

**Can audit effort (hours) reduce a firm's cost of capital?
Evidence from South Korea**

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Table 1 Variable Definitions

Dependent Variable	Sign	Definition
WACC		Weighted average cost of capital
Variables of Interest		
Audit effort	+	Natural logarithm of audit hours
Control Variables		
1. Size		
<i>Firm Size</i>	-	Natural logarithm of total assets
<i>Auditor size</i>	+/-	A dummy variable that takes 1 if an auditor is Big4, 0 otherwise
2. Business Risk		
<i>Market risk</i>	+	Systematic risk proxied by beta
<i>Indebtedness</i>	+	debt ratio (=total liabilities / total assets)
<i>Financial risk (Loss)</i>	+	A dummy variable that takes 1 if a firm's net income is negative, 0 otherwise
<i>Earnings management</i>	+	Absolute value of discretionary accruals, suggested by Kothari et al. (2008)
3. Performance		
<i>CFO (Cash performance)</i>	-	Cashflow from operation / total assets
<i>Crating</i>	-	Credit rating scores
4. Governance Structure		
<i>Bigown</i>	+/-	Biggest shareholder's share holdings(%)
<i>Fore</i>	+/-	Foreign investors' share holdings(%)
5. Fixed effect		
<i>ID</i>		Industry fixed effect
<i>YD</i>		Year fixed effect

Table 2 Sample selection

Panel A: WACC and audit hour sample from 2002-2014

Initial WACC Sample	23,648
Excluding firms with insufficient obs. to compute WACC	(9,184)
Potential Sample	14,464
Excluding firms with no audit hours data available	(3,760)
Final Sample	10,704

Panel B: audit hour (raw data) by year

Year	Obs.	Mean audit hour	Year	Obs.	Mean audit hour
2002	721	312.76	2009	833	1052.48
2003	760	713.89	2010	851	1159.87
2004	786	882.29	2011	859	1423.46
2005	802	944.42	2012	860	1448.95
2006	823	1034.07	2013	875	1558.26
2007	827	1066.83	2014	884	1611.72
2008	823	1085.04	Total	10,704	1099.54

Panel C: WACC by year

Year	Obs.	Mean WACC	Year	Obs.	Mean WACC
2002	721	8.34	2009	833	6.62
2003	760	7.04	2010	851	6.54
2004	786	6.29	2011	859	6.75
2005	802	6.74	2012	860	6.39
2006	823	6.96	2013	875	5.42
2007	827	6.78	2014	884	5.04
2008	823	7.08	Total	10,704	6.61

Table 3 Univariate Analysis

Descriptive Statistics and Difference Tests (Big4 vs Non-Big4)

Var	(1) Full				(2) Big4				(3) Non-Big4				Diff (2)-(3) t (z)
	Obs.	Mean (Med)	Max (Min)	S.D	Obs.	Mean (Med)	Max (Min)	S.D	Obs.	Mean (Med)	Max (Min)	S.D	
WACC	10704	6.58 (6.45)	11.70 (3.04)	1.83	5659	6.51 (6.39)	11.15 (3.04)	1.63	5045	6.62 (6.50)	11.70 (3.11)	1.70	-3.79*** (-3.51***)
Audit_effort	10704	6.41 (6.52)	8.96 (1.79)	1.21	5659	6.78 (6.85)	8.96 (2.19)	1.17	5045	6.00 (6.25)	7.61 (1.79)	1.13	35.09*** (45.71***)
Size	10704	18.80 (18.54)	23.93 (13.35)	1.45	5659	19.33 (19.10)	23.93 (16.45)	1.58	5045	18.21 (18.15)	22.25 (13.35)	1.00	42.72*** (39.16***)
Big4	10704	0.53 (1)	1 (0)	0.50	5659				5045				
Market_risk	10704	0.80 (0.77)	5.68 (0.00)	0.41	5659	0.81 (0.78)	5.05 (0.00)	0.42	5045	0.79 (0.76)	5.68 (0.00)	0.42	2.05** (2.80***)
Lev	10704	0.42 (0.42)	8.87 (0.00)	0.22	5659	0.43 (0.43)	0.91 (0.03)	0.21	5045	0.41 (0.41)	8.87 (0.00)	0.23	3.94*** (4.51***)
Loss	10704	0.24 (0)	1 (0)	0.43	5659	0.21 (0)	1 (0)	0.41	5045	0.28 (0)	1 (0)	0.45	-8.13*** (-8.11***)
EM	10704	0.07 (0.05)	0.39 (0.00)	0.08	5659	0.07 (0.05)	0.36 (0.00)	0.07	5045	0.08 (0.05)	0.39 (0.00)	0.08	-5.18*** (-4.53***)
CFO	10704	0.04 (0.04)	0.58 (-6.03)	0.12	5659	0.05 (0.05)	0.51 (-2.85)	0.11	5045	0.03 (0.04)	0.58 (-6.03)	0.14	6.53*** (7.01***)
Crating	10704	5.12 (5)	10 (1)	1.90	5659	5.04 (5)	10 (1)	1.89	5045	5.21 (5)	10 (1)	1.92	-4.36*** (-4.52***)
BigOwn	10704	0.41 (0.41)	0.79 (0.06)	0.17	5659	0.42 (0.42)	0.79 (0.09)	0.17	5045	0.40 (0.40)	0.78 (0.06)	0.17	5.73*** (5.23***)
Foreign	10704	0.07 (0.01)	0.56 (0.00)	0.12	5659	0.09 (0.03)	0.56 (0.00)	0.13	5045	0.04 (0.01)	0.51 (0.00)	0.08	26.45*** (27.85***)

Note: t indicates t value for mean-difference test.

z indicates wilcoxon z value for median-difference test.

*, **, *** indicate significance level at 10%, 5%, 1% respectively.

See Table 1 for variable definitions.

Table 4 Pearson Correlations

	1.	2.	3.	4.	5.	6.
1. <i>WACC</i>	1					
2. <i>Audit_effort</i>	-0.19***	1				
3. <i>Size</i>	-0.13***	0.51***	1			
4. <i>Big4</i>	-0.03***	0.32***	0.38***	1		
5. <i>Market_risk</i>	0.59***	0.05***	0.04***	0.02**	1	
6. <i>Lev</i>	0.02*	0.06***	0.13***	0.03***	0.04***	1
7. <i>Loss</i>	0.17***	-0.01	-0.18***	-0.08***	0.06***	0.22***
8. <i>EM</i>	0.18***	-0.08***	-0.19***	-0.05***	0.09***	0.13***
9. <i>CFO</i>	-0.03***	0.03***	0.13***	0.06***	-0.01	-0.31***
10. <i>Crating</i>	-0.08***	0.03***	-0.02***	-0.05***	0.08***	0.71***
11. <i>BigOwn</i>	-0.24***	-0.03***	0.07***	0.06***	-0.22***	-0.07***
12. <i>Foreign</i>	-0.01	0.25***	0.44***	0.25***	0.02*	-0.12***
	7.	8.	9.	10.	11.	12.
7. <i>Loss</i>	1					
8. <i>EM</i>	0.21***	1				
9. <i>CFO</i>	-0.31***	-0.09***	1			
10. <i>Crating</i>	0.53***	0.20***	-0.36***	1		
11. <i>BigOwn</i>	-0.21***	-0.14***	0.09***	-0.17***	1	
12. <i>Foreign</i>	-0.14***	-0.07***	0.13***	-0.24***	-0.04***	1

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively.

See Table 1 for variable definitions.

Table 5 Cost of capital and audit effort

Hypothesis: Increased audit effort will decrease a firm's required cost of capital

Model:

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

	Pred. sign	Parameter estimate	t-statistic
Intercept	+/-	7.98***	37.90
Audit_effort	+/-	-0.32***	-25.32
Size	+/-	-0.06***	-4.73
Big4	+/-	0.15***	5.04
Market_risk	+	2.53***	74.51
Lev	+	0.83***	9.02
Loss	+	0.59***	15.02
EM	+	1.57***	8.78
CFO	-	-0.64***	-5.37
Crating	-	-0.13***	-10.52
BigOwn	+/-	-0.68***	-8.05
Foreign	+/-	0.84***	6.50
YD		Included	
ID		Included	
F value		716.21***	
Adj. R2		0.4242	
Obs.		10704	

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively. Refer to Table 1 for variable definitions.

Table 6 Comparative & Separate analysis: Big4 vs Non-big4

Model:

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Big4_{i,t} + \beta_3 Audit_effort * Big4_{i,t} + \beta_4 Size_{i,t} + \beta_5 Market_risk_{i,t} + \beta_6 Lev_{i,t} + \beta_7 Loss_{i,t} + \beta_8 EM_{i,t} + \beta_9 CFO_{i,t} + \beta_{10} Crating_{i,t} + \beta_{11} BigOwn_{i,t} + \beta_{12} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

	Pred. sign	Big4 vs Non-Big4	Big4	Non-big4
<i>Intercept</i>	+/-	8.26*** (34.07)	7.61*** (30.13)	8.49*** (20.81)
Audit_effort	+/-	-0.35*** (-20.33)	-0.31*** (-17.79)	-0.34*** (-18.84)
<i>Big4</i>	+/-	0.19* (1.69)		
<i>Effort*Big4</i>	+/-	0.05** (2.32)		
<i>Size</i>	+/-	-0.06 (-5.11)	-0.05*** (-2.96)	-0.08*** (-3.36)
<i>Market_risk</i>	+	2.58*** (74.46)	2.60*** (56.71)	2.46*** (49.24)
<i>Lev</i>	+	0.82*** (9.02)	0.17 (1.22)	0.91*** (6.96)
<i>Loss</i>	+	0.59*** (14.97)	0.55*** (10.34)	0.59*** (10.11)
<i>EM</i>	+	1.56*** (8.72)	1.48*** (5.95)	1.54*** (5.97)
<i>CFO</i>	-	-0.64*** (-5.36)	1.00*** (5.50)	-1.55*** (-9.26)
<i>Crating</i>	-	-0.12*** (-10.46)	-0.04** (-2.48)	-0.14*** (-8.20)
<i>BigOwn</i>	+/-	-0.67*** (-8.04)	-0.86*** (-7.77)	-0.42*** (-3.25)
<i>Foreign</i>	+/-	0.83*** (6.36)	0.75*** (5.15)	0.81*** (2.99)
<i>YD</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>ID</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>F value</i>		657.24***	452.28***	362.65***
<i>Adj. R2</i>		0.4245	0.4447	0.4187
<i>Obs.</i>		10704	5659	5045

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively. Figures in parenthesis indicate t value

See Table 1 for variable definitions.

Table 7 Investment grade vs Non-investment grade firms

Model:

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 IG_{i,t} + \beta_3 Audit_effort * IG_{i,t} + \beta_4 Size_{i,t} + \beta_5 Big4_{i,t} + \beta_6 Market_risk_{i,t} + \beta_7 Lev_{i,t} + \beta_8 Loss_{i,t} + \beta_9 EM_{i,t} + \beta_{10} CFO_{i,t} + \beta_{11} Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

	Pred. sign	IG vs NIG		NIG
		IG	NIG	
Intercept	+/-	7.90*** (33.10)	6.95*** (32.79)	7.29*** (17.26)
Audit_effort	+/-	-0.35*** (-19.30)	-0.32*** (-26.18)	-0.33*** (-13.67)
<i>IG</i>	+/-	-0.15 (-1.06)		
<i>Effort*IG</i>	+/-	0.05** (2.17)		
<i>Size</i>	+/-	-0.06*** (-4.65)	-0.02** (-1.97)	-0.05** (-2.28)
<i>Big4</i>	+	0.15*** (4.95)	0.13*** (4.45)	0.19*** (3.38)
<i>Market_risk</i>	+	2.53*** (74.46)	3.05*** (91.24)	1.89*** (30.03)
<i>Lev</i>	+	0.83*** (9.13)	-0.77*** (-7.05)	1.51*** (9.74)
<i>Loss</i>	+	0.61*** (15.22)	0.26*** (4.98)	0.61*** (10.03)
<i>EM</i>	+	1.56*** (8.71)	1.21*** (6.17)	1.52*** (5.00)
<i>CFO</i>	-	-0.62*** (-5.26)	0.56*** (3.36)	-0.64*** (-3.44)
<i>Crating</i>	-	-0.09*** (-6.38)	-0.06*** (-4.09)	0.01 (0.24)
<i>BigOwn</i>	+/-	-0.68*** (-8.04)	-0.30*** (-3.63)	-1.10*** (-7.03)
<i>Foreign</i>	+/-	0.82*** (6.26)	0.83*** (7.51)	0.23 (0.68)
<i>YD</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>ID</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>F value</i>		607.86***	974.02***	165.69***
<i>Adj. R2</i>		0.4250	0.6293	0.2944
<i>Obs.</i>		10704	6324	4380

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively. Figures in parenthesis indicate t value

See Table 2 for variable definition

Table 8 Relatively larger firms vs smaller firms

Model:

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Market_{i,t} + \beta_3 Audit_effort * Market_{i,t} + \beta_4 Size_{i,t} + \beta_5 Big4_{i,t} + \beta_6 Market_risk_{i,t} + \beta_7 Lev_{i,t} + \beta_8 Loss_{i,t} + \beta_9 EM_{i,t} + \beta_{10} CFO_{i,t} + \beta_{11} Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

	Pred. sign	KOSPI vs KOSDAQ	KOSPI	KOSDAQ
<i>Intercept</i>	+/-	8.25*** (32.04)	6.88*** (21.67)	10.62*** (27.50)
Audit_effort	+/-	-0.32*** (-17.96)	-0.36*** (-19.24)	-0.27*** (-15.59)
<i>Market</i>	+/-	0.12 (0.83)		
<i>Effort*Market</i>	+/-	-0.00 (-0.13)		
<i>Size</i>	+/-	-0.08*** (-5.54)	0.00 (0.03)	-0.22*** (-9.77)
<i>Big4</i>	+	0.14*** (4.80)	0.10** (2.21)	0.18*** (5.07)
<i>Market_risk</i>	+	2.56*** (72.27)	2.37*** (41.43)	2.68*** (61.31)
<i>Lev</i>	+	0.83*** (9.05)	0.37** (2.23)	0.72*** (6.59)
<i>Loss</i>	+	0.59*** (15.05)	0.66*** (10.49)	0.49*** (9.89)
<i>EM</i>	+	1.61*** (8.95)	1.89*** (6.07)	1.48*** (7.03)
<i>CFO</i>	-	-0.62*** (-5.16)	1.07*** (4.69)	-1.34*** (-9.66)
<i>Crating</i>	-	-0.13*** (-10.55)	-0.03 (-1.55)	-0.16*** (-10.27)
<i>BigOwn</i>	+/-	-0.67*** (-7.87)	-0.86*** (-6.96)	-0.37*** (-3.30)
<i>Foreign</i>	+/-	0.85*** (6.50)	0.78*** (4.65)	0.82*** (3.74)
<i>YD</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>ID</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>F value</i>		607.20***	242.88***	478.50***
<i>Adj. R2</i>		0.4248	0.3340	0.4958
<i>Obs.</i>		10704	5339	5365

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively. Figures in parenthesis indicate t value
See Table 1 for variable definitions.

Table 9 Cost of equity and cost of debt

Model:

$$WACC_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

$$Cost\ of\ Equity_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

$$Cost\ of\ debt_{i,t} = \beta_0 + \beta_1 Audit_effort_{i,t} + \beta_2 Size_{i,t} + \beta_3 Big4_{i,t} + \beta_4 Market_risk_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Loss_{i,t} + \beta_7 EM_{i,t} + \beta_8 CFO_{i,t} + \beta_9 Crating_{i,t} + \beta_{12} BigOwn_{i,t} + \beta_{13} Foreign_{i,t} + ID + YD + \varepsilon_{i,t}$$

	Pred. sign	DV: WACC	DV: Cost of equity	DV: Cost of debt
<i>Intercept</i>	+/-	7.98*** (37.90)	5.59*** (54.54)	6.42*** (8.43)
Audit_effort	+/-	-0.32*** (-25.32)	-0.39*** (-63.72)	-0.15*** (-3.18)
<i>Size</i>	+/-	-0.06*** (-4.73)	0.05*** (8.61)	-0.07 (-1.59)
<i>Big4</i>	+	0.15*** (5.04)	0.18*** (12.69)	-0.23** (-2.19)
<i>Market_risk</i>	+	2.53*** (74.51)	3.41*** (207.79)	-0.08 (-0.70)
<i>Lev</i>	+	0.83*** (9.02)	0.33*** (7.49)	1.70*** (5.14)
<i>Loss</i>	+	0.59*** (15.02)	-0.08*** (-4.58)	1.12*** (7.80)
<i>EM</i>	+	1.57*** (8.78)	0.52*** (5.95)	3.76*** (5.80)
<i>CFO</i>	-	-0.64*** (-5.37)	0.19*** (3.29)	-1.73*** (-4.03)
<i>Crating</i>	-	-0.13*** (10.52)	-0.01** (-1.96)	0.24*** (5.51)
<i>BigOwn</i>	+/-	-0.68*** (-8.05)	-0.02 (-0.43)	-2.74*** (-8.97)
<i>Foreign</i>	+/-	0.84*** (6.50)	0.32*** (5.08)	-0.39 (-0.84)
<i>YD</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>ID</i>		<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>F value</i>		716.21***	4556.24***	87.30***
<i>Adj. R2</i>		0.4242	0.8224	0.0824
<i>Obs.</i>		10704	10704	10704

Note: *, **, *** indicate significance level at 10%, 5%, 1% respectively. Figures in parenthesis indicate t value

See Table 1 for variable definitions.

Table 10 Audit hours vs Audit fees (Incremental effect analysis)

Model:			
	Model1	Model2	Model3
<i>Intercept</i>	7.98*** (37.90)	8.89*** (34.25)	7.12*** (27.28)
Audit_hours	-0.32*** (-25.32)		-0.35*** (-25.77)
Audit_fees		-0.12*** (-3.51)	0.19*** (5.54)
<i>Size</i>	-0.06*** (-4.73)	-0.15*** (-8.75)	-0.11*** (-7.16)
<i>Big4</i>	0.15*** (5.04)	0.05 (1.62)	0.13*** (4.44)
<i>Market_risk</i>	2.53*** (74.51)	2.53*** (72.25)	2.51*** (74.06)
<i>Lev</i>	0.83*** (9.02)	0.93*** (9.91)	0.79*** (8.64)
<i>Loss</i>	0.59*** (15.02)	0.55*** (13.49)	0.58*** (14.63)
<i>EM</i>	1.57*** (8.78)	1.65*** (8.97)	1.55*** (8.63)
<i>CFO</i>	-0.64*** (-5.37)	-0.56*** (-4.61)	-0.63*** (-5.37)
<i>Crating</i>	-0.13*** (-10.52)	-0.13*** (-10.68)	-0.12*** (-10.51)
<i>Bigown</i>	-0.68*** (-8.05)	-0.57*** (-6.55)	-0.61*** (-7.17)
<i>Fore</i>	0.84*** (6.50)	0.79*** (5.93)	0.77*** (5.95)
<i>ID</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>YD</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>fvalue</i>	716.21***	622.15***	661.03***
<i>Adj. R2</i>	0.4242	0.3904	0.4261
<i>Obs.</i>	10704	10704	10704
Mean vif	1.58	1.85	1.87