

Internal Capital Allocation and Firm Performance

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Motivation

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 - to the right industry
 - to the right project
- How is capital allocated across industries?
 - External capital market
 - direct: equity or bond issuance
 - indirect: information
 - Internal capital market
 - single-segment firms: NO
 - multi-segment firms: Yes

Research questions

- 1 Can conglomerate firms efficiently allocate capital across business segments?
 - Categorize firms as “active” or “passive” in their capital allocation across segments
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 - Industry-adjusted valuation levels
 - Subsequent stock performance

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- 2 Does the market recognize the (in)ability of firms to do so?
 - Industry-adjusted valuation levels
 - Subsequent stock performance
- 3 How and why does the capital allocation process matter?

Our measures of capital allocation style

- We introduce three passive benchmark strategies and define a firm as active if it deviates from the benchmark.
- Benchmark 1: Deviation from Lagged Capital allocation (DLC).
 - Example: Firm X has two divisions, with *CAPX* allocations of (50%, 50%) in year 1 and (40%, 60%) in year 2.

$$DLC = \frac{1}{2} (|.4 - .5| + |.6 - .5|) = 0.1$$

- Benchmark 2: Deviation from Industry-adjusted Capital allocation (DIC)
- Benchmark 3: Deviation from Segment Free-cash-flow (DSF)

Main results

- 1 Active firms have lower profitability than passive firms.
- 2 Active firms have lower valuation levels than passive firms.
- 3 Active firms have lower subsequent stock returns than passive firms.
- 4 Results are robust using matching analysis and regression analysis with firm fixed effects and various firm characteristics and return factors.

Relevant literature – corporate finance

- Conglomeration and firm value
 - Lang and Stulz (1994), Berger and Ofek (1995), Whited (2001), Campa and Kedia (2002), Maksimovic and Phillips (2002), Villalonga (2004), and Chevalier (2004)
- Internal capital allocation and firm value
 - Williamson (1975), Stein (1997), Scharfstein (1998), Scharfstein and Stein (2000), Rajan, Servaes, and Zingales (2000), Billett and Mauer (2003), Marino and Matsusaka (2005), Ozbas (2005), and Guedj and Scharfstein (2008)
- CEO decisions and firm value
 - Bertrand and Schoar (2003), and Malmendier and Tate (2005)

Relevant literature – asset pricing

- Firm fundamentals and stock returns
 - Lamont and Polk (2001), Chan, Lakonishok, and Sougiannis (2001), Griffin and Lemmon (2002), Easley and O'Hara (2004), Daniel and Titman (2006), Hoberg and Phillips (2008), and Hou and Robinson (2008)
- Mutual fund performance
 - Treynor and Mazuy (1966), Henriksson and Merton (1981), Grinblatt and Titman (1993), Brown and Goetzmann (1995), Carhart (1997), Daniel, Grinblatt, Titman and Wermers (1997), and Kacperczyk, Sialm and Zheng (2005).

Data

- Compustat Segment and Industrial Annual files
- To be included in our sample:
 - Have more than 1 segment
 - Not financial and service firms
 - Have sales more than \$20m

⇒ Our sample:

- Years: 1980 - 2006
- 23,620 firm - year observations

Capital allocation measure I – rigidity benchmark

A firm is active if it deviates from a passive benchmark strategy.

① Deviation from Lagged Capital allocation (DLC)

$$dlc_{f,t} = \frac{1}{2} \sum_{i \in \mathcal{F}} \left| \frac{CAPX_{i,t}}{\sum_{j \in \mathcal{F}} CAPX_{j,t}} - \frac{CAPX_{i,t-1}}{\sum_{j \in \mathcal{F}} CAPX_{j,t-1}} \right|,$$

- $CAPX_{i,t}$ is the CAPX of segment i in firm f in year t ,
- Set \mathcal{F} includes segments that appear in both year $t-1$ and t .

- Low DLC firms are “rigid” and maintain stable capital allocation over time
- To capture style, we also examine long-term average DLC

$$DLC_{f,t} = \frac{1}{3} (dlc_{f,t} + dlc_{f,t-1} + dlc_{f,t-2})$$

Capital allocation measure II – industry benchmark

- ② Deviation from Industry-adjusted Capital allocation (DIC) is the 3-year average of *dic*:

$$dic_{f,t} = \frac{1}{2} \sum_{i \in \mathcal{F}} \left| \frac{CAPX_{i,t}}{\sum_{j \in \mathcal{F}} CAPX_{j,t}} - \frac{g_{i,t} CAPX_{i,t-1}}{\sum_{j \in \mathcal{F}} g_{j,t} CAPX_{j,t-1}} \right|,$$

- $CAPX_{i,t}$ is the CAPX of segment i in firm f in year t
 - Set \mathcal{F} includes segments that appear in both year $t - 1$ and t
 - $g_{i,t} = (\sum_{s \in \mathcal{I}} CAPX_{s,t}) / (\sum_{s \in \mathcal{I}} CAPX_{s,t-1})$
- Low DIC firms are “passive indexers” that follow industry standard

Capital allocation measure III – cash flow benchmark

- ③ Deviation from Segment Free-cash-flow (DSF) is the 3-year average of dsf :

$$dsf_{f,t} = \frac{1}{2} \sum_{i \in \mathcal{F}} \left| \frac{CAPX_{i,t}}{\sum_{j \in \mathcal{F}} CAPX_{j,t}} - \frac{SF_{i,t-1}}{\sum_{j \in \mathcal{F}} SF_{j,t-1}} \right|,$$

- $CAPX_{i,t}$ is CAPX of segment i in firm f in year t
 - $SF_{i,t}$ is the sum of income and depreciation in segment i
 - Set \mathcal{F} includes segments that appear in both year $t - 1$ and t .
- Low DSF firms are “passive” and effectively treat each segment as a standalone firm

Summary statistics

Table 1A. Sample Characteristics

	N	N (Seg.)	Asset (\$M)	B/M	ROA	CAPX /Asset	H (CAPX)	%Δ CAPX
All	23,620	2.90	3,194	0.68	0.03	0.07	0.61	0.10

Table 1B. Summary Statistics of Capital Allocation Measures

	Mean	Std. Dev.	5%	25%	Median	75%	95%
<i>DLC</i>	0.150	0.119	0.015	0.064	0.122	0.207	0.375
<i>DIC</i>	0.151	0.115	0.011	0.065	0.128	0.210	0.369
<i>DSF</i>	0.162	0.712	0.018	0.054	0.095	0.159	0.355

Table 1C. Correlations of Allocation Measures with Firm Characteristics

	<i>DIC</i>	<i>DSF</i>	N(seg.)	Asset	B/M	ROA	CAPX /Asset	H (CAPX)	%Δ CAPX
<i>DLC</i>	0.85	0.09	0.17	-0.06	0.00	-0.15	-0.08	-0.13	0.04
<i>DIC</i>		0.07	0.22	-0.03	0.00	-0.09	-0.08	-0.22	0.02
<i>DSF</i>			0.00	-0.01	0.00	-0.09	-0.03	0.01	-0.02

Summary statistics of *DLC*-sorted quintile portfolios

Table 2A. Characteristics of *DLC*-Sorted Quintile Portfolios

	<i>DLC</i>	N(seg.)	Asset (\$M)	B/M	ROA	CAPX /Asset	H (CAPX)	%Δ CAPX
Passive	0.03	2.39	4,339	0.71	0.04	0.08	0.77	0.10
2	0.08	2.85	4,215	0.51	0.04	0.07	0.59	0.10
3	0.12	3.07	3,400	0.71	0.03	0.06	0.55	0.08
4	0.19	3.14	2,514	0.79	0.03	0.06	0.55	0.09
Active	0.34	3.11	1,681	0.74	0.01	0.06	0.59	0.14

	<i>DLC</i>	Disp. Q	O-Score	Debt /Asset	Illiq.	Idio. Risk	Disp. AF	Miss. AF
Passive	0.03	1.77	0.45	0.39	2.16	0.10	0.17	0.35
2	0.08	2.56	0.37	0.38	1.68	0.09	0.15	0.31
3	0.12	2.21	0.41	0.38	2.20	0.10	0.22	0.33
4	0.19	1.71	0.49	0.38	2.98	0.11	0.26	0.43
Active	0.34	1.14	0.62	0.38	7.76	0.13	0.32	0.60

Industry and industry-adjusted profitability

Table 3A1. **Industry ROA** of *DLC*-Sorted Portfolios

<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	2.96	2.94	2.88	2.70	2.47	2.36	2.40	2.34
2	3.32	3.31	3.27	3.06	2.90	2.79	2.81	2.74
3	3.19	3.22	3.15	3.01	2.95	2.79	2.72	2.69
4	2.95	3.00	3.03	2.95	2.81	2.70	2.63	2.61
Active	2.52	2.52	2.58	2.45	2.43	2.38	2.47	2.46
A-P	-0.44	-0.42	-0.30	-0.25	-0.04	0.02	0.07	0.12
(t-stat)	(2.25)	(2.05)	(1.25)	(0.92)	(0.31)	(0.02)	(0.27)	(0.43)

Panel 3B1. **Industry-Adjusted ROA** of *DLC*-Sorted Portfolios

<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	1.85	1.74	1.53	1.18	1.37	1.55	1.45	1.59
2	1.60	1.68	1.50	1.20	1.05	1.00	1.02	1.04
3	1.29	1.08	0.87	0.45	0.26	0.20	0.42	0.42
4	0.59	0.32	0.01	-0.38	-0.38	-0.20	0.03	-0.10
Active	-0.51	-0.92	-1.62	-2.02	-1.81	-1.64	-1.64	-1.25
A-P	-2.36	-2.66	-3.15	-3.20	-3.18	-3.19	-3.09	-2.84
(t-stat)	(6.33)	(7.15)	(8.61)	(8.35)	(7.87)	(7.53)	(6.70)	(6.13)

$$\text{Ind. Adj. } ROA_f = ROA_f - \sum_{i \in f} \omega_i ROA_i.$$

Industry-adjusted profitability – Matching analysis

Matching active and passive firms by size and past profitability

Table 4A1. Passive firms and their active matches

<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	1.48	1.52	1.40	1.19	1.25	1.21	1.13	1.16
Active Match	1.76	1.36	1.21	0.35	0.39	0.37	-0.02	0.07
A-P (t-stat)	0.28	-0.15	-0.19	-0.85 (2.21)	-0.87 (3.07)	-0.83 (2.15)	-1.15 (2.67)	-1.09 (2.79)

Industry-adjusted profitability – Matching analysis

Matching active and passive firms by size and past profitability

Table 4A1. Passive firms and their active matches

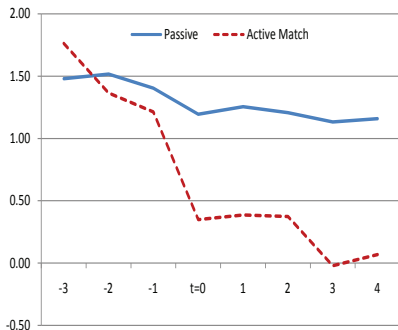
<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	1.48	1.52	1.40	1.19	1.25	1.21	1.13	1.16
Active Match	1.76	1.36	1.21	0.35	0.39	0.37	-0.02	0.07
A-P (t-stat)	0.28	-0.15	-0.19	-0.85 (2.21)	-0.87 (3.07)	-0.83 (2.15)	-1.15 (2.67)	-1.09 (2.79)

Panel 4B1. Active firms and their passive matches

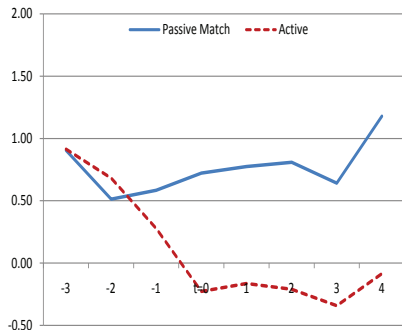
<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive Match	0.91	0.51	0.58	0.72	0.78	0.81	0.64	1.18
Active	0.91	0.68	0.28	-0.23	-0.16	-0.21	-0.34	-0.08
A-P (t-stat)	0.01	0.17	-0.31	-0.95 (2.89)	-0.94 (2.30)	-1.02 (2.77)	-0.98 (1.98)	-1.26 (2.21)

Industry-adjusted profitability – Matching analysis

Passive firms and active matches



Active firms and passive matches



Industry-adjusted profitability – Bivariate analysis

Table 5. Profitability of portfolios sorted on *DLC* and firm characteristics

<i>DLC</i>	Transfer to High Q		Transfer to Low Div		Ind-Adj. Q	
	No	Yes	No	Yes	Low	High
Passive	1.32	1.77	1.37	1.70	-1.05	2.70
Active	-0.45	-0.56	-0.98	-0.11	-1.99	0.64
A-P	-1.77	-2.32	-2.35	-1.81	-0.94	-2.06
(t-stat)	(12.36)	(8.77)	(9.43)	(7.66)	(6.61)	(8.73)

<i>DLC</i>	Dispersion in Q		CEO Age		Chairman CEO	
	Low	High	Young	Old	No	Yes
Passive	0.05	1.94	2.47	3.11	2.07	3.02
Active	-1.49	0.23	1.66	1.34	1.09	1.41
A-P	-1.53	-1.71	-0.81	-1.77	-0.98	-1.61
(t-stat)	(7.08)	(10.31)	(1.55)	(7.75)	(2.05)	(7.32)

Industry-adjusted profitability – Fixed-effect regression

Table 6. Future Industry-Adjusted Profitability (ROA_{t+1})

	DLC		DIC		DSF	
Allocation Measure	-0.21***	(0.08)	-0.16**	(0.07)	-0.09	(0.08)
Tranf. to High Q	-0.19***	(0.07)	-0.19***	(0.07)	-0.18***	(0.06)
Tranf. to Low Div.	8.88**	(3.44)	8.92**	(3.44)	7.21**	(3.15)
Ind.-Adj. ROA_t	22.43***	(0.92)	22.36***	(0.93)	23.59***	(0.98)
Ind.-Adj. ROA_{t-1}	2.56***	(0.87)	2.67***	(0.87)	6.52***	(1.03)
Ind.-Adj. Q_t	4.80***	(0.22)	4.80***	(0.22)	4.94***	(0.21)
Size	0.81**	(0.17)	0.82***	(0.17)	0.09	(0.17)
# of Segments	-0.17***	(0.08)	-0.19**	(0.08)	-0.07	(0.08)
CAPX	-0.80***	(0.11)	-0.79***	(0.11)	-0.49***	(0.10)
CAPX Growth	0.04*	(0.03)	0.04	(0.03)	0.00	(0.02)
Disp. in Seg. Q	0.05**	(0.02)	0.05**	(0.02)	0.04**	(0.02)
Leverage	-0.06	(0.21)	-0.06	(0.21)	-0.57***	(0.22)
O-Score	0.13***	(0.03)	0.13***	(0.03)	0.16***	(0.03)
H(CAPX)	0.11	(0.33)	0.07	(0.34)	-0.13	(0.32)
Year Fixed- Effects	Yes		Yes		Yes	
Firm Fixed-Effects	Yes		Yes		Yes	
R-Square	0.63		0.63		0.60	

Industry-adjusted valuation levels

Following Berger and Ofek (1995),

$$\text{Ind. Adj. Valuation} = \ln M_f - \ln \left(\sum_{j \in \mathcal{F}} B_j (M/B)_j \right).$$

Table 7A. Industry-Adjusted Valuation of *DLC*-Sorted Portfolios

<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	3.02	3.61	2.79	1.31	1.28	1.37	2.07	2.41
2	1.43	1.05	0.72	0.29	0.64	0.91	2.01	3.58
3	-0.76	-0.74	-1.83	-2.58	-2.59	-2.39	-2.39	-1.84
4	-4.13	-5.33	-6.03	-5.76	-4.84	-4.44	-4.38	-3.78
Active	-8.11	-7.45	-8.48	-8.44	-9.00	-8.88	-8.26	-7.88
A-P	-11.13	-11.05	-11.27	-9.74	-10.28	-10.25	-10.33	-10.29
(t-stat)	(5.56)	(5.77)	(6.47)	(6.42)	(6.12)	(5.71)	(5.42)	(5.26)

Industry-adjusted valuation – Matching analysis

Matching active and passive firms by size and past industry-adjusted valuation

Table 8A1. Passive firms and their active matches

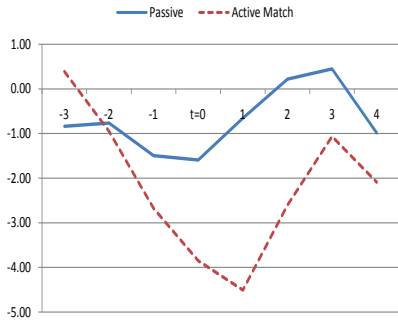
<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive	-0.84	-0.76	-1.50	-1.59	-0.65	0.22	0.45	-0.99
Active Match	0.39	-0.95	-2.67	-3.85	-4.51	-2.60	-1.06	-2.09
A-P	1.23	-0.18	-1.18	-2.25	-3.85	-2.82	-1.51	-1.10
(t-stat)				(2.13)	(1.95)	(2.59)	(0.62)	(0.52)

Panel 8B1. Active firms and their passive matches

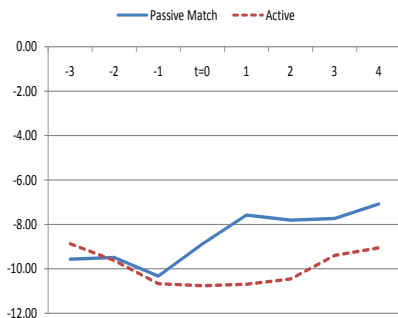
<i>DLC</i>	-2	-1	t=0	1	2	3	4	5
Passive Match	-9.56	-9.48	-10.32	-8.87	-7.57	-7.81	-7.73	-7.07
Active	-8.86	-9.62	-10.66	-10.76	-10.69	-10.45	-9.39	-9.05
A-P	0.70	-0.14	-0.34	-1.89	-3.12	-2.64	-1.66	-1.97
(t-stat)				(1.78)	(1.79)	(1.71)	(0.70)	(0.82)

Industry-adjusted valuation – Matching analysis

Passive firms and active matches



Active firms and passive matches



Industry-adjusted valuation – Regression analysis

Table 9. Industry-adjusted valuation (Q_t)

	DLC	DIC	DSF
Allocation Measure	-0.31* (0.19)	-0.41** (0.18)	-0.03 (0.21)
Tranf. to High Q	0.70*** (0.21)	0.71*** (0.21)	0.77*** (0.20)
Tranf. to Low Div.	49.81*** (6.89)	50.70*** (6.87)	52.62*** (6.73)
Ind.-Adj. ROA _t	42.16*** (2.81)	41.40*** (2.80)	58.37*** (3.26)
Ind.-Adj. ROA _{t-1}	-21.80*** (2.61)	-20.99*** (2.60)	-19.89*** (3.33)
Ind.-Adj. Q _{t-1}	78.73*** (0.47)	78.61*** (0.47)	77.75*** (0.50)
Size	0.06 (0.20)	0.07 (0.20)	0.30 (0.20)
# of Segments	-0.14 (0.18)	-0.14 (0.18)	-0.23 (0.18)
CAPX	0.97*** (0.17)	0.97*** (0.16)	0.96*** (0.17)
CAPX Growth	-0.33*** (0.07)	-0.33*** (0.07)	-0.32*** (0.07)
Disp. in Seg. Q	-0.12*** (0.05)	-0.12*** (0.05)	-0.19*** (0.05)
Leverage	-11.22*** (1.15)	-11.01*** (1.14)	-11.08*** (1.21)
O-Score	1.90*** (0.19)	1.85*** (0.18)	2.08*** (0.19)
H(CAPX)	-0.07 (0.83)	-0.36 (0.84)	-0.14 (0.83)
Beta	0.25 (0.28)	0.22 (0.28)	-0.19 (0.30)
Idio. Vol.	1.71 (3.64)	1.52 (3.63)	0.05 (4.26)
R-Square	0.68	0.68	0.69

Stock returns – portfolio analysis

Table 10A1. Four-factor α of *DLC*-Sorted Portfolios

<i>DLC</i>	$t = 1$	2	3
Passive	0.31	0.09	0.12
2	0.11	0.09	0.08
3	-0.23	0.07	0.07
4	-0.06	-0.26	-0.20
Active	-0.19	-0.28	-0.44
A-P	-0.50	-0.37	-0.56
(t-stat)	(3.24)	(2.35)	(3.11)

Stock returns – Regression analysis

Table 11. Industry-Adjusted Monthly Return ($R_{f,t+1} - \sum_j w_j R_{j,t+1}$)

	DLC		DIC		DSF	
Allocation Measure	-0.06**	(0.03)	-0.04	(0.03)	-0.03	(0.03)
Beta	0.06	(0.10)	0.06	(0.10)	0.15	(0.11)
B/M	-0.04	(0.12)	-0.01	(0.12)	0.06	(0.13)
Size	-0.13***	(0.04)	-0.12***	(0.04)	-0.11***	(0.04)
Momentum	-0.15	(0.14)	-0.16	(0.14)	-0.25	(0.17)
# of Segments	0.02	(0.02)	0.02	(0.02)	0.05**	(0.02)
Ind.-Adj. ROA _t	-0.01	(0.88)	0.17	(0.88)	1.58	(1.05)
Ind.-Adj. Q _t	-0.55**	(0.25)	-0.51**	(0.25)	-0.46*	(0.27)
Asset Growth (AG)	-0.48***	(0.14)	-0.45***	(0.14)	-0.49***	(0.15)
CAPX Growth	-0.05***	(0.01)	-0.05***	(0.01)	-0.06***	(0.02)
Disp. of AG	0.11	(0.15)	0.06	(0.15)	0.07	(0.15)
Disp. in Seg. Q	0.03***	(0.01)	0.03***	(0.01)	0.03***	(0.01)
Leverage	-0.97***	(0.32)	-1.03***	(0.32)	-0.88**	(0.35)
O-Score	0.14***	(0.05)	0.15***	(0.05)	0.16**	(0.06)
Illiquidity	0.01	(0.01)	0.00	(0.01)	0.00	(0.01)
Idio. Volatility	-2.43*	(1.47)	-2.52*	(1.45)	-3.40**	(1.63)
Disp. in AF	-0.19**	(0.08)	-0.19**	(0.08)	-0.18**	(0.09)
Missing AF	-0.22**	(0.09)	-0.21**	(0.09)	-0.11	(0.09)
Adjusted R-Square	0.05		0.05		0.05	

Conclusions

- 1 Active firms have lower profitability than passive firms.
- 2 Active firms have lower valuation levels than passive firms.
- 3 Active firms have lower subsequent stock returns than passive firms.

These results suggest that:

- 1 Conglomerate firms on average do not efficiently allocate capital across business segments.
- 2 The market fails to fully recognize this.