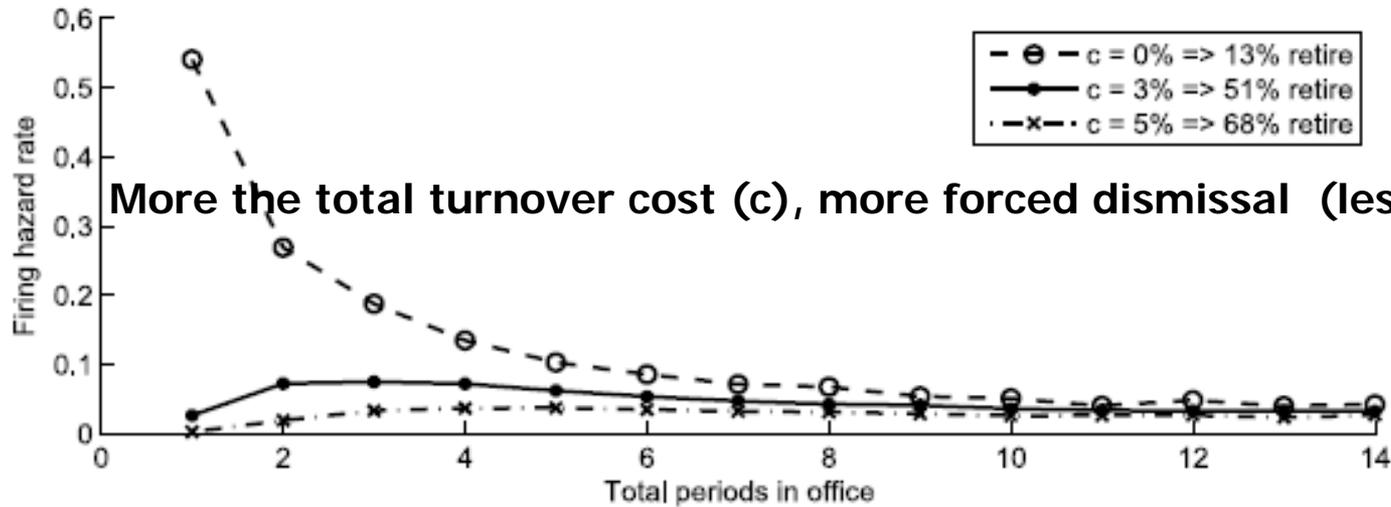
- To solve the model, the author used Bayes's rule, Bellman equation and simulation
- The board will fire the CEO as soon as the posterior mean drops below an endogenous threshold
- The total turnover cost, $c = c^{(firm)} + c^{(pers)} / k$



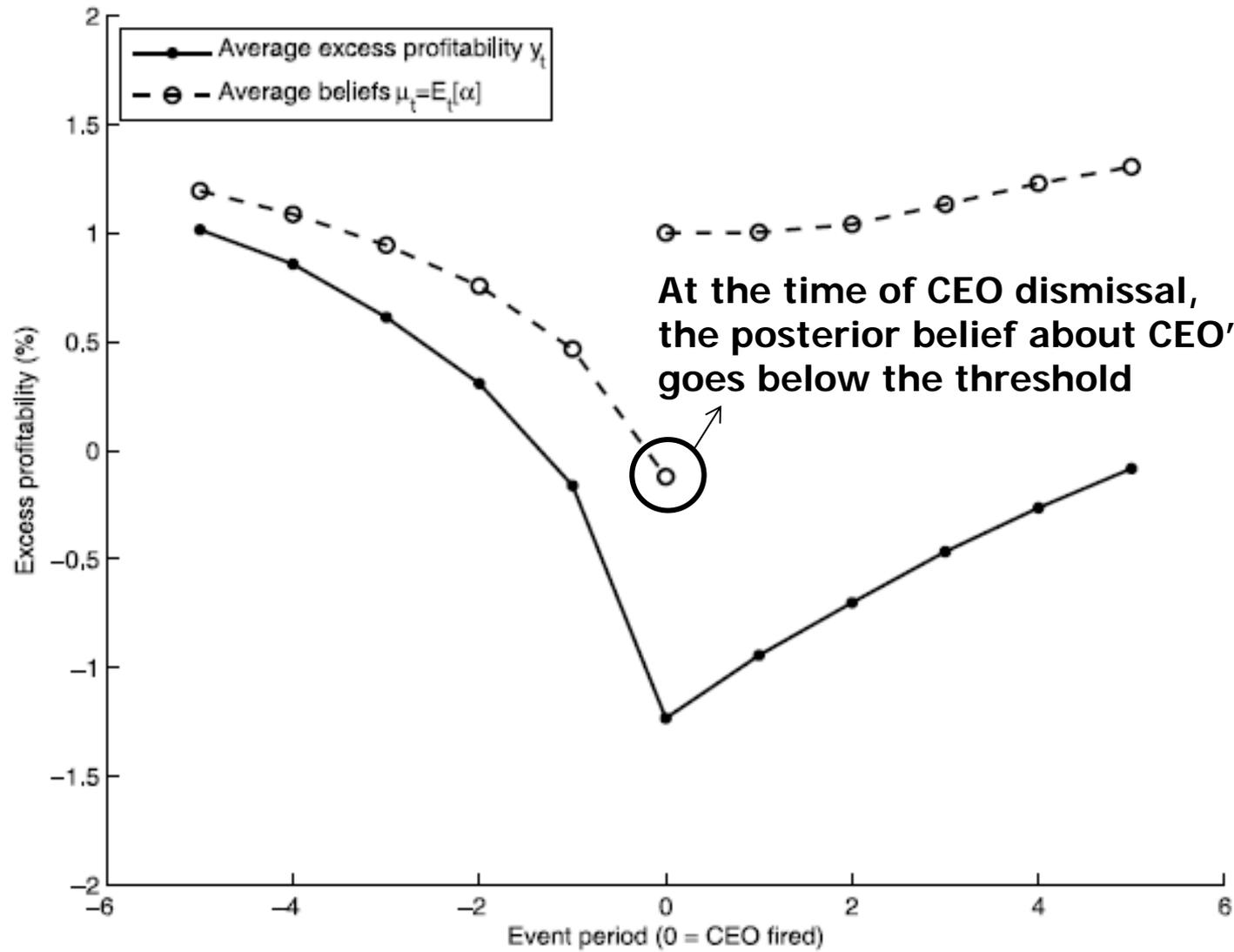
Model Specifications

- Following parameter values are used for the model's predictions
 - Discount factor, $\beta = 0.9$
 - Prior mean ability, $\mu_0 = 1\%$
 - Volatilities, $\sigma_0 = 2\%$, $\sigma_\epsilon = 3\%$, $\sigma_z = 7\%$
 - Total CEO turnover cost, $c = 3\%$
 - Persistence parameter, $\phi = 0.12$

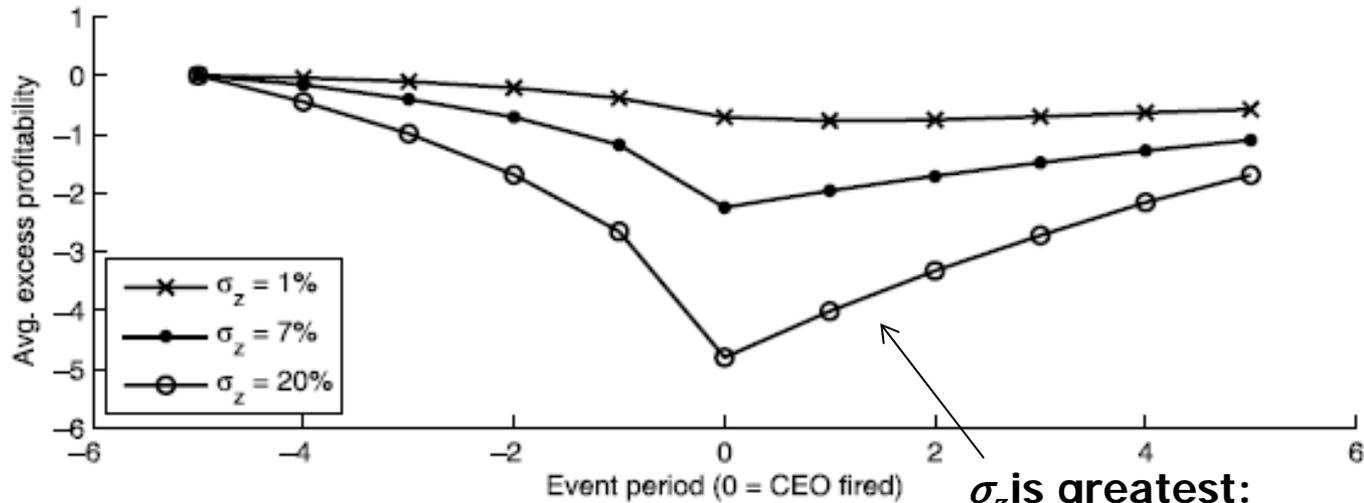
Predicted CEO Dismissal Rates



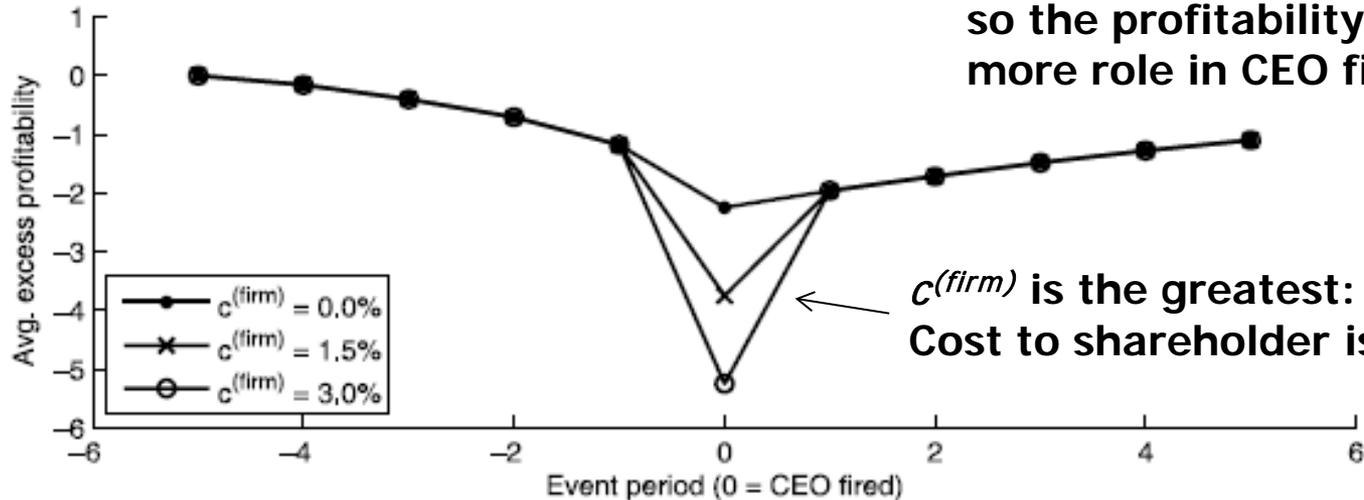
Predicted Profitability at Dismissal



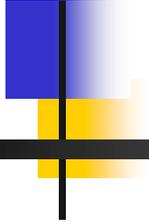
Profitability around CEO dismissal



σ_z is greatest:
 Additional signal is not precise,
 so the profitability would play
 more role in CEO firing decision

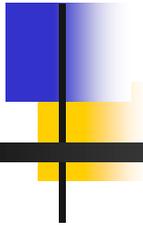


$c^{(firm)}$ is the greatest:
 Cost to shareholder is the greatest



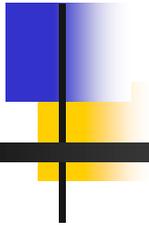
Database

- 1) Compustat
- 2) CEO turnover database constructed using the method of Huson et al. (2001)
- 3) *Forbes* annual compensation surveys from 1971 to 2006
- 4) CEO turnover data from 1971 to 1994 from Robert Parrino



Forced vs. Unforced Successions

- Forced Succession if: (1) fired
(2) forced from position
(3) departs due to unspecified policy differences,
(4) departs under the age of 60 and does not report the reason such as death, poor health, or the acceptance of another position
(5) does not announce the retirement at least 6 months before succession



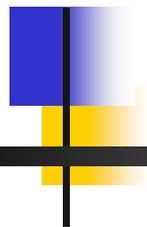
Data

- Full sample contains 981 CEOs and 7,325 firm-year observations
- *Forbes* surveys contains at least 2,500 CEOs from 1971 to 2005
- Out of 981 successions in the sample, 168 (171%) are forced
- On average, 2.29% of sample firms fire their CEOs in a given year

Summary Statistics

Panel A: Sample Size and CEO Turnover Rates

	Firm- Years	Forced CEOs	Forced Successions	Unforced Successions	% Forced	% Forced per Year
Full sample	7,325	981	168	813	17.1	2.29
Consumer nondurables	757	87	13	74	14.9	1.72
Consumer durables	325	42	8	34	19.0	2.46
Manufacturing	1,543	204	28	176	13.7	1.81
Energy	315	40	7	33	17.5	2.22
Chemicals	436	63	3	60	4.8	0.69
Business equipment	605	90	23	67	25.6	3.80
Telecom	153	23	5	18	21.7	3.27
Utilities	662	82	7	75	8.5	1.06
Wholesale and retail	517	88	19	69	21.6	3.68
Health	481	57	8	49	14.0	1.66
Finance	920	127	27	100	21.3	2.93
Other	611	78	20	58	25.6	3.27
1970–1974	580	102	8	94	7.8	1.38
1975–1979	886	132	15	117	11.4	1.69
1980–1984	1,182	146	21	125	14.4	1.78
1985–1989	1,340	163	23	140	14.1	1.72
1990–1994	1,113	126	23	103	18.3	2.07
1995–1999	713	90	20	70	22.2	2.81
2000–2004	989	149	40	109	26.8	4.04
2005–2006	522	73	18	55	24.7	3.45



Summary Statistics

Panel B: Additional Statistics

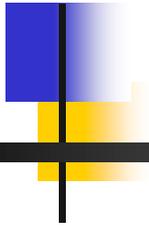
Variable	Observations	Mean	Std. dev.	Median	Min	Max
ROA (% p.a.)	7,325	16.0	9.07	15.5	-23.8	85.6
Excess profitability (% p.a.)	7,325	2.00	7.37	0.75	-35.7	68.0
Assets (\$billion)	7,325	12.5	55.0	2.38	0.015	1264
Spell length (years):						
All	981	7.5	4.9	6	1	29
Forced	168	5.1	3.8	4	1	21
Unforced	813	8.0	4.9	7	1	29

Parameter Estimates from SMM

Parameter Estimates

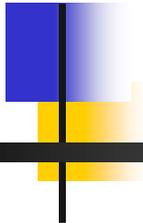
This table contains estimates of the parameters from the model in Section I. Estimation uses data on a sample of 981 CEOs, described in Section II.A. Parameters are estimated using SMM, as described in Section II. Parameter definitions are in Table I. Standard errors are in parentheses.

Firm Cost $c^{(firm)}$	Personal Cost $c^{(pers)}/K$	Prior Mean μ_0	Prior Stdev. σ_0	Persistence ϕ	Profit. Stdev. σ_ϵ	z Signal Stdev. σ_z
1.33 (0.61)	4.61 (0.58)	0.88 (0.34)	2.42 (0.06)	0.125 (0.004)	3.43 (0.09)	5.15 (0.33)



Interpretation of Estimates

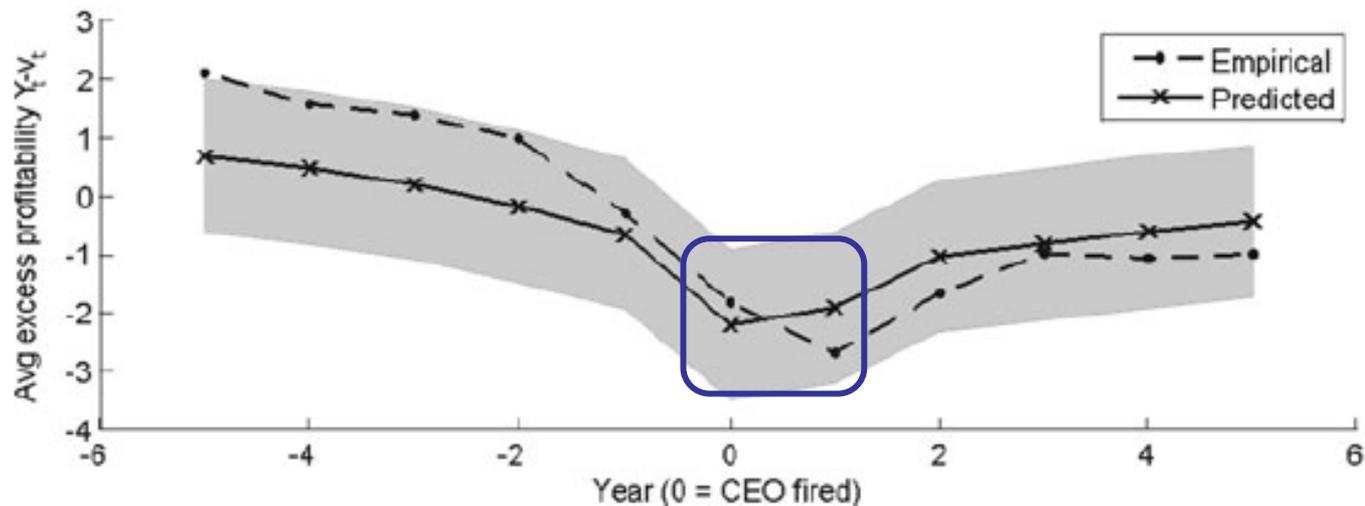
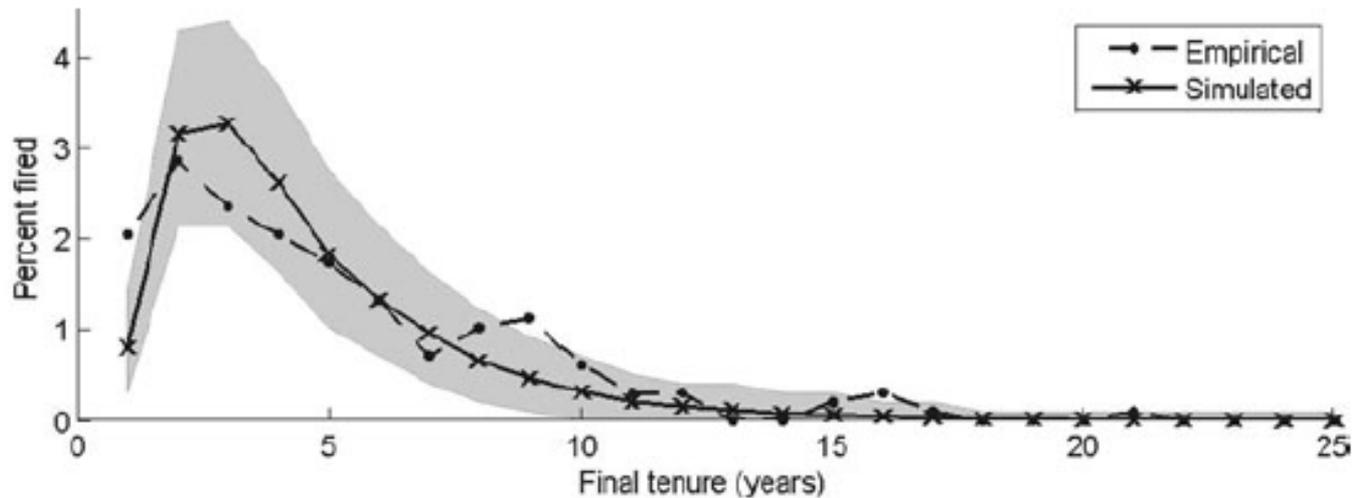
- The estimated turnover cost to the firm, $c^{(firm)}$ is 1.33% of the firm's assets, which is \$57 million (median) and \$292 million (mean) in 2009 dollars for the sample firm
- Comparing this value to Yermack (2006), it is not unreasonable!



Interpretation of Estimates

- The estimated effective personal turnover cost, $c^{(pers)}$ is 4.61% of the firm's assets, which is \$197 million (median) and \$292 billion (mean)
- \$1.03 billion personal cost should not be interpreted as \$1.03 billion leaving directors' pockets
- The board behaves as if firing CEO costs shareholders $c^{(firm)} + c^{(pers)} / k = 5.9\%$ of the firm's assets

Empirical and Predicted Patterns



Statistics on Model Fit

	Median Spell Length		% Forced	% Forced per Year	Probit Model		
	Unforced	Forced			Slope	Stderr.	Pseudo- R^2
Empirical	7	4	17.1	2.29	-0.168	[0.026]	0.03
Simulated	7	4	16.2	2.16	-0.125	[0.002]	0.02

- Empirical data and Simulated data are very close to each other
- The low Pseudo- R^2 (2% from the simulated data and 3% from the real data) indicate that profitability poorly predicts forced turnover

Estimation in Subsamples

Panel A: Parameter Estimates in Subsamples

	Firm Cost $c^{(firm)}$	Personal Cost $c^{(pers)}/K$	Prior Mean μ_0	Prior Stdev. σ_0	Persistence ϕ	Profit. Stdev. σ_ϵ	z Signal Stdev. σ_z	CEOs	χ^2 (p -val.)
Small firms	0.01 (1.05)	8.53 (1.06)	1.38 (0.69)	3.26 (0.05)	0.120 (0.004)	4.01 (0.14)	5.34 (0.24)	543	18.7 (0.01)
Large firms	1.71 (0.64)	-0.29 (0.74)	0.35 (0.37)	1.23 (0.03)	0.135 (0.002)	2.89 (0.10)	7.65 (0.27)	438	29.9 (0.00)
1971–1989	0.05 (0.91)	8.32 (1.02)	0.49 (0.44)	2.52 (0.05)	0.125 (0.003)	3.30 (0.10)	4.37 (0.20)	222	21.3 (0.00)
1990–2006	1.67 (0.70)	2.28 (0.76)	1.24 (0.67)	2.72 (0.07)	0.123 (0.002)	3.61 (0.14)	9.51 (0.46)	222	27.5 (0.00)
Low ownership	0.04 (1.07)	6.41 (1.09)	-0.76 (0.60)	3.10 (0.11)	0.126 (0.003)	3.10 (0.11)	12.92 (0.93)	327	16.1 (0.02)
High ownership	0.00 (1.19)	7.99 (1.54)	0.14 (0.94)	3.99 (0.18)	0.088 (0.004)	3.35 (0.15)	8.62 (1.03)	325	8.6 (0.29)
Less outsiders	0.00 (1.26)	8.25 (1.69)	1.57 (0.67)	2.93 (0.11)	0.117 (0.004)	3.69 (0.18)	5.84 (0.94)	491	9.7 (0.21)
More outsiders	0.00 (0.85)	3.00 (0.99)	-0.56 (0.47)	1.98 (0.07)	0.116 (0.002)	2.87 (0.10)	10.80 (0.65)	490	14.7 (0.04)

Estimation in Subsamples

Panel B: Model Fit in Subsamples

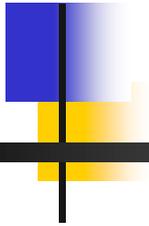
		Median Tenure		% Forced	% Forced/ yr	$\sigma(E[X])$	Probit Model		
		Unforced	Forced				Slope	Stderr.	Pseudo- R^2
Small firms	Data	7	4	15.7	2.14	19.1	-0.143	0.029	0.04
	Model	7	3	16.6	2.23	17.1	-0.089	0.002	0.01
Large firms	Data	7	4	18.6	2.45	10.3	-0.207	0.050	0.03
	Model	7	5	19.1	2.59	10.0	-0.252	0.003	0.04
1971–1989	Data	7	5	12.3	1.68	14.6	-0.121	0.031	0.03
	Model	7	4	10.2	1.30	12.7	-0.072	0.002	0.02
1990–2006	Data	7	4	23.1	3.03	16.1	-0.242	0.045	0.04
	Model	7	4	23.2	3.27	15.4	-0.225	0.002	0.04
Low ownership	Data	8	5	12.6	1.51	12.3	-0.161	0.040	0.06
	Model	7	5	12.1	1.54	12.1	-0.161	0.002	0.08
High ownership	Data	8	4	17.6	2.14	24.6	-0.121	0.031	0.03
	Model	7	4	16.6	2.22	19.8	-0.072	0.002	0.02
Less outsiders	Data	7	4.5	11.6	1.58	17.9	-0.080	0.038	0.02
	Model	7	4	12.0	1.54	14.8	-0.074	0.002	0.02
More outsiders	Data	8	5	16.0	2.05	10.4	-0.200	0.043	0.05
	Model	7	5	13.7	1.77	10.7	-0.171	0.002	0.05

Effect of Entrenchment

Experiment	% of CEOs Fired per Year		Mean Length (Years)		Mean Profitability (%/Year)		% Effect on Shareholder value
	Control	Treat.	Control	Treat.	Control	Treat.	
1. Eliminate entrenchment							
Full sample	2.1	12.3	7.5	4.5	15.5	16.0	+3.1
1971–1989	1.3	25.7	7.9	2.9	15.2	16.2	+6.9
1990–2006	3.3	8.7	7.1	5.4	15.8	16.0	+1.4
Low ownership	1.6	25.1	7.8	3.0	13.9	14.6	+5.1
High ownership	2.2	26.3	7.5	2.9	15.1	16.4	+8.8
Few outsiders	1.6	26.4	7.8	2.9	16.3	17.4	+6.5
More outsiders	1.8	25.4	7.7	3.0	14.0	14.3	+2.5
Small firms	2.3	26.6	7.4	2.8	16.3	17.6	+7.7
Large firms	2.6	1.8	7.4	7.7	14.6	14.6	+0.0
2. Hire a very bad CEO							
Pers. cost = estimate	2.1	17.3	7.5	4.0	15.5	13.9	-6.3
Pers. cost = zero	12.3	57.1	4.5	1.6	16.0	14.4	-4.6

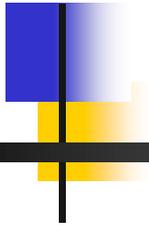
Robustness

	Firm Cost $c^{(firm)}$	Personal Cost $c^{(pers)}/K$	Prior Mean μ_0	Prior Stdev. σ_0	Persis- tence ϕ	Profit. Stdev. σ_ϵ	z Signal Stdev. σ_z	χ^2 (p -val.)
Main results	1.33 (0.61)	4.61 (0.58)	0.88 (0.34)	2.42 (0.06)	0.125 (0.004)	3.43 (0.09)	5.15 (0.33)	33.2 (0.00)
Alt. fired def'n	0.00 (0.41)	1.34 (0.34)	1.46 (0.38)	1.24 (0.03)	0.125 (0.003)	3.45 (0.08)	6.08 (0.33)	398.6 (0.00)
Fixed effects	1.00 (0.53)	5.13 (0.55)	-0.10 (0.19)	1.61 (0.03)	0.262 (0.004)	3.31 (0.08)	2.90 (0.15)	39.1 (0.00)
30 industries	0.86 (0.59)	4.05 (0.52)	0.89 (0.40)	2.30 (0.05)	0.134 (0.002)	3.46 (0.09)	6.29 (0.19)	38.7 (0.00)
Flat threshold	0.71 (0.67)	5.28 (0.52)	0.87 (0.34)	2.94 (0.05)	0.132 (0.004)	3.32 (0.11)	6.74 (0.47)	33.1 (0.00)
$c_{(retire)} = 0$	0.01 (0.57)	5.94 (0.53)	0.67 (0.32)	3.34 (0.04)	0.128 (0.001)	3.42 (0.08)	9.71 (0.35)	36.0 (0.00)
$\beta = 0.85$	1.21 (0.57)	2.68 (0.60)	0.81 (0.38)	2.47 (0.04)	0.129 (0.002)	3.45 (0.08)	6.30 (0.23)	37.2 (0.00)
$\beta = 0.95$	1.60 (0.52)	5.33 (0.56)	1.00 (0.39)	2.01 (0.05)	0.129 (0.003)	3.37 (0.11)	5.06 (0.37)	43.3 (0.00)



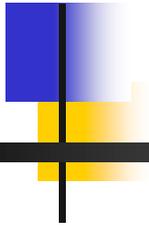
Conclusions

- Establishes a benchmark for the forced turnover rate
- Quantifies the amount of shareholder value at stake
- Empirical forced turnover rate was low so that the model needs large turnover costs to fit the data
- These costs mainly reflect CEO entrenchment rather than a real cost to shareholders



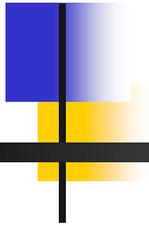
Conclusions (Continued)

- Eliminating the entrenchment would raise shareholder value by 3%, assuming all else constant
- CEO entrenchment is bad for shareholders ex post
 - Because it means that boards retain some CEOs whom shareholders would rather see fired



Further Research

- Is the entrenchment bad for shareholders ex ante?
- Extend the model to include the initial choice of governance structures
- How about using stock performance instead of ROA?



Questions

- Thank you for your attention!

ANY QUESTIONS?