

## **Cummins, Hassett, and Oliner, "Investment Behavior, Observable Expectations, and Internal Funds"**

### **Appendix C: Additional Robustness Tests**

#### **Key to the tables**

##### **Alternative sample selection rules**

Table C.1: Deletes lower and upper 1% tails for variables in regression equation and IV set

Table C.2: Deletes observations with  $Q_e$  or  $Q_{hat}$  less than zero or greater than ten

##### **Alternative sets of instrumental variables**

Table C.3: Adds t-2 values of  $I/K$  and  $CF/K$  to IV set

Table C.4: Adds t-3 and t-4 values of components of  $Q_{hat}$  to IV set

Table C.5: Removes t-3 and t-4 values of  $CF/K$  from IV set, adds t-3 and t-4 values of  $Q_e$ ,  $Q_{hat}$ , and  $Sales/K$

Table C.6: Removes t-3 and t-4 values of  $CF/K$  from IV set, adds t-3 and t-4 values of  $Sales/K$

##### **Other tables**

Table C.7: Uses forward-mean differencing instead of first differencing

Table C.8: Contains first-stage F-tests for regression of first-differenced variables on t-3 and t-4 levels of  $I/K$  and  $CF/K$

Table C.1

Alternative sample selection rule: Delete lower and upper 1% tails for variables in regression equation and IV set (otherwise identical to Table 2 in the paper)

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.009 (0.002)	0.006 (0.002)	0.005 (0.002)	LTG <sub>it</sub>	1.970 (0.277)	1.794 (0.330)	1.325 (0.303)
(CF/K) <sub>it</sub>	0.182 (0.051)	0.064 (0.057)	0.117 (0.055)	(CF/K) <sub>it</sub>	0.016 (0.052)	-0.065 (0.050)	0.051 (0.055)
Sargan $p$ -value	0.000	0.000	0.000	Sargan $p$ -value	0.000	0.017	0.005
$m_2$ $p$ -value	0.000	0.003	0.009	$m_2$ $p$ -value	0.000	0.000	0.002

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.028 (0.005)	0.027 (0.008)	0.019 (0.005)	$\hat{Q}_{it}$	0.021 (0.006)	0.026 (0.010)	0.018 (0.006)
(CF/K) <sub>it</sub>	-0.003 (0.053)	-0.076 (0.060)	0.000 (0.064)	(CF/K) <sub>it</sub>	0.022 (0.055)	-0.069 (0.062)	-0.003 (0.063)
				$Q_{it}^E$	0.005 (0.002)	0.000 (0.003)	0.001 (0.002)
Sargan $p$ -value	0.000	0.000	0.000	Sargan $p$ -value	0.000	0.000	0.000
$m_2$ $p$ -value	0.000	0.003	0.016	$m_2$ $p$ -value	0.000	0.003	0.018

  

No. of firms:	1630	583	1044
No. observations:	10460	3616	4605

=significant at the 5% level

Table C.2

Alternative sample selection rule: Delete observations with  $Q_e$  or  $Q_{hat}$  less than zero or greater than ten (otherwise identical to Table 2 in the paper)

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.042 (0.007)	0.015 (0.011)	0.029 (0.009)	LTG <sub>it</sub>	1.687 (0.289)	1.664 (0.432)	1.068 (0.322)
$(CF/K)_{it}$	0.191 (0.072)	0.131 (0.068)	-0.028 (0.088)	$(CF/K)_{it}$	0.142 (0.075)	0.071 (0.072)	0.087 (0.086)
Sargan $p$ -value	0.000	0.000	0.007	Sargan $p$ -value	0.005	0.014	0.334
$m_2$ $p$ -value	0.001	0.062	0.023	$m_2$ $p$ -value	0.000	0.001	0.035

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.117 (0.015)	0.089 (0.027)	0.084 (0.013)	$\hat{Q}_{it}$	0.110 (0.017)	0.110 (0.033)	0.084 (0.014)
$(CF/K)_{it}$	-0.002 (0.078)	0.081 (0.077)	-0.183 (0.098)	$(CF/K)_{it}$	-0.008 (0.078)	0.080 (0.077)	-0.186 (0.103)
				$Q_{it}^E$	0.007 (0.008)	-0.016 (0.017)	0.001 (0.010)
Sargan $p$ -value	0.074	0.032	0.580	Sargan $p$ -value	0.072	0.028	0.545
$m_2$ $p$ -value	0.002	0.256	0.031	$m_2$ $p$ -value	0.003	0.127	0.031

  

No. of firms:	1187	486	715
No. observations:	7916	2889	3163

=significant at the 5% level

Table C.3

Alternative instrumental variables: Add t-2 values of I/K and CF/K to IV set  
(otherwise identical to Table 2 in the paper)

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.048 (0.005)	0.040 (0.009)	0.024 (0.006)	LTG <sub>it</sub>	1.210 (0.291)	1.082 (0.345)	0.982 (0.310)
(CF/K) <sub>it</sub>	0.136 (0.067)	0.027 (0.055)	0.179 (0.071)	(CF/K) <sub>it</sub>	0.138 (0.072)	0.058 (0.059)	0.179 (0.077)
Sargan $p$ -value	0.000	0.000	0.001	Sargan $p$ -value	0.000	0.000	0.098
$m_2$ $p$ -value	0.009	0.125	0.162	$m_2$ $p$ -value	0.020	0.292	0.174

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.138 (0.014)	0.093 (0.017)	0.078 (0.014)	$\hat{Q}_{it}$	0.106 (0.016)	0.074 (0.019)	0.064 (0.016)
(CF/K) <sub>it</sub>	0.054 (0.073)	0.000 (0.056)	0.138 (0.076)	(CF/K) <sub>it</sub>	0.06 (0.071)	-0.010 (0.055)	0.140 (0.074)
				$Q_{it}^E$	0.023 (0.007)	0.018 (0.010)	0.011 (0.007)
Sargan $p$ -value	0.001	0.000	0.048	Sargan $p$ -value	0.001	0.000	0.079
$m_2$ $p$ -value	0.033	0.071	0.148	$m_2$ $p$ -value	0.031	0.082	0.138

  

No. of firms:	1066	429	642
No. observations:	7167	2552	2854

=significant at the 5% level

**Table C.4**

**Alternative instrumental variables: Add t-3 and t-4 values of components of Qhat to IV set (otherwise identical to Table 2 in the paper)**

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.032 (0.005)	0.030 (0.010)	0.013 (0.005)	LTG <sub>it</sub>	0.656 (0.139)	0.368 (0.149)	0.354 (0.186)
(CF/K) <sub>it</sub>	0.232 (0.059)	0.178 (0.064)	0.183 (0.066)	(CF/K) <sub>it</sub>	0.273 (0.062)	0.217 (0.065)	0.204 (0.071)
Sargan $p$ -value	0.000	0.011	0.665	Sargan $p$ -value	0.016	0.002	0.640
$m_2$ $p$ -value	0.001	0.151	0.003	$m_2$ $p$ -value	0.000	0.061	0.002

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.105 (0.013)	0.088 (0.015)	0.046 (0.012)	$\hat{Q}_{it}$	0.095 (0.013)	0.089 (0.016)	0.041 (0.013)
(CF/K) <sub>it</sub>	0.057 (0.063)	0.066 (0.054)	0.116 (0.068)	(CF/K) <sub>it</sub>	0.064 (0.062)	0.066 (0.054)	0.115 (0.067)
				$Q_{it}^E$	0.010 (0.006)	-0.001 (0.011)	0.005 (0.006)
Sargan $p$ -value	0.006	0.021	0.497	Sargan $p$ -value	0.006	0.028	0.537
$m_2$ $p$ -value	0.001	0.162	0.005	$m_2$ $p$ -value	0.002	0.159	0.007

  

No. of firms:	1066	429	642
No. observations:	7167	2552	2854

     =significant at the 5% level

Table C.5

Alternative instrumental variables: Remove t-3 and t-4 values of CF/K from IV set, add t-3 and t-4 values of  $Q_e$ ,  $Q_{hat}$ , and Sales/K  
(otherwise identical to Table 2 in the paper)

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.029	0.035	0.018	LTG <sub>it</sub>	1.403	0.796	1.063
	(0.005)	(0.010)	(0.004)		(0.241)	(0.263)	(0.278)
(CF/K) <sub>it</sub>	0.117	0.059	0.103	(CF/K) <sub>it</sub>	0.096	0.070	0.079
	(0.067)	(0.067)	(0.065)		(0.070)	(0.068)	(0.066)
Sargan $p$ -value	0.000	0.001	0.147	Sargan $p$ -value	0.010	0.003	0.371
$m_2$ $p$ -value	0.000	0.104	0.004	$m_2$ $p$ -value	0.000	0.026	0.005

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.081	0.073	0.058	$\hat{Q}_{it}$	0.065	0.060	0.050
	(0.011)	(0.015)	(0.012)		(0.013)	(0.018)	(0.014)
(CF/K) <sub>it</sub>	0.002	-0.019	0.051	(CF/K) <sub>it</sub>	0.000	-0.011	0.046
	(0.070)	(0.068)	(0.066)		(0.069)	(0.068)	(0.066)
				$Q_{it}^E$	0.013	0.011	0.007
					(0.005)	(0.011)	(0.005)
Sargan $p$ -value	0.003	0.003	0.221	Sargan $p$ -value	0.006	0.002	0.263
$m_2$ $p$ -value	0.000	0.097	0.009	$m_2$ $p$ -value	0.001	0.110	0.011

  

No. of firms:	1066	429	642
No. observations:	7167	2552	2854

=significant at the 5% level

Table C.6

Alternative instrumental variables: Remove t-3 and t-4 values of CF/K from IV set, add t-3 and t-4 values of Sales/K  
(otherwise identical to Table 2 in the paper)

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.049	0.040	0.024	LTG <sub>it</sub>	1.929	1.490	1.145
	(0.008)	(0.013)	(0.009)		(0.352)	(0.425)	(0.390)
(CF/K) <sub>it</sub>	0.230	-0.049	0.215	(CF/K) <sub>it</sub>	0.142	0.016	0.162
	(0.138)	(0.109)	(0.122)		(0.149)	(0.124)	(0.133)
Sargan $p$ -value	0.004	0.001	0.155	Sargan $p$ -value	0.121	0.082	0.456
$m_2$ $p$ -value	0.003	0.069	0.006	$m_2$ $p$ -value	0.000	0.007	0.005

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.130	0.103	0.076	$\hat{Q}_{it}$	0.108	0.128	0.065
	(0.019)	(0.023)	(0.019)		(0.022)	(0.029)	(0.021)
(CF/K) <sub>it</sub>	0.094	-0.150	0.162	(CF/K) <sub>it</sub>	0.076	-0.161	0.134
	(0.146)	(0.110)	(0.123)		(0.145)	(0.114)	(0.124)
				$Q_{it}^E$	0.017	-0.017	0.012
					(0.009)	(0.016)	(0.010)
Sargan $p$ -value	0.246	0.036	0.381	Sargan $p$ -value	0.226	0.063	0.385
$m_2$ $p$ -value	0.002	0.086	0.015	$m_2$ $p$ -value	0.005	0.084	0.034

  

No. of firms:	1066	429	642
No. observations:	7167	2552	2854

=significant at the 5% level

**Table C.7**  
**Forward-mean differencing instead of first differencing**  
**(otherwise identical to Table 2 in the paper)**

Variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)	Variable	FULL SAMPLE (4)	RATED SAMPLE (5)	UNRATED SAMPLE (6)
$Q_{it}^E$	0.031	0.031	0.006	LTG <sub>it</sub>	1.545	1.100	1.13
	(0.007)	(0.012)	(0.008)		(0.357)	(0.419)	(0.387)
(CF/K) <sub>it</sub>	0.092	0.029	0.185	(CF/K) <sub>it</sub>	0.043	0.039	0.153
	(0.074)	(0.059)	(0.110)		(0.088)	(0.061)	(0.118)
Sargan $p$ -value	0.000	0.000	0.098	Sargan $p$ -value	0.076	0.025	0.618
$m_2$ $p$ -value	0.018	0.152	0.217	$m_2$ $p$ -value	0.026	0.318	0.176

  

Variable	FULL SAMPLE (7)	RATED SAMPLE (8)	UNRATED SAMPLE (9)	Variable	FULL SAMPLE (10)	RATED SAMPLE (11)	UNRATED SAMPLE (12)
$\hat{Q}_{it}$	0.130	0.107	0.062	$\hat{Q}_{it}$	0.117	0.105	0.062
	(0.019)	(0.026)	(0.021)		(0.020)	(0.030)	(0.021)
(CF/K) <sub>it</sub>	-0.015	-0.003	0.112	(CF/K) <sub>it</sub>	-0.015	-0.004	0.112
	(0.087)	(0.061)	(0.115)		(0.086)	(0.061)	(0.115)
				$Q_{it}^E$	0.013	0.002	0.000
					(0.008)	(0.014)	0.008
Sargan $p$ -value	0.218	0.046	0.249	Sargan $p$ -value	0.226	0.036	0.238
$m_2$ $p$ -value	0.030	0.067	0.153	$m_2$ $p$ -value	0.031	0.070	0.153

  

No. of firms:	1066	429	642
No. observations:	7167	2552	2854

  =significant at the 5% level



**Table C.8****First-stage F-tests for regression of first-differenced variables on t-3 and t-4 levels of I/K and CF/K**

First-differenced variable	FULL SAMPLE (1)	RATED SAMPLE (2)	UNRATED SAMPLE (3)
$Q_{it}^E$	36.501 (0.000)	27.988 (0.000)	24.990 (0.000)
$(CF/K)_{it}$	21.118 (0.000)	12.603 (0.013)	12.679 (0.013)
$LTG_{it}$	69.161 (0.000)	24.600 (0.000)	52.114 (0.000)
$\hat{Q}_{it}$	44.524 (0.000)	25.243 (0.000)	23.098 (0.000)
No. of firms:	1066	429	642
No. observations:	7167	2552	2854

                     =reject the null hypothesis that the lags of I/K and CF/K are jointly insignificant at the 5% level

Note.  $p$ -values are in parentheses