Corporate Payout Policy, Cash Savings, and The Cost of Consistency:

Evidence from a Structural Estimation

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Joint work with Hamed Mahmudi
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Question

- What should happen to dividends in response to an operational catastrophe?
  (or some less dramatic change in cash flow)

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Terry Macalister and Tim Webb
guardian.co.uk, Thursday 3 June 2010 20.09 BST
Article history

Overview

- Goal:
  - Estimate the managerial perceived cost from cutting payout
  - Investigate interactions of this cost with other policies: savings and investment
  - Examine motives underlying payout smoothing
- Model:
  We present a structural model which captures the effect of a manager associating a cost to cutting corporate payout
  - Dynamic tradeoff model where the manager incentives are:
    Base Case - Aligned with shareholders (First-best)

    Agency Case - Also associates a cost to cutting payout
  - Subject to a rich set of frictions:
    *t*axation, debt recapitalization & adjustment costs

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Preview of Results

- Average firm maintains 'suboptimal' payout variance
- Adding a managerial payout consistency cost explains:
  1) Suboptimal payout variance
  2) Low investment variance
  3) High savings
- This cost accounts for 6.6% loss in shareholders' equity value
- This cost is larger for firms which:
  1) are larger
  2) have more dispersed analyst forecasts
  3) have CEOs with low PPS contracts
  4) have larger institutional holdings
  5) pay larger fractions of their payout as dividends

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Outline

- Motivation
- Literature review
- Base-case model
  - First-best results
- Agency model
  - Comparative statics
  - SMM results
  - Cross-sectional results
- Conclusions

Motivation

- Dividend (payout) smoothing prevalent since Lintner (1956)
- Not easily explained via tradeoff model
  - Previous dynamic structural models overshoot the empirical payout variance (e.g. Hennessy and Whited (2007))
- Why do firms smooth their payout?
  - Remedial view (Easterbrook (1984) and Jensen (1986))
  - Overcoming information asymmetry (Kumar (1988), Kumar and Lee (2001) and Guttman et al. (2001))
- Empirical difficulties:
  - Endogeneity: Investment, payout, cash and external financing policies
  - Hidden Parameters: Payout consistency cost is not directly observable
  - Counterfactuals: Estimation of shareholder cost of agency

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Background

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  - Information asymmetry: Kumar (1988), Kumar and Lee (2001) and Guttman et al. (2001)
  - Remedial view: Easterbrook (1984) and Jensen (1986)
  - Institutional investors and tax clientele: Allen et al. (2000)
  - Empirics: Leary and Michaely (2010) and Aivazian et al. (2009)
- Structural models of financial policy
  - Cash & Costly external equity finance: Riddick and Whited (2008)
  - Cash & Riskless debt: Gamba and Triantis (2008)
  - Cash & Uncertain liquidity needs: Moyen and Boileau (2009)
  - Cash & Agency: *managerial compensation and empire building preferences* Nikolov and Whited (2010)
- Our work builds on the structural literature, focusses on payout, incorporates: cash, debt, costly equity finance and agency stemming from a perceived cost to cutting payout

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The Base-Case Model

- Discrete-time (t), Infinite-horizon, Partial equilibrium model
- Manager and claimants on equity and debt are risk neutral
- Firm maintains: debt (B_t), capital (K_t) and cash holdings (C_t)
- Firm Selects:
  - Dividends ($D_t > 0$) and issuance ($D_t < 0$),
  - Changes in cash (ΔC_t) and debt (ΔB_t) and investment (I_t)
- With objective of *maximizing equity value*

$$V_t = D_t + T(D_t) + \Lambda(D_t) + \frac{1}{1+(1-\tau_b)r} E_t[V_{t+1}]$$

Personal interest tax rate τ_b Risk free rate r
Tax on payout $T(D_t)$ Equity issuance cost $\Lambda(D_t)$

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The Base-Case Model: Equity and Capital

- Firm issues equity when $D_t < 0$ pays dividend D_t otherwise
- Equity issuance is costly (Hennessy & Whited 2007):

$$\Lambda(D_t) = (-\lambda_0 + \lambda_1 D_t - \tfrac{1}{2}\lambda_2 D_t^2)\mathbf{1}_{(D_t<0)}$$

- *Convex* dividends and capital gains tax schedule :

$$T(D_t) = -(\tau_d D_t + \tfrac{\tau_d}{\phi}\exp^{-\phi D_t} - \tfrac{\tau_d}{\phi})\mathbf{1}_{(D_t>0)}$$

Payout tax parameter $\phi > 0$, tax rate τ_d

- Depreciating capital accumulation:

$$K_{t+1} = (1-\delta)K_t + I_t$$

- Capital adjustment cost:

$$A(K_t, I_t) = \tfrac{a}{2}\left(\tfrac{I_t}{K_t}\right)^2 K_t$$

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The Base-Case Model: Debt

- Risk-free debt with asymmetric recapitalization cost:

$$\Omega(B_{t+1}, B_t) = \tfrac{\omega}{2}(B_{t+1} - \bar{B})^2 + q(B_{t+1} - B_t)\mathbf{1}_{(B_{t+1} > B_t)}$$

- Stochastic cash flows:

$$f(K_t; \theta_t) = \theta_t K_t^{\alpha}, \qquad \ln \theta_{t+1} = \rho \ln \theta_t + \sigma \epsilon_{t+1}, \qquad \epsilon_t \sim N(0,1)$$

- The firm's sources-and-uses of funds equation:

$D_t =$ After tax Cash Flow $+$ Depreciation Tax Shield $+$ Debt Servicing
$+$ Capital Adjustment Cost $+$ Cost of Holding Cash $-\Delta C_t + \Delta B_t - I_t$

$$= (1-\tau_c) f(K_t; \theta_t) + \tau_c \delta K_t - I_t + \Delta B_{t+1} - \Omega(B_{t+1}, B_t)$$
$$-(1-\tau_c) r B_t - A(K_t, K_{t+1}) + (1 + (1-\tau_c) r) C_t - C_{t+1}$$

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The Base-Case: Generating Results

- Defined the bellman equation of the firm's intertemporal problem:

$$V(K_t, B_t, C_t; \theta_t) =$$
$$\max_{D_t, K_{t+1}, \Delta B_{t+1}, C_{t+1}} \left\{ D_t + T(D_t) + \Lambda(D_t) + \frac{1}{1+(1-\tau_b)r} E_t[V(K_{t+1}, B_{t+1}, C_{t+1}; \theta_{t+1})] \right\}$$

  s.t. the constraints hold (debt recap. cost, motion of capital, ...)

- Calibrated parameters from the literature:

$\lambda_0 = 0.389$, $\lambda_1 = 0.053$, $\lambda_2 = 0.0002$, $r = 0.02$, $\delta = 0.10$, $\tau_c = 0.35$, $\tau_b = 0.25$, $\tau_d = 0.25$, $\phi = 0.45$, $a = 0.2471$, $\rho = 0.62$, $\sigma = 0.20$, $\omega = 0.02$, $\bar{B} = 14$, $\alpha = 0.45$, $q = 0.02$

- Discretized and solved numerically for the optimal policy
- Used optimal policy to generate a panel of 20,000 firms for 20 consecutive periods

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- Discretized and solved numerically for the optimal policy
- Used optimal policy to generate a panel of 20,000 firms for 20 consecutive periods

The Base-Case Results

Name of Moments	Empirical Moments		Simulated Moments
Average Debt/Assets	0.2682		0.3142
Variance of Long-Term Debt/Assets	0.0712		0.0858
Frequency of Long-Term Debt Reduction	0.6483		0.5730
Variance of Payout	0.0015	<<	0.0025
Frequency of Paying Out	0.4511		0.4923
Correlation of Payout and Cash/Assets	0.0543		0.2131
Average Cash/Assets	0.1631	>>	0.0414
Variance of Cash /Assets	0.0436		0.0514
Variance of Investment/Assets	0.0069	<<	0.0139
Average Equity Issuance/Assets	0.0368		0.0305
Variance of Equity Issuance/Assets	0.0593		0.0638
Payout ratio	0.2072		0.2284
SD of the Shock to Income/Assets	0.1483		0.1317
Serial Correlation of Income/Assets	0.6091		0.5751

- Suboptimal payout variance: *Indicates payout smoothing*
- Excess cash
- Suboptimal investment variance

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The Agency Model

- Bellman equation:

$$V(K_t, B_t, C_t; \theta_t) =$$
$$\max_{D_t, K_{t+1}, \Delta B_{t+1}, C_{t+1}} \Big\{ D_t + T(D_t) + \Lambda(D_t) + \frac{1}{1+(1-\tau_b)r} E_t[V(K_{t+1}, B_{t+1}, C_{t+1}; \theta_{t+1})]$$
$$+ \gamma(D_t - D_{t-1}) 1_{(0<D_t<D_{t-1})} \Big\}$$

s.t. to the same constraints hold (debt recap. cost, ...)

- Use Simulated Method of Moments
  - Find parameters values ($\hat{\Gamma}$) where:
    Simulated moments from the agency model (h_n^s)
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$$\hat{\Gamma} = \underset{\Gamma}{\operatorname{argmin}} \left(\hat{H}_N - \frac{1}{S} \sum_{s=1}^{S} h_n^s(\Gamma) \right)' \hat{W}_N \left(\hat{H}_N - \frac{1}{S} \sum_{s=1}^{S} h_n^s(\Gamma) \right)$$

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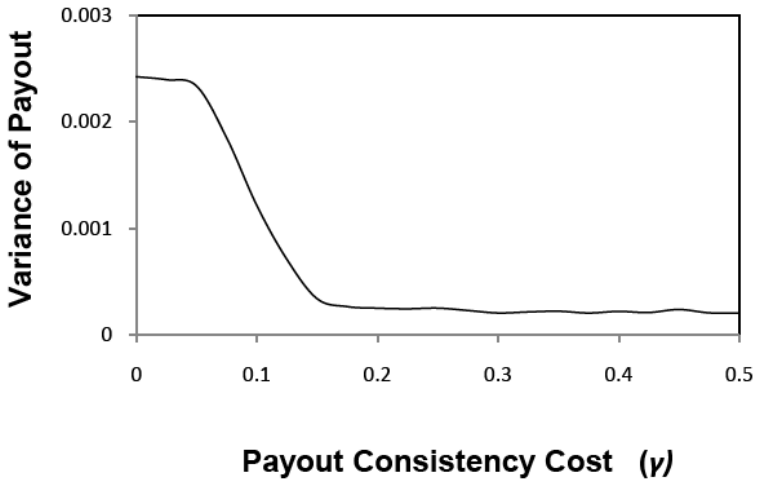
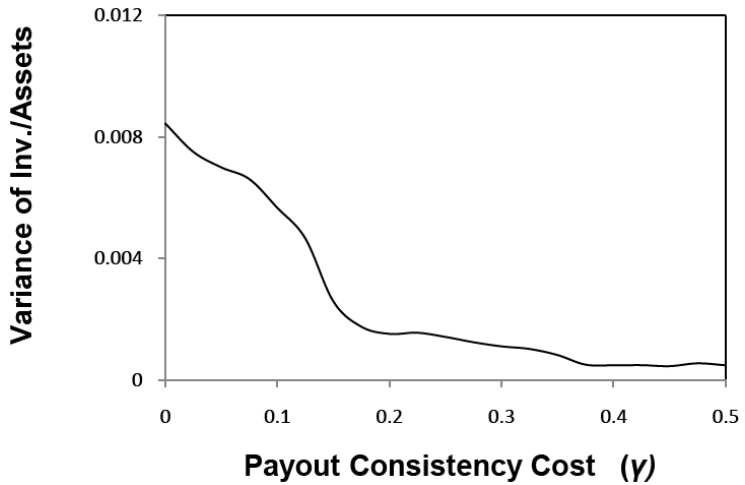
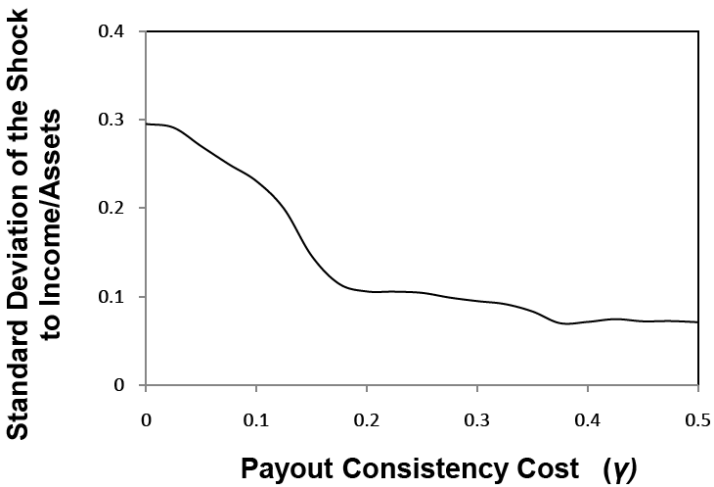
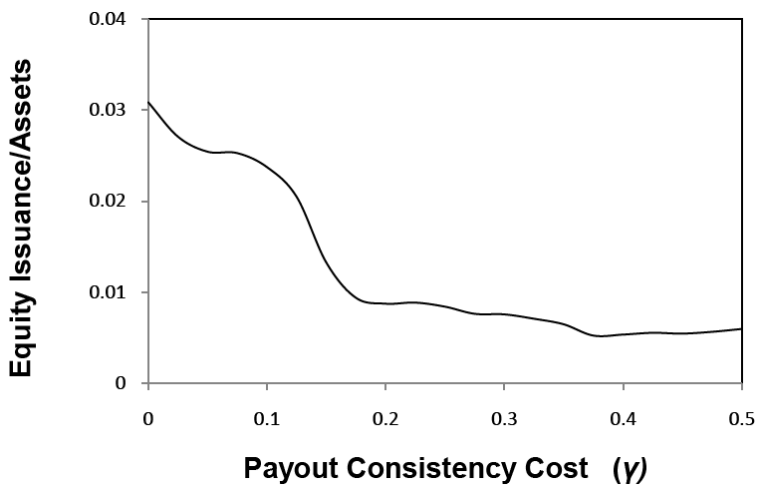
Comparative Statics: $\gamma \rightarrow$ less volatile policies

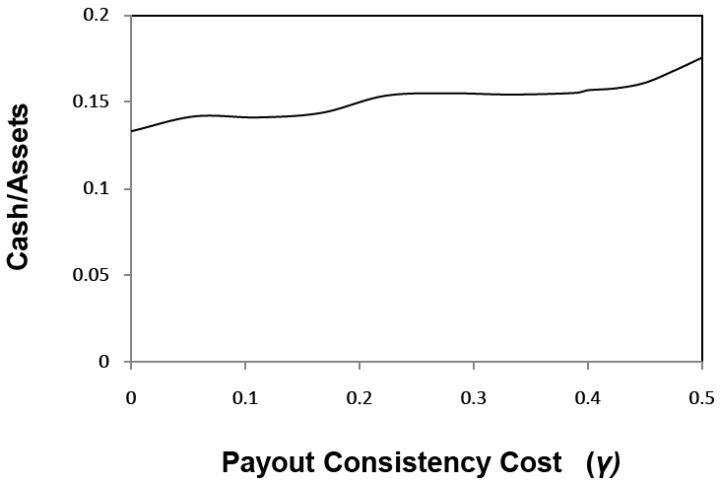


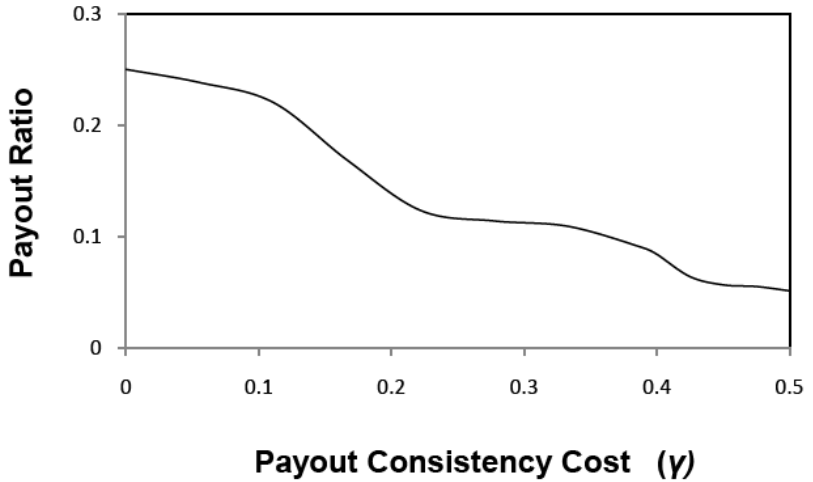


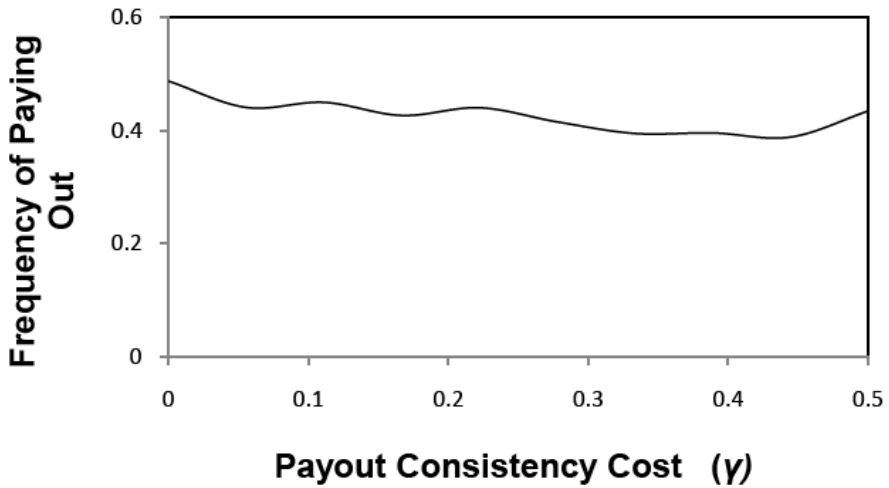




Comparative Statics: Side-effects of γ







SMM Results: Full Sample

Name of Moments	Empirical Moments	Simulated Moments
Average Debt/Assets	0.2682	0.2693
Variance of Long-Term Debt/Assets	0.0712	0.0606
Frequency of Long-Term Debt Reduction	0.6483	0.6328
Variance of Payout	0.0015	0.0013
Frequency of Paying Out	0.4511	0.4532
Correlation of Payout and Cash/Assets	0.0543	0.0594
Average Cash/Assets	0.1631	0.1458
Variance of Cash /Assets	0.0436	0.0354
Variance of Investment/Assets	0.0069	0.0061
Average Equity Issuance/Assets	0.0368	0.0316
Variance of Equity Issuance/Assets	0.0593	0.0503
Payout ratio	0.2072	0.1929
SD of the Shock to Income/Assets	0.1483	0.1501
Serial Correlation of Income/Assets	0.6091	0.6169

λ_0	λ_1	λ_2	γ	ω	q
0.481	0.070	0.0002	0.113	0.045	0.042
(0.084)	(0.037)	(0.123)	(0.048)	(0.085)	(0.079)

$\bar{B}$	ϕ	a	ρ	σ	χ^2
13.541	0.318	0.541	0.681	0.246	7.42
(0.008)	(0.093)	(0.087)	(0.058)	(0.066)	(0.059)

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SMM Results: Sample Splits & Equity Value Loss

- Cross-sectional analysis:
  - Performed via sample splits on
    - Total assets
    - Pay performance sensitivity of CEO contract
    - Proportion of institutional holdings
    - Share repurchase vs. dividend ratio
    - Information asymmetry (analyst forecast dispersion)
    - Recent years (2002-2007)
- Compare SMM estimations on upper and lower quartiles
- Equity value loss:
  Percentage change in equity value/assets of
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Measure	γ large		γ small	Equity loss% large	Equity loss% small
Total Assets	0.138		0.066	8.9	1.2
PPS in CEO Contracts	0.071		0.129	2.4	7.3
Institutional Holdings	0.131		0.059	8.7	2.3
Share Rep. Ratio	0.051		0.142	2.3	9.4
Information Asymmetry	0.126		0.091	7.1	3.4
2002-2007 vs. Full	0.124	$\approx$	0.113	6.8	6.6

- Higher Information Asymmetry:
  Same payout variance (0.0017 vs. 0.0019) BUT larger γ
- Recent years (2002-2007):
  Increase in cash holdings due primarily to increase in σ (0.337 vs. 0.246)

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Conclusions

- Proposed a dynamic model of payout, debt, cash and investment.
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  - smooth their payouts
  - save too much cash
- Proposed an agency model: managers perceive a cost to cutting payout
  - Match simulated moments with real empirical values
  - Estimate managerial payout consistency cost
  - $\Rightarrow$ 6.6 % loss in equity values
- Endogeniety: Dynamic joint determination of cash and payout
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  - support for information asymmetry
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