

Replicating Bates, Kahle, and Stulz (2009)

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1 Introduction

In this paper, I replicate Bates, Kahle, and Stulz (2009, Journal of Finance)'s results.

2 Results

- Summary statistics and univariate analysis (Table 1 and 2) and Figures (Figure 1, 2, 3, and 4) are well replicated, suggesting that sample construction is not very far from the paper.
- Regression results (Table 3 4, 5, and 6) are hard to replicate for some specifications, even after following the same filters and winsorizations. Especially, coefficients for **Industry sigma** is very far from reported values. When LHS variable is **Log(Cash/Net Assets)**, the results are very sensitive to outliers and I suspect there would be additional filters other than reported.

Table 1: Average and Median Cash and Leverage Ratios from 1980 to 2006

Year	N	Aggregate Cash Ratio	Average Cash Ratio	Median Cash Ratio	Average Leverage	Median Leverage	Average Net Leverage	Median Net Leverage
1980	4,228	0.113	0.105	0.053	0.273	0.248	0.167	0.181
1981	4,502	0.103	0.120	0.056	0.262	0.232	0.142	0.164
1982	4,458	0.098	0.121	0.062	0.267	0.238	0.147	0.162
1983	4,866	0.099	0.154	0.083	0.253	0.208	0.099	0.114
1984	4,932	0.088	0.138	0.068	0.258	0.220	0.120	0.143
1985	4,885	0.087	0.139	0.070	0.269	0.232	0.129	0.151
1986	5,131	0.089	0.152	0.079	0.272	0.237	0.119	0.141
1987	4,600	0.086	0.153	0.077	0.270	0.237	0.117	0.150
1988	4,429	0.073	0.138	0.070	0.276	0.239	0.138	0.156
1989	4,267	0.064	0.135	0.065	0.281	0.244	0.146	0.168
1990	4,220	0.061	0.131	0.061	0.277	0.238	0.146	0.163
1991	4,276	0.061	0.152	0.072	0.254	0.209	0.102	0.122
1992	4,412	0.058	0.157	0.078	0.235	0.188	0.077	0.104
1993	5,387	0.060	0.156	0.072	0.208	0.154	0.052	0.068
1994	5,689	0.057	0.141	0.060	0.213	0.162	0.072	0.086
1995	5,795	0.059	0.156	0.063	0.214	0.162	0.058	0.084
1996	6,166	0.063	0.178	0.073	0.209	0.157	0.031	0.070
1997	6,156	0.066	0.178	0.075	0.223	0.168	0.045	0.080
1998	5,798	0.064	0.166	0.067	0.241	0.187	0.075	0.104
1999	5,585	0.073	0.185	0.066	0.234	0.182	0.049	0.098
2000	5,376	0.071	0.195	0.075	0.223	0.159	0.028	0.073
2001	4,855	0.078	0.201	0.088	0.231	0.158	0.030	0.062
2002	4,490	0.088	0.198	0.095	0.219	0.156	0.021	0.055
2003	4,207	0.100	0.207	0.104	0.201	0.146	-0.005	0.039
2004	3,659	0.112	0.237	0.144	0.195	0.139	-0.041	-0.005
2005	3,573	0.111	0.235	0.145	0.191	0.131	-0.044	-0.006
2006	3,496	0.105	0.229	0.132	0.203	0.139	-0.026	0.009

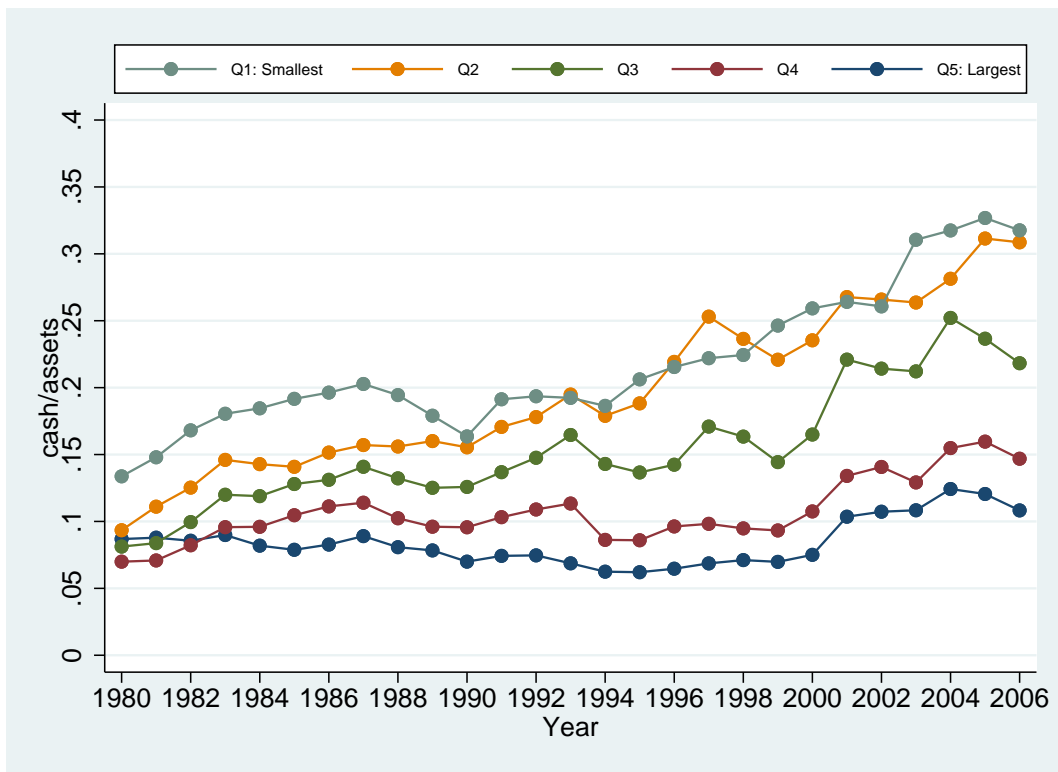


Figure 1: Average cash ratios by firm size quintile from 1980 to 2006

Table 2: Average Cash Ratios from 1980 to 2006 Delineated by New Issue Status, the Payment of Dividends, and Accounting Performance

Year	New Issues		Dividend Status		Accounting Performance	
	IPO Firms	Non-IPO Firms	Dividend Payer	Nondividend Payer	Negative Net Income	Nonnegative Net Income
1980	0.171	0.088	0.090	0.130	0.124	0.102
1981	0.193	0.092	0.095	0.151	0.142	0.114
1982	0.171	0.099	0.105	0.138	0.120	0.121
1983	0.226	0.112	0.116	0.187	0.174	0.147
1984	0.189	0.104	0.103	0.165	0.159	0.130
1985	0.187	0.105	0.106	0.165	0.149	0.135
1986	0.199	0.115	0.109	0.181	0.168	0.144
1987	0.194	0.119	0.109	0.175	0.179	0.139
1988	0.168	0.115	0.103	0.156	0.161	0.127
1989	0.162	0.118	0.100	0.154	0.142	0.131
1990	0.155	0.116	0.098	0.148	0.140	0.126
1991	0.198	0.123	0.105	0.174	0.167	0.142
1992	0.207	0.127	0.104	0.182	0.187	0.141
1993	0.205	0.122	0.093	0.187	0.205	0.133
1994	0.177	0.112	0.081	0.170	0.200	0.117
1995	0.200	0.116	0.085	0.191	0.203	0.135
1996	0.228	0.125	0.085	0.218	0.259	0.139
1997	0.222	0.132	0.091	0.214	0.252	0.140
1998	0.204	0.129	0.080	0.202	0.233	0.128
1999	0.247	0.132	0.075	0.228	0.276	0.130
2000	0.265	0.138	0.070	0.239	0.286	0.127
2001	0.272	0.155	0.080	0.245	0.282	0.130
2002	0.263	0.168	0.088	0.241	0.274	0.140
2003	0.273	0.182	0.102	0.255	0.300	0.157
2004	0.338	0.203	0.132	0.275	0.341	0.185
2005	0.309	0.213	0.132	0.276	0.331	0.188
2006	0.276	0.216	0.124	0.273	0.339	0.177

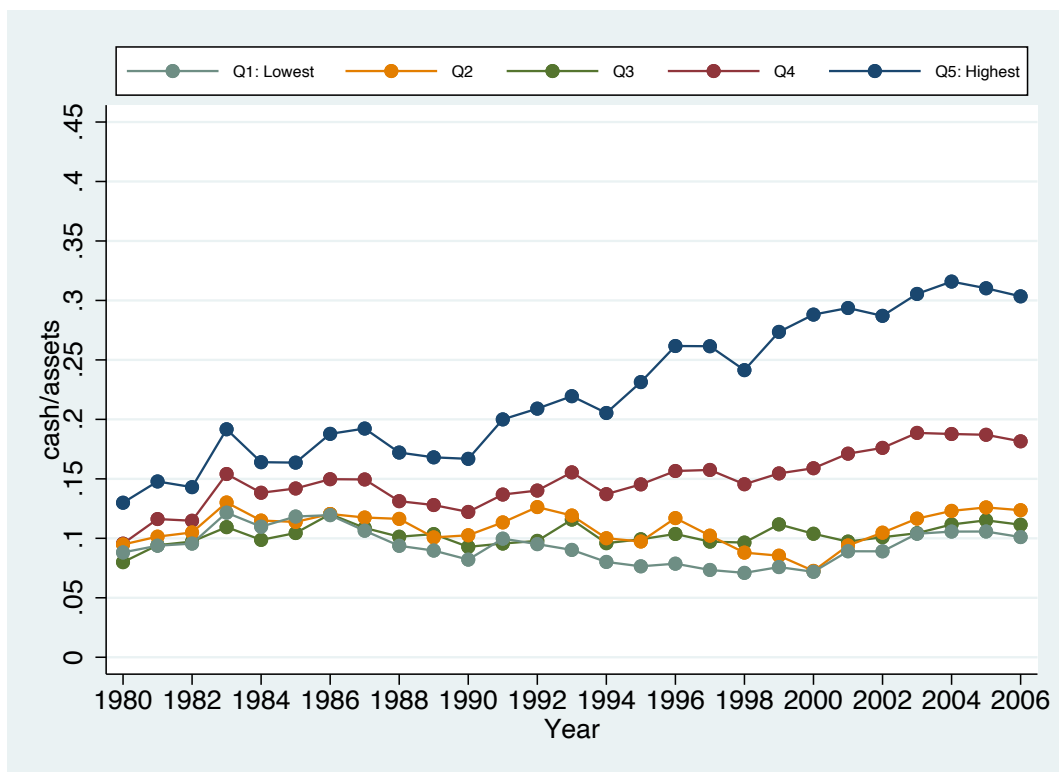


Figure 2: Average cash ratios by idiosyncratic risk

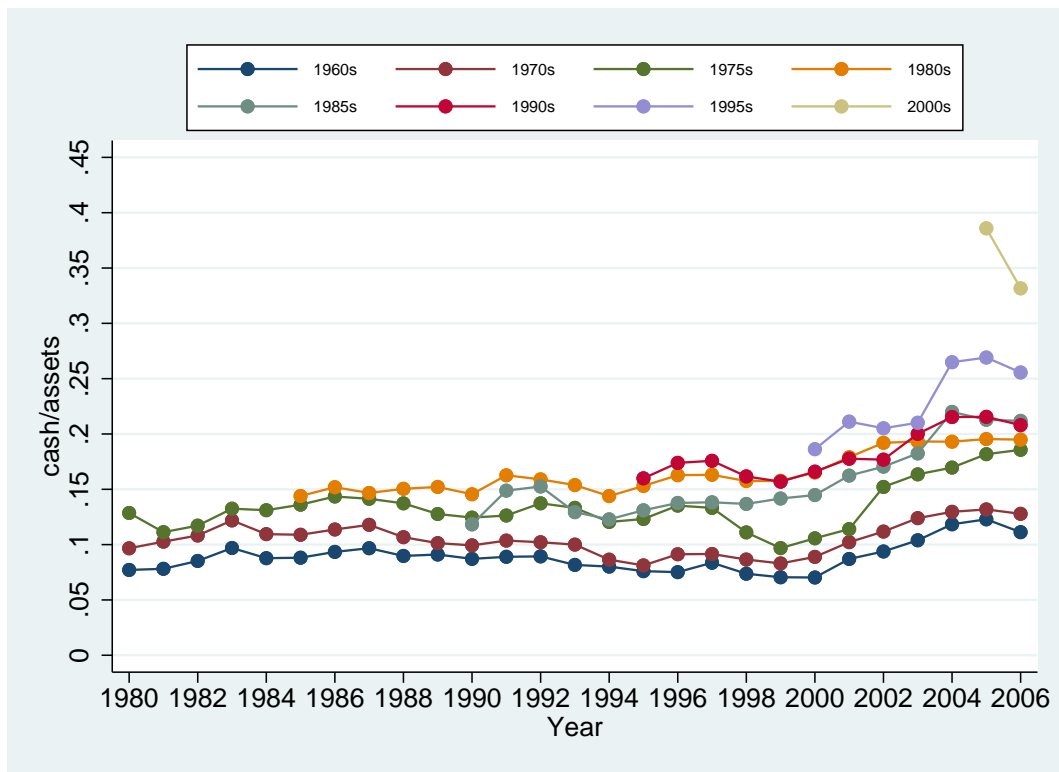


Figure 3: Average cash ratios by idiosyncratic risk

Table 3: Regressions Estimating the Determinants of Cash Holdings

Panel A										
Model	OLS	OLS	Changes	OLS	OLS	Log(Cash/ Net Assets)	Changes	F-M (1980s)	F-M (1990s)	FE
Dependent Variables	Cash/Assets	Log(Cash/ Net Assets)	Cash/Assets	Cash/Assets	Cash/Assets	Log(Cash/ Net Assets)	Cash/Assets	Cash/Assets	Cash/Assets	Cash/Assets
Constant	0.255 (0.000)	-1.569 (0.000)	0.073 (0.000)	0.257 (0.000)	-1.535 (0.000)	0.076 (0.000)	0.294 (0.000)	0.217 (0.000)		
Lag dcash			-0.092 (0.000)			-0.092 (0.000)				
Lag cash			-0.247 (0.000)			-0.249 (0.000)				
Industry sigma	0.701 (0.000)	5.543 (0.000)	0.142 (0.000)	0.843 (0.000)	7.605 (0.000)	0.170 (0.000)	0.490 (0.099)	0.954 (0.000)	0.770 (0.000)	
Market to book	0.017 (0.000)	0.144 (0.000)	0.005 (0.000)	0.017 (0.000)	0.148 (0.000)	0.005 (0.000)	0.011 (0.000)	0.019 (0.000)	0.019 (0.000)	0.019 (0.000)
Real size	-0.006 (0.000)	-0.059 (0.000)	-0.000 (0.362)	-0.005 (0.000)	-0.040 (0.000)	-0.000 (0.525)	-0.011 (0.000)	-0.004 (0.008)	-0.007 (0.000)	-0.007 (0.000)
Cash flow / assets	0.003 (0.704)	0.109 (0.153)	0.061 (0.000)	0.005 (0.609)	0.128 (0.128)	0.062 (0.000)	0.025 (0.022)	0.003 (0.823)	0.019 (0.041)	0.019 (0.041)
NWC / assets	-0.230 (0.000)	-1.998 (0.000)	-0.094 (0.000)	-0.232 (0.000)	-2.035 (0.000)	-0.095 (0.000)	-0.221 (0.000)	-0.249 (0.000)	-0.209 (0.000)	-0.209 (0.000)
Capex	-0.353 (0.000)	-2.369 (0.000)	-0.306 (0.000)	-0.365 (0.000)	-2.550 (0.000)	-0.307 (0.000)	-0.303 (0.000)	-0.458 (0.000)	-0.407 (0.000)	-0.407 (0.000)
Leverage	-0.358 (0.000)	-3.575 (0.000)	-0.086 (0.000)	-0.360 (0.000)	-3.604 (0.000)	-0.086 (0.000)	-0.356 (0.000)	-0.350 (0.000)	-0.286 (0.000)	-0.286 (0.000)
R&D / sales	0.069 (0.000)	0.398 (0.000)	0.020 (0.000)	0.068 (0.000)	0.392 (0.000)	0.020 (0.000)	0.060 (0.000)	0.066 (0.000)	0.071 (0.000)	0.071 (0.000)

Dividend dummy	-0.038 (0.000)	-0.277 (0.000)	-0.006 (0.001)	-0.042 (0.000)	-0.339 (0.000)	-0.007 (0.000)	-0.027 (0.000)	-0.051 (0.000)	-0.020 (0.000)
Acquisition activity	-0.226 (0.000)	-1.716 (0.000)	-0.349 (0.000)	-0.220 (0.000)	-1.637 (0.000)	-0.347 (0.000)	-0.108 (0.000)	-0.280 (0.000)	-0.202 (0.000)
1990s dummy				-0.029 (0.000)	-0.424 (0.000)	-0.009 (0.015)			
2000s dummy				-0.020 (0.019)	-0.299 (0.002)	-0.004 (0.299)			
Year dummies									Yes
Adjusted R^2	0.456	0.369	0.235	0.459	0.377	0.236	0.356	0.492	0.421
Obs.	101,754	100,910	78,068	101,754	100,910	78,068	36,834	64,920	61,470

Panel B									
Model	Cash/Assets			Cash/Assets			Log (Cash/Net Assets)		
	Estimate	Interaction	Interaction	Estimate	Interaction	Interaction	Estimate	Interaction	Interaction
Dependent Variables		1990s	2000s		1990s	2000s		1990s	2000s
Intercept	0.319 (0.000)	-0.107 (0.000)	-0.005 (0.750)	0.326 (0.000)	-0.105 (0.000)	0.013 (0.352)	-1.075 (0.000)	-0.749 (0.000)	-0.247 (0.044)
Industry sigma	0.115 (0.302)	0.816 (0.000)	0.120 (0.239)	0.157 (0.062)	0.719 (0.000)	0.053 (0.576)	1.636 (0.016)	6.694 (0.000)	0.230 (0.786)
Market to book	0.011 (0.000)	0.007 (0.000)	0.002 (0.429)	0.006 (0.000)	0.008 (0.000)	0.001 (0.691)	0.066 (0.000)	0.056 (0.000)	0.032 (0.184)
Real size	-0.011 (0.000)	0.007 (0.000)	0.001 (0.607)	-0.010 (0.000)	0.006 (0.000)	0.002 (0.470)	-0.070 (0.000)	0.016 (0.217)	0.051 (0.001)
Cash flow/ assets	0.028 (0.012)	-0.024 (0.103)	-0.029 (0.114)	0.081 (0.000)	-0.004 (0.823)	-0.037 (0.065)	0.614 (0.000)	-0.052 (0.717)	-0.355 (0.037)
NWC/ assets	-0.222 (0.000)	-0.005 (0.725)	-0.039 (0.040)	-0.251 (0.000)	0.017 (0.220)	-0.039 (0.043)	-2.111 (0.000)	-0.115 (0.412)	-0.027 (0.883)
Capex	-0.297 (0.000)	-0.084 (0.002)	-0.136 (0.025)	-0.419 (0.000)	-0.066 (0.024)	-0.139 (0.014)	-2.850 (0.000)	-0.521 (0.023)	-1.241 (0.063)
Leverage	-0.361 (0.000)	-0.003 (0.847)	0.021 (0.276)	-0.360 (0.000)	-0.000 (0.982)	-0.005 (0.770)	-3.584 (0.000)	-0.233 (0.024)	0.381 (0.041)
R&D/ sales	0.063 (0.000)	0.004 (0.472)	-0.003 (0.449)	0.053 (0.000)	0.008 (0.130)	0.000 (0.999)	0.319 (0.000)	0.009 (0.751)	0.004 (0.865)
Dividend dummy	-0.030 (0.000)	-0.019 (0.000)	-0.009 (0.148)	-0.019 (0.000)	-0.018 (0.000)	-0.015 (0.018)	-0.189 (0.000)	-0.165 (0.006)	-0.065 (0.249)
Acquisition activity	-0.097 (0.000)	-0.126 (0.000)	-0.127 (0.000)	-0.264 (0.000)	-0.103 (0.000)	-0.101 (0.001)	-1.534 (0.000)	-1.292 (0.000)	-0.809 (0.014)
Net equity issuance				0.143			0.904		

Net debt issuance	(0.000)		(0.000)
	0.164		1.255
	(0.000)		(0.000)
Loss dummy	-0.002		-0.084
	(0.564)		(0.041)
T-bill	-0.001		-0.014
	(0.197)		(0.074)
Credit spread	0.002		0.132
	(0.576)		(0.058)
IPO1	0.031		0.152
	(0.000)		(0.001)
IPO2	0.012		0.007
	(0.007)		(0.865)
IPO3	0.000		-0.065
	(0.965)		(0.109)
IPO4	-0.003		-0.072
	(0.503)		(0.037)
IPO5	-0.004		-0.084
	(0.151)		(0.007)
Adjusted R^2	0.466		0.389

Table 4: Predicted Cash Ratios and Their Deviations from Actual Cash Holdings over Time

	Whole Sample			S&P 500 Firms			Firms Paying a Dividend			Firms Not Paying a Dividend		
	Predicted	Actual – Predicted	<i>t</i> -statistic	Predicted	Actual – Predicted	<i>t</i> -statistic	Predicted	Actual – Predicted	<i>t</i> -statistic	Predicted	Actual – Predicted	<i>t</i> -statistic
1990	0.145	-0.013	-5.26	0.092	-0.022	-4.53	0.105	-0.007	-2.13	0.164	-0.016	-4.81
1991	0.164	-0.011	-4.36	0.103	-0.035	-8.73	0.116	-0.011	-3.36	0.184	-0.011	-3.30
1992	0.168	-0.011	-4.51	0.112	-0.038	-8.89	0.123	-0.017	-5.20	0.187	-0.009	-2.68
1993	0.177	-0.010	-4.07	0.114	-0.041	-8.81	0.129	-0.018	-5.45	0.195	-0.007	-2.13
1994	0.169	-0.019	-8.10	0.113	-0.044	-8.53	0.121	-0.028	-9.09	0.186	-0.016	-5.30
1995	0.172	-0.013	-5.54	0.111	-0.042	-8.02	0.118	-0.025	-7.94	0.191	-0.009	-2.95
1996	0.178	-0.002	-0.96	0.112	-0.042	-8.25	0.119	-0.023	-7.17	0.199	0.005	1.62
1997	0.169	0.002	0.76	0.111	-0.037	-6.60	0.119	-0.016	-4.47	0.186	0.008	2.52
1998	0.154	0.004	1.42	0.108	-0.035	-6.44	0.106	-0.020	-5.52	0.169	0.011	3.54
1999	0.170	0.002	0.76	0.112	-0.034	-5.70	0.103	-0.019	-5.13	0.190	0.008	2.53
2000	0.177	0.005	1.62	0.122	-0.023	-3.28	0.106	-0.024	-6.24	0.196	0.013	3.55
2001	0.176	0.019	5.64	0.125	-0.005	-0.65	0.111	-0.021	-5.39	0.193	0.030	7.29
2002	0.177	0.018	5.41	0.128	0.004	0.48	0.120	-0.021	-4.81	0.193	0.029	7.04
2003	0.186	0.019	5.71	0.136	0.012	1.47	0.130	-0.009	-2.02	0.204	0.028	6.85
2004	0.192	0.021	6.49	0.140	0.006	0.73	0.134	-0.005	-1.12	0.214	0.032	7.50
2005	0.189	0.024	7.23	0.140	0.007	0.81	0.133	-0.005	-1.15	0.213	0.036	8.39
2006	0.182	0.023	7.11	0.132	-0.006	-0.92	0.126	-0.007	-1.80	0.206	0.036	8.42

Table 5: Determinants of Changes in Predicted Cash between 2000 and 2006

	Whole Sample	Nondividend Paying Firms	Dividend Paying Firms	Difference	Non-S&P 500 Firms	S&P 500 Firms	Difference
Industry sigma	0.008 (0.0000)	0.008 (0.0001)	0.006 (0.0001)	0.002	0.008 (0.0000)	0.007 (0.0002)	0.001
Market to book	0.002 (0.0001)	0.001 (0.0001)	0.002 (0.0001)	-0.001	0.001 (0.0001)	0.006 (0.0002)	-0.005
Real size	-0.008 (0.0001)	-0.014 (0.0001)	-0.007 (0.0002)	-0.007	-0.008 (0.0001)	-0.007 (0.0003)	-0.002
Cash flow/ assets	-0.001 (0.0001)	-0.000 (0.0002)	0.001 (0.0001)	-0.002	-0.002 (0.0001)	0.002 (0.0001)	-0.004
NWC/ assets	0.019 (0.0004)	0.016 (0.0005)	0.017 (0.0006)	-0.000	0.019 (0.0004)	0.022 (0.0008)	-0.003
Capex	0.012 (0.0002)	0.014 (0.0003)	0.010 (0.0003)	0.004	0.012 (0.0002)	0.013 (0.0005)	-0.001
Leverage	-0.004 (0.0008)	0.032 (0.0008)	-0.064 (0.0013)	0.095	-0.004 (0.0008)	0.005 (0.0015)	-0.009
R&D/ sales	0.010 (0.0003)	0.012 (0.0004)	0.000 (0.0000)	0.012	0.010 (0.0003)	0.002 (0.0001)	0.009
Dividend dummy	0.002 (0.0001)	0.000 (.)	0.000 (.)	0.000	0.002 (0.0001)	0.005 (0.0002)	-0.003
Acquisition activity	-0.002 (0.0001)	-0.002 (0.0001)	-0.003 (0.0002)	0.001	-0.002 (0.0001)	-0.002 (0.0003)	-0.000
Net equity issuance	-0.002 (0.0005)	-0.005 (0.0007)	-0.003 (0.0002)	-0.003	-0.002 (0.0005)	-0.004 (0.0002)	0.003
Net debt issuance	-0.001 (0.0002)	-0.000 (0.0003)	-0.002 (0.0003)	0.001	-0.001 (0.0002)	-0.001 (0.0004)	-0.000

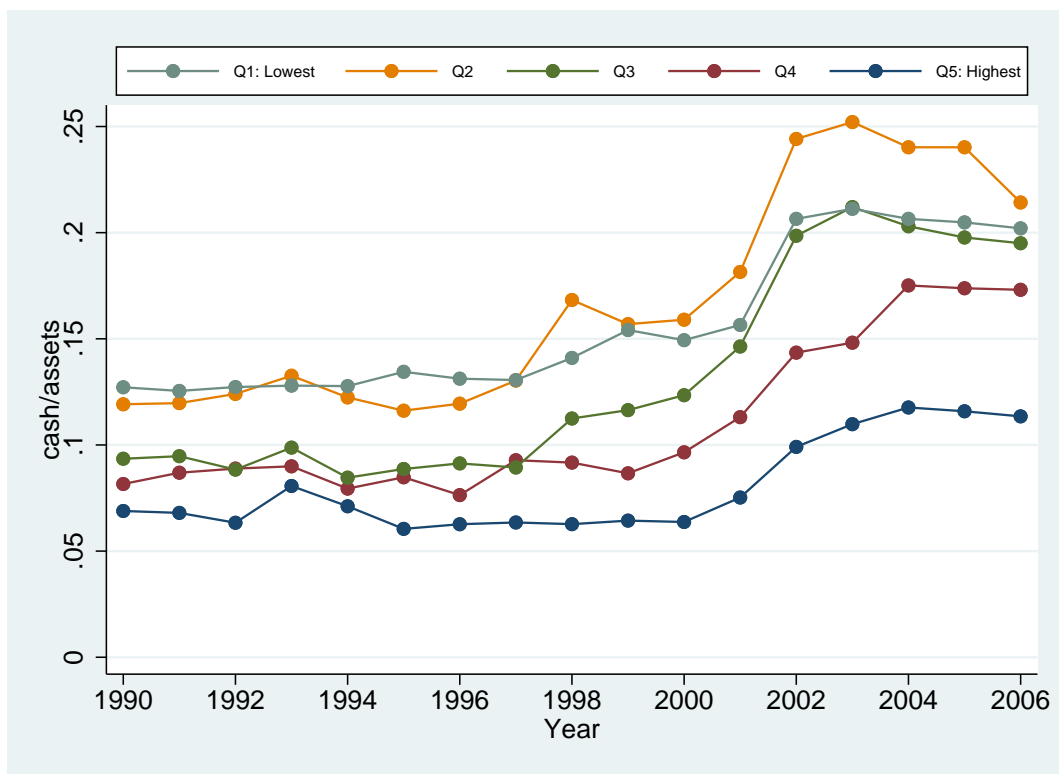


Figure 4: Average cash ratios sorted by quintiles of the GIM index from 1990 to 2006

Table 6: OLS Regression Results for the Market Value of the Firm

	(1)	(2)
Intercept	0.736 (0.000)	0.657 (0.000)
E_t	-0.796 (0.001)	1.103 (0.053)
dE_t	0.155 (0.168)	-0.096 (0.332)
dE_{t+2}	-0.213 (0.155)	0.303 (0.132)
dNA_t	0.380 (0.000)	0.608 (0.000)
dNA_{t+2}	0.312 (0.000)	0.353 (0.073)
RD_t	5.337 (0.000)	4.705 (0.000)
dRD_t	0.484 (0.029)	1.555 (0.094)
dRD_{t+2}	2.847 (0.000)	6.181 (0.000)
I_t	4.253 (0.000)	-3.195 (0.011)
dI_t	-5.962 (0.000)	-3.431 (0.019)
dI_{t+2}	-0.096 (0.901)	-4.491 (0.029)
D_t	5.477 (0.000)	7.896 (0.000)
dD_t	-1.260 (0.000)	-1.511 (0.000)
dD_{t+2}	1.314 (0.288)	2.652 (0.010)
dV_{t+2}	-0.092 (0.049)	-0.101 (0.159)
L_t	1.866 (0.000)	0.915 (0.000)
$L_t * D90s$	0.417 (0.364)	1.803 (0.011)
$L_t * D00s$	-0.857	-0.771

	(0.196)	(0.374)
<i>D90s</i>	0.170 (0.000)	0.248 (0.000)
<i>D00s</i>	0.086 (0.162)	0.038 (0.521)
Adjusted R^2	0.276	0.301
Obs.	58,478	19,819