Value Relevance of Financial Information Considering Industry Life Cycle – Evidence from Korean Internet Related Industry

Hangbae Chang[1] and JeongYeon Kim[2]

[1,2]*Division of Business Administration, College of Business, Sangmyung University, 20, Hongjimun 2-gil, Jongno-gu, Seoul 110-743, Korea*
[1]*hbchang@smu.ac.kr,* [2]*gojykimgo@gmail.com*

Abstract

With transition to Knowledge society, many companies in Internet related industries have had higher stock price than their accounting book value. Researchers pointed out its intangible assets as the reason of it. In addition, previous studies show that the effects of this nonfinancial information may be different according to industry life cycle.

To check the effects of nonfinancial information about intangible assets and related expenditure on firm market value, we compare the relationships between financial information and firm valuation in Korean Capital market especially for "Software", "Digital content", and "Internet" related companies. We classify industry life cycle based on Tobin's Q value and compare the effects of intangible assets and expenditure for each period. The result shows the effects of intangible asset on firm market value are different according to industry life cycle.

Keywords: *financial information, Intangible asset, Intangible expenditure, industrial life cycle, firm valuation*

1. Introduction

The Firm valuation process in current Capital market considers several kinds of information in addition to financial report. Especially, analysts of technology-intensive company focus on intangible assets for their valuation process, because there were many cases traditional firm valuation process based on financial report could not explain stock price in Capital market. We can find several examples of nonfinancial information effected on firm valuation such as "web traffic information" of internet companies [15] or "patents information" of chemical & pharmaceutical company.

Besides, for technology-intensive companies, some studies showed that the value relevance of nonfinancial information and financial information may change according to firm life cycle [3, 5]. There are many different terms, but we regard firm or industry life cycle consists of "Embryonic", "Growth", "Maturity", and "Decline" stages. In the initial stages of development, non-financial information plays an important role for firm valuation, whereas financial information of company determines market value in later stages of [4].

As intangible asset's importance grows, many researchers asked why we should treat the expenses to acquire intangible assets as same as other expenditures. It would bring positive effects on corporate value in near future. Also data analysis showed capitalization of intangible asset related expenditures such as R&D increases the explanation power of financial information for firm market value. However, current accounting standards don't

[1] First Author
[2] Corresponding Author

accept these requirements on the bases that it's very hard to quantify the elements affecting the firm value and to measure future economic benefits. Moreover, the impact of intangible expenditure on corporate value is evaluated differently according to investment type. For example, some reported advertising expenses have brought positive results for firm market value [10], while others reported they have not [6].

This study assumes industry life cycle as one of the causes for such contradictory conclusions and verifies it through empirical data analysis. For this purpose, we investigate Internet-related companies in Korea including software and digital content, which experienced rapid growth in early 2000s and assumed to be maturing. For example, the cyber shopping in Korea has up to 10.3 percent of overall retail sales according to the report from Statistics Korea, "first quarter of 2012 e-commerce and associated with online cyber shopping trends". However, the revenue and profit growth rates are lower than the early 2000s.

To check the value relevance of financial information, we analyze financial reports of companies listed in KOSDAQ market and classified as software, digital content and Internet-related companies during 2000-2011. We use aggregated market value as a Proxy of firm market value and select companies included in KOSDAQ Star Index as the control group to identify industry stage in life cycle. We assume Tobin's Q of experimental groups is getting similar to the value of control group as the industry turns into maturity stagy, because Tobin's Q is ratio between the market value and accounting book value.

The analysis result shows that value relevance of financial information increases in maturity stage of industry. It may provide us insights about how to understand the contradict results of previous researches on value relevance of intangible expenditures. Also it will help us to predict firm value changes caused by future investment on intangible assets with change of industry life cycle status.

2. Theoretical Background and Hypothesis

2.1. Literature Review

With the difficulty of measurement for intangible assets and uncertainty of future benefits, it's almost impossible to reflect exact effects of intangible assets and expenditure to financial reports. Also current accounting standards require spending on intangible assets should be classified as expenditures. However, the value of the intangible asset and nonfinancial information are more important for the measure of company's market value. Financial analysts try to supplement the insufficient intellectual capital information in the financial statements [2].

There are many articles reported that capitalization of intangible assets and related expenditures increases the explanatory power of financial information on firm market value. First of all, many empirical researches concluded that company's investment in research and development has positive impacts on firm value [12, 13, 1]. They presented theoretical background that accounting standards allow alternative ways for processing R&D spending as expenditure or intangible asset.

However, for other expenditure associated with intangible assets, there are still various views exist. [17] insisted intangible assets could be classified as one group having positive impacts on firm market value and the other not having positive impacts. The most questioning investment for intangible assets is advertising expenditure. Some researches support advertising expenditure has positive impacts on firm value [10, 18, 19] and it needs to be recognized as an asset because it can generate additional cash flow. On the contrary, other researchers [6, 20] reported different results.

Another remarkable finding on value relevance is the impact of financial information to market may vary depending on a company's life cycle [3, 5]. Companies in early stages of growth should invest to create additional cash flow related to better performance. In the mature stage, however, investment to procure the actual cash flow is important. [11] also insist that nonfinancial information plays an important role on firm evaluation in growth phrase while financial information plays an important role in maturity phase. Additional empirical analysis added for various industries, such as airline or IT industry [16, 7].

2.2. Hypothesis Development

With the assumption that Korean Internet related companies are entering maturity stage in life cycle, we can expect the impact of financial information on firm value increases. According to previous research [11], the more industry matures, the more important is finance information in Capital Market. It means we can divide company-year data of experimental group into initial stage and maturity stage based on Tobin's Q. Assuming growth stage in early 2000s, Internet related industry has higher Tobin's Q than market average while it has similar Tobin's Q value to market average in later 2000s as its industry life cycle turns into maturity stage.

Hypothesis 1*: Tobin's Q values of Korean Internet related industry are getting closer to Market average.*

After identification of industry life cycle change based on companies' Tobin's Q value, we can check the effects of intangible assets and related expenditures to firm market value. Most of previous research insisted that increase of intangible assets makes a positive impact on the firm value in both initial stages and mature stages of industry development.

Hypothesis 2*: Regardless firm's stage in life cycle, intangible assets of Korean internet-related companies have positive effects on firm's market value.*

In addition, we also can check the effects of R&D expenditure on firm value. Previous studies consistently showed that it brings positive results for firm value. The results was similar regardless the spending is treated as intangible assets or expenditure in finance reports.

Hypothesis 3*: Regardless firm's stage in life cycle, Research and development expenditure of Korean Internet-related businesses has positive impacts on firm's market value.*

Beside intangible assets, we also hope to check the effects of another intangible expenditure, advertising expenses. Effects of advertising expenses are irregularly observed during the long-term period, but financial information has more impacts on firm value for companies in maturity stage of its life cycle. We can expect clearer positive impacts on firm market value caused by advertising expenses in maturity stage than initial stages in life cycle.

Hypothesis 4: *Advertising expenditure of Korean internet-related company has clearer positive impacts on firm market value in maturity stage of industry life cycle.*

3. Empirical Classification of Industry Life Cycle Stages

3.1. Data

We use financial reports during 2000–2011 for companies listed in KOSDAQ and classified as Internet related, digital content, and software group. Also we choose company group classified for KOSDAQ Star Index as control group, because they are selected as representative companies in the market based on financial strength.

Table 1. Company Distribution for Control and Expriemental Group

Industry	Company	Company-Year
KOSDAQ Star index	31 (5 duplicated with below industries)	279 (38 duplicated with below industries)
Internet Industry	12	639
Digital Content Industry	30	
Software Industry	45	

* Duplicated data are excluded from the control group

3.2. Life Cycle Identification

Table 2 shows Tobin's Q distribution for control group and experimental groups and expressed as graph in Figure 1.

Table 2. Tobin's Q Distribution of Selected Industries

		all	2005	2006	2007	2008	2009	2010	2011
STAR index	Mean	1.9719	2.3000	2.2068	2.7765	1.5806	2.4591	2.2483	1.9777
	SD	1.2090	1.2527	1.4087	2.0031	0.9994	1.1912	0.8820	0.8376
	Medi	1.6470	1.8798	1.6135	2.0319	1.3237	2.5078	2.1494	1.8379
	Min	0.6039	0.9633	0.7211	0.6057	0.6541	0.8668	0.7284	0.9990
	Max	8.4996	6.2308	6.2650	8.4996	5.6647	5.4920	4.6962	5.0048
Software Industry	Mean	1.5159	2.3282	1.6239	1.7706	0.9161	1.5563	1.3949	1.6794
	SD	1.1578	2.1429	1.1208	1.6050	0.4018	1.0181	0.5625	1.3385
	Medi	1.2648	1.6900	1.3634	1.3322	0.8375	1.1857	1.3002	1.3270
	Min	0.3641	0.6846	0.5507	0.4394	0.3641	0.4571	0.5746	0.5297
	Max	9.8103	9.8103	6.6993	9.2072	2.2532	6.0737	2.8368	8.2150
Internet Industry	Mean	1.9635	3.5762	2.4895	2.6852	1.1427	1.6932	1.5221	1.4339
	SD	1.2449	1.4027	1.7699	1.6237	0.3392	0.8078	0.6261	0.8084
	Medi	3.8134	3.1053	1.8044	1.7482	1.1042	1.3511	1.4074	1.1459
	Min	0.4949	2.2923	0.9927	1.0995	0.5107	0.6488	0.7001	0.6487
	Max	6.5741	6.0845	6.5741	5.0168	1.8401	3.3782	2.6917	3.3227
Digital Content Industry	Mean	2.0420	3.1761	2.4230	2.1747	1.3270	2.3202	1.9796	2.1661
	SD	1.2370	1.7236	1.2501	1.7688	0.6624	1.1704	0.8247	1.1635
	Medi	1.7084	2.8412	2.0589	1.9922	1.1895	1.8946	1.9744	1.8095
	Min	0.3923	1.2042	0.7821	0.3923	0.4546	0.7223	0.7458	0.7019
	Max.	9.4452	7.1450	4.8004	9.4452	3.7243	5.3362	4.3776	6.1421

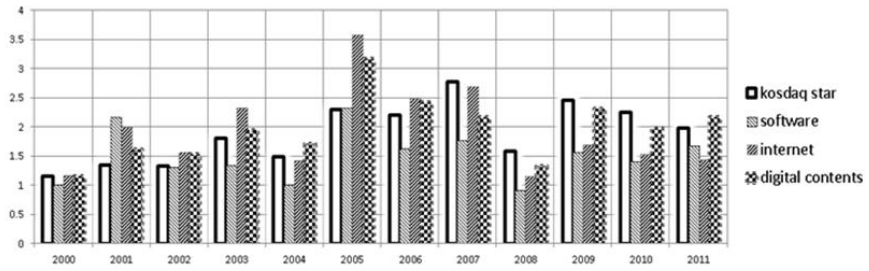

Fig. 1. Distribution of Tobin's Q for each Industry

As we can see in Figure 1, the Internet, digital content group have higher Tobin's Q values than control group during the period of 2001-2006. Since 2007, the distribution of Tobin's Q for those groups has been significantly changed compared to control group. Software industry, however, has relatively low Tobin's Q value compared to control group except 2001. The difference of Tobin's Q between experimental groups and control group has a peak in 2005 and sharply declined in 2007.

4. Data Analysis

4.1 Regression Model

According to Tobin's Q value displayed in Figure 1, Korean Internet-related industries experienced life cycle change during 2006-2007. With changes of Tobin's Q value compared to control group, we can regard Korea internet related industry's life cycle is " growth" stage during 2000-2006. Afterwards the industry's life cycle has turned as "maturity" during 2007-2011. The transition to maturity stage of industry accompany more competition, which results in lower increase of revenue and profit [4]. Besides, the impacts of nonfinancial information on firm valuation decrease, while the impacts of financial information on corporate value increase [3, 5, 11). The ratio changes between the company's book value and the market value can be identified by the change of Tobin's Q according to life cycle change as described in hypothesis 1.

For further discussion, we use regression analysis to measure the influence of selected finance information to firm value. As described in related researches, Ohlson model[3] can be deployed with non-intangible assets, intangible assets, liabilities, net income, and dividends [14, 9, 8]. We added another term to check interaction between intangible assets and life cycle.

$$P_{it} = \beta_0 + \beta_1 * NIA_{it} + \beta_2 * IA_{it} + \beta_3 * LIA_{it} + \beta_4 * OI_{it} + \beta_5 * D_{it} + \beta_6 * G_{it} + \beta_7 * (IA_{it} * G_{it}) + \epsilon \quad (1)$$

Cf) P_{it} : natural log of company i's aggregate stock price in time t

NIA_{it} : natural log of company i's Not Intangible Assets in time t

[3] It is a firm valuation model based on assumption that Residual Income and other information follow linear information dynamics.

IA_{it} : natural log of company i's Intangible Assets in time t

LIA_{it} : natural log of company i's Liability in time t

OI_{it} :natural log of company i's Operational income in time t

D_{it} : natural log of company i's Dividend in time t

G_{it} : dummy variable indicating Growth stage of company i in time t

ε : error

From the equation (1), we expect positive coefficient for asset or net income related terms and negative coefficient for debt and payment of dividends related teams from the result of the traditional Ohlson model. The dummy variable G, indicating growth stage, will has positive coefficient only if non-financial information would have positive impacts on firm value.

In order to test hypotheses 2 and 3, we added R&D expenses and advertising expenses related variables in equation (2) and (3). We can expect positive coefficient for R&D expenses while sign of coefficient for Advertising expenses are not obvious.

$$P_{it} = \beta_0 + \beta_1 * NIA_{it} + \beta_2 * IA_{it} + \beta_3 * LIA_{it} + \beta_4 * OI_{it} + \beta_5 * D_{it} + \beta_6 * R_{it} + \beta_7 * AD_{it} + \beta_8 * G_{it} + \beta_9 * (R_{it} * G_{it}) + \epsilon \quad (1)$$

$$P_{it} = \beta_0 + \beta_1 * NIA_{it} + \beta_2 * IA_{it} + \beta_3 * LIA_{it} + \beta_4 * OI_{it} + \beta_5 * D_{it} + \beta_6 * R_{it} + \beta_7 * AD_{it} + \beta_8 * M_{it} + \beta_9 * (AD_{it} * M_{it}) + \epsilon \quad (2)$$

4.2 Variables

The distribution and correlation between variables used in equations are presented in Table 3 and Table 4. We can see the variables are independent.

Table 3. Distribution of Variables

variable	Average	SD	Median	Min	Max
P	17.7143	1.1704	17.6321	14.5887	21.2021
NIA	17.5182	0.8876	17.4792	14.8742	20.1220
IA	14.2862	2.0163	14.4443	0.0000	17.8913
LIA	16.1987	1.0636	16.1791	12.4918	19.5926
OI	4.0419	14.6243	13.9753	-17.8908	18.5315
D	3.9646	6.2115	0	0	16.8877
R	8.7742	6.3639	12.2198	0	17.0308
AD	11.8484	3.0853	12.2319	0.0000	16.7436
G	0.2911	0.4546	0.0000	0.0000	1.0000

Table 4. Pearson Correlation

	NIA	IA	LIA	OI	D	R	AD	G
P	0.7724 (0.0000)***	0.4007 (0.0000)***	0.4714 (0.0000)***	0.3238 (0.0000)***	0.2684 (5.256e-12)***	-0.0721 (0.0685)*	0.3658 (0.0000)***	0.3795 (0.0000)***
NIA		0.4016 (0.0000)***	0.6983 (0.0000)***	0.2096 (8.88e-08)***	0.2385 (1.031e-09)***	-0.0135 (0.7336)	0.3461 (0.0000)***	-0.0542 (0.1708)
IA			0.3370 (0.0000)***	0.0428 (0.2805)***	0.1183 (0.002754)**	-0.0074 (0.8518)	0.2919 (5.129e-14)***	0.0176 (0.6562)
LIA				0.0034 (0.9316)	0.0726 (0.06653)*	0.0366 (0.3555)	0.3035 (4.441e-15)***	-0.0370 (0.35)
OI					0.4339 (0.0000)***	0.0352 (0.3749)	0.0567 (0.1521)	0.0995 (0.01188)**
D						0.0489 (0.2168)	0.1381 (0.0000)***	0.0056 (0.8872)
R							-0.0671 (0.09027)*	-0.0336 (0.3962)
AD								0.1432 (0.0002826)***

Cf) p-value in ( )
N=639; * p < .05, ** p < .01, *** p < .001.

4.3 Regression Results

According to the results of the regression analysis with expression (1) in Table 5, variables of assets, liabilities, and dividends have expected coefficient signs. Assets related variables have positive coefficient values, and debt-related variables have negative coefficient values. Growth dummy variables also have a positive coefficient. It means companies in Growth stage have higher firm value than others with same financial information. We guess it's because of positive impacts of non-financial information in Growth stage.

Coefficient of the non-intangible assets is greater than the value of intangible assets. It shows, even for internet-related companies, non-intangible assets have greater influence on firm value. In addition, interaction term with intangible assets and growth dummy variables has not positive coefficient, which means intangible assets have additional impact in maturity stage. The differences are not significant and it makes we can accept hypothesis 2 as true.

Table 5. Regression Results with Expression (1), (2) and (3)

	Expression (1)	Expression (2)	Expression (3)
Constant	-0.5142 (0.2569)	0.1430 (0.7390)	1.4002 (0.0011)***
NIA	1.0726 (0.0000)***	1.0477 (0.0000)***	1.0646 (0.0000)***
IA	0.0767 (0.0000)***	0.0554 (0.0000)***	0.0590 (0.0000)***
LIA	-0.1242 (0.0000)***	-0.1209 (0.0000)***	-0.1197 (0.0000)***
OI	0.0077 (0.0000)***	0.0082 (0.0000)***	0.0082 (0.0000)***
D	0.0049 (0.1922)	0.0052 (0.1662)	0.0045 (0.2282)
R		-0.0109 (0.0048)***	-0.0097 (0.0028)***
AD		0.0106 (0.1545)	-0.0372 (0.0167)**
G	1.8650 (0.0000)***	0.9618 (0.0000)***	
G*IA	-0.0569 (0.0087)***		
G*R		0.0082 (0.2508)	
M			-1.7415 (0.0000)
M*AD			0.0572 (0.0006)
F value	372.8726	291.1206	297.1384
Adj R^2	0.8032	0.8037	0.8069

Cf) p-value in ( )
N=639; * p < .05, ** p < .01, *** p < .001.

The result of regression using equation (2) shows R&D expenditure variable has negative coefficient value. It means R&D spending recognized as expenditure may not give positive impact on firm market value. If R&D spending recognized as intangible assets instead of expenditure, it also give positive impacts for firm market value. In addition, interaction term with R&D expenditure variable and growth dummy variable has positive coefficient, which means R&D invest has more positive effects on firm market value in growth stage. However, the positive effects of R&D expenditure for Growth stage companies are not statistically significant and we cannot accept hypothesis (3) as true.

Finally, the result of regression using equation (3) in Table 5 shows advertising expenditure has not positive coefficient, while interaction term with maturity dummy variable and advertising expenditure has positive coefficient. Also the interaction term has much stronger effects on firm market value than advertising expenditure itself. It shows exactly why previous researches have contradictory results. Generally speaking, the use of advertising expenses is expected to have a negative impact on firm market value in short term. However, you can have strong positive impacts on the firm market value only for companies in maturity stage.

5. Discussions

This study investigated the value relevance of financial information with financial reports for Korean Internet related companies. We especially verify the effects of intangible assets and related expenditures on firm market value considering the industry Life Cycle. Starting

with comparing of Tobin's Q to identify industry life cycle, we compared the effects on firm market value caused by financial information in different life cycle.

Obtained conclusions through data analysis follow.

First, we can verify Tobin's Q of Internet related industry changes during 2006-2007. It can be a clue for Industry life cycle changes and investors should think about the value relevance of finance information instead of non-financial data. Second, intangible assets impact to the firm market value regardless industry life cycle. Third, spending for R&D-related intangible assets does not give positive impacts on the firm market value in short term. Fourth, advertising expenses for intangible assets does not give positive impacts on the firm market value, but it can get more positive impacts for firm market value if industry is in maturity stage instead of growth stage.

The empirical results verify the relationship between intangible expenditure and industry life cycle of Korea internet related companies. The results on firm market value could be applicable in a wide range of application including corporate valuation models. Besides we need more theoretical discussion on the assumption that we can identify industry life cycle changes by comparing Tobin's Q value.

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