

The Application of Accounting Fraud Models to South Korean Companies Listed on the United States Stock Exchanges and Implications for Auditors

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Abstract

The financial scandals in South Korea in recent years have had a significant negative impact on the South Korean society. The fraudulent activity could have been detected by auditors, and the investors could have been protected, if auditors had assessed the fraud risk properly. After the scandals, some South Korean companies started to raise capital in the U.S. stock market. This paper provides a quantitative accounting fraud analysis of seven South Korean companies that are listed on the U.S. Stock Exchanges by using five red flag models and five ratios and suggests possible audit implications.

I. Introduction

South Korea's economy has grown significantly during the last few decades and has set an example as an economically successful developing country. However, several big financial reporting and corruption scandals happened in the late 1990's. South Korea suffered from the scandals and their negative impacts on the society; however, it is still not uncommon to read news about these cases. According to Albrecht et al, "many of the scandals that have occurred within South Korean society were viewed as smart financial movements rather than unethical corrupt acts" (2010). Because of the legal system and cultural social norms of South Korea, South Korean fraudulent companies' management is not punished as severely as the management of fraudulent companies in the United States.

Increased globalization in the world's investment markets has affected the U.S. investors greatly as stocks of foreign companies are listed on the U.S. stock markets. However, because the regulations and cultures of their home countries are different from those of the U.S., the U.S. regulations such as Sarbanes Oxley and Dodd Frank may not protect the investors properly. The Chinese IPO and RTO companies' fraud cases, which incurred billions of dollars of losses for investors, are examples of this concern (Grove and Clouse, 2014).

As South Korean companies began to expand their businesses in the global market, some South Korean companies began to raise capital from foreign stock markets. Ten South Korean companies are listed on the U.S. Stock Exchanges for 2015.

In this paper, we focus on the seven South Korean issuers in the U.S. stock market that are not financial institutions and perform a quantitative analysis applying the red flag models and ratios to the companies' financial information to determine whether the companies show indication of possible or existing fraud. Most of the fraud discovered subsequently could have been detected by the auditors if the auditors performed due diligence. Although the main purpose of the audit is not fraud detection, auditors should consider the possible material misstatement due to fraud. The auditors for the South Korean issuers on the U.S. Stock Exchanges are South Korean audit firms that are affiliated with the Big 4 accounting firms. Since cultural rationalizations greatly affect the likelihood of fraud in cultures throughout the world (Albrecht et al, 2010), we will

analyze the results of the red flag model applications in order to assess fraud risk and ultimately to suggest possible implications for audit detection.

II. Red Flag Models and Ratios

The red flag models that apply to the subject companies are the following: Quality of Earnings, Quality of Revenues, the Sloan Accrual Measure, the Beneish Fraud Model, and the Altman Bankruptcy Model (Grove and Cook, 2010). We also used five inputs of the Beneish Fraud Model (1999) as separate ratios. Below are short descriptions of each model. The formulas for the models and ratios are described in Appendix A.

The Quality of Earnings model measures whether a company is intentionally inflating its earnings. The model may indicate that a company has earnings which may not be converted into operating cash flows. The red flag benchmark for the model is a value less than 1.0 (Schilit, 2003).

The Quality of Revenues model measures whether a company artificially inflated revenues without the corresponding cash collections. The red flag benchmark for the model is a value less than 1.0 (Schilit, 2003).

The Sloan Accrual Measure can be used to determine the quality of a company's earnings based on the amount of accruals included in net income and the sustainability of a company's earnings.

The Altman Z-Score forecasts the likelihood that a company will go bankrupt within the next two years. Five components of the formulas and their coefficients play a role to determine the bankruptcy probability.

The Beneish Fraud Model Z-Score is used to detect fraudulent financial reporting and earnings management. The Z-Score consists of five ratios, their coefficients, and the constant value -4.84. The key five ratios are Sales Growth Index, Gross Margin Index, Asset Quality Index, Days' Sales in Receivables Index, and Total Assets to Total Accruals. The red flag benchmark is a Z-Score greater than -1.49 (Beneish, 1999). Sales Growth Index (SGI) is used to detect abnormal increases in sales possibly due to the fraudulent revenue recognition. Gross Margin Index (GMI) may indicate that a company may be under pressure to improve its financial performance if a company's gross margin is decreasing. Asset Quality Index (AQI) may indicate that a company capitalized additional expenses to maintain profitability if the index is increasing. Days' Sales in Receivables Index (DSRI) may show enterprises that made significant changes in their collection policies or recognized phony or early revenues. However, it could also reflect an economic downturn that may affect most enterprises. An increase in Total Accruals to Total Assets (TATA) may show the likelihood of earnings manipulation and possible operating cash problems.

From Beneish's (1999) study, Wells (2001) explained why Beneish's five key fraud detection or "irrational" ratio indexes should work for detecting fraudulent financial reporting (Grove and Cook, 2004). Benchmarks were provided in Beneish's (1999) original study for both Non-Manipulators' Mean Index (NMMI) and Manipulators' Mean Index (MMI) numbers for the five irrational ratios, which are five inputs of the Beneish Z-Score. According to Grove and Cook

(2004), “these five ratios correctly classified the manipulators between 58% and 76% of the time in various tests. Thus, the non-manipulators’ and the manipulators’ mean indexes were statistically different from each other.” Grove and Cook (2004) showed that the irrational ratios worked well for high-profile fraud cases in the U.S. such as Enron, WorldCom, Qwest, and Global Crossing. They also demonstrated that the five red flag models were appropriate to use for these fraud cases. Thus, we also used the red flag models and ratios to show whether there are any fraud indications for the South Korean companies in their most recent financial statements. This information could be very important to their auditors and investors.

III. Quantitative Analysis

Among the seven subject companies, MagnaChip Semiconductor Corporation is the only company that restated its financial statements for the period included in this paper due to misstatements and has been accused of a fraud scheme by the investors. The other six companies do not have any fraud schemes yet. However, because of South Korea’s experience with the scandals, we applied the red flag models and the ratios to the six companies’ most recent financial statements that were filed with the U.S. Securities and Exchange Commission (SEC). Among the six companies, SK Telecom had embezzlement issues in 2008. Thus, we also analyzed its 2008 financial statements for any possible indications.

MagnaChip Semiconductor Corporation (NYSE: MX) designs and manufactures analog and mixed-signal semiconductor products (MagnaChip Website). Several class action lawsuits have been filed for its fraud scheme. The Oklahoma Police Pension & Retirement System filed the lawsuit on April 21 against MagnaChip and its executives, alleging the company failed to disclose improper revenues and earnings overstatements in 2011, 2012 and the first three months of 2013 (Washington Examiner, 2015). The Shareholders Foundation, Inc. also filed a lawsuit against MagnaChip. The plaintiff argues that Magnachip issued materially false and misleading statements about the company’s operations and financial performance between February 1, 2012 and February 12, 2015. The plaintiff claims that Magnachip purportedly failed to disclose or represent that the company was improperly recognizing revenues, its internal controls were inappropriate, and the company's prior financial statements required restatement (Bloomberg Business, 2015).

Table 1 provides a quantitative analysis for MagnaChip Semiconductor Corporation using the five red flag models and irrational ratios discussed above. For 2011, the Quality of Revenue (0.991) and the Sloan Accrual Measure (-0.056) indicated red flags. The Days’ Sales in Receivable Index (1.054) and the Gross Margin Index (1.043) indicated possible red flags because the index numbers were between the non-manipulator’ and the manipulator’ mean index numbers. By using its 2012 original financial statements, the Quality of Earnings (0.626), the Quality of Revenues (0.979), the Beneish Z-score (-1.584), and the Asset Quality Index (1.804) indicated red flags. The Days’ Sales in Receivable Index (1.073) and the Total Accruals to Total Asset index (0.020) indicated possible fraud, which means 60% of the models and ratios indicated possible fraud. However, by using its 2012 restated financial statements, only 30% of the models and ratios indicated possible fraud. For 2013 and 2014, 30% of the models and ratios indicated fraud.

Table 2 provides a quantitative analysis for POSCO, KT Corporation, KEPCO, LG Display, and Gravity, and SK Telecom. POSCO (NYSE: PKX) is a multinational steel maker headquartered in South Korea. It ranked 177th on the Fortune 500 Global Company list. POSCO operates USS-POSCO, a joint venture with U.S. Steel, in Pittsburg, California (USS-POSCO Website). One of POSCO's subsidiaries, POSCO E&C is under investigation over the allegations that an executive director and approximately ten employees created a slush fund in Vietnam and took bribes from a subcontractor. The prosecution is questioning the possibility that the group was involved in the slush fund (Jung, 2015). In our analysis, the only fraud indicator for 2014 was Quality of Revenues (0.998), which is very close to the benchmark 1.0. Although the investigation is ongoing for its subsidiary, it seems that POSCO itself did not have huge fraudulent financial reporting problems for 2014.

KT Corporation (NYSE: KT), South Korea's second largest mobile carrier, provides integrated wired/wireless telecommunication services (KT Corporation Website). In 2013, prosecutors probed allegations that the company incurred losses on asset selloffs and bad investments. In 2014, KT ENS Co., affiliated with KT Corporation, was investigated over suspicion of illegally taking out approximately \$260 million in loans from 16 local banks by forging documents (Yonhap News, 2013). From the quantitative analysis for 2014, the Quality of Earnings was -2.036, which is due to the net loss, and the Altman Z-Score was 1.35. The red flag benchmark for the Altman Z-Score is a Z-score of less than 1.8 (Grove and Clouse, 2015). These two indicators show that the company has a possible bankruptcy problem. However, we did not see any other indication of fraudulent financial reporting in KT's 2014 financial statements.

Korea Electric Power Corporation (KEPCO; NYSE: KEP) is the largest electric utility provider in South Korea. The South Korean government owns 51% of the shares of KEPCO. Top executives of KEPCO and its affiliate KEPCO KDN were arrested for taking bribes from a supplier in return for favors. The former KEPCO permanent auditor and the head of a supplier were also arrested. According to a prosecutor, "The corruption monitoring system did not work at KEPCO. All executives included in the bidding process, as well as the auditor who was supposed to check such irregularities, were bribed" (Chung, 2015). From the quantitative analysis, the quality of revenues was 0.997, which was slightly less than the benchmark, and the Altman Z-score was 0.861. Since KEPCO is a state-owned company, it is less likely to go bankrupt even though the Altman Z-score forecasted possible bankruptcy of KEPCO within the next two years. Because its auditor was involved in the corruption, there might have been fraudulent financial reporting; however, the red flag models and ratios did not indicate the red flags for fraud.

LG Display (NYSE: LPL) manufactures LCD panels such as thin-film transistor liquid crystal display (TFT-LCD) panels (LG Display Website). LG Display is one of the subsidiaries of LG Corporation, a multinational conglomerate corporation. The company had a price fixing scandal in 2012 but did not have any fraudulent financial reporting scandals. From the quantitative analysis, the Quality of Revenues was slightly less than the benchmark 1.0 and the Days' Sales in Receivable Index (1.125) was between the manipulators' and non-manipulators' mean index. Thus, we concluded that there is very little evidence of fraud.

GRAVITY Co., Ltd. (NASDAQ: GRVY) develops and publishes online games around the world and its main product is Ragnarok Online. The company is the only one that is listed on the NASDAQ as a South Korean foreign private issuer. From the 2014 financial statement analysis, the Quality of Earnings was 0.293 due to the negative operating cash flow and the negative net income. The Altman negative Z-score (5.748) highly indicated that the company might enter bankruptcy within a few years. The other fraud models and ratios did not indicate any fraud problems.

SK Telecom Co., Ltd (NYSE: SKM) is South Korea's largest wireless telecommunication operator and is part of the SK Group, one of the largest South Korean conglomerates. In 2013, the chairman of SK was convicted of embezzling \$45.6 million from SK Telecom and SK C&C in 2008. He was sentenced to four years in prison and has been imprisoned since April 2013 (Choe, 2013). From the quantitative analysis, the Quality of Revenues for 2008 and 2014 were slightly less than 1.0. The Gross Margin Index for 2008 was 1.148, which was much higher than the manipulators' mean index. However, this index did not tell us whether the company reported fraudulent financial statements. Although the chairman of SK embezzled money from SK Telecom in 2008, the ratios and models did not indicate the potential problem. Since the red flag models and ratios normally work well for earnings management rather than embezzlement, it was expected.

IV. Conclusions

The purpose of this paper is to provide information to auditors from the use of fraud detection models applied to seven South Korean companies that are listed on the U.S. stock market. By analyzing these seven South Korean companies' financial statements, we could see the usefulness of the red flag models and ratios since they worked well for the MagnaChip's fraudulent financial reporting and the other six companies' fair representations. The legal systems in the U.S. and in South Korea are totally different. A South Korean company with a fraud scheme could go bankrupt due to the subsequent class action lawsuits. The auditor of MagnaChip could have used the red flag models and ratios to detect earnings management and financial reporting fraud. Fortunately, the red flag models and ratio numbers for the other six companies' financial information did not indicate any fraud scheme. However, it is worthwhile to apply the red flag models and ratios to detect possible fraud during the audit. As companies implement better corporate governance and internal controls, the hope is that it is less likely to have major fraud cases. Both quantitative and qualitative analysis can be used for fraud detection. Combining the quantitative analysis from this paper with a qualitative analysis of a company's corporate governance can complement the traditional analytics done by auditors.

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Table 1: MagnaChip Semiconductor Corporation

Models or Ratios	Benchmark	2014	2013	2012	2012	2011
				(restated)	(original)	(original)
Quality of Earnings	1.0<x: good	0.320	-1.071	1.073	0.626	4.797
Quality of Revenues	1.0<x: good	1.009	1.037	0.996	0.979	0.991
Sloan Accrual Measure	0.1<x: bad	-0.108	0.058	0.080	0.192	-0.056
Altman Z-Score	1.8>x: bad, 3.0<x: good	2.914	3.976	3.269	4.857	3.131
x1	1.8~3.0: inconclusive	0.202	0.275	0.351	0.391	0.402
x2		-0.021	0.169	0.250	0.364	0.156
x3		-0.188	-0.064	0.214	0.207	0.091
x4 (12/31 Market Cap)		0.810	1.223	1.160	1.183	0.675
x5		1.323	1.174	1.186	1.038	1.282
Beneish Z-Score	-1.99<x: bad	-2.598	-2.716	-2.263	-1.584	-2.689
DSRI	NMMI=1.031, MMI=1.465	0.972	0.819	0.951	1.073	1.054
GMI	NMMI=1.014, MMI=1.193	0.965	1.426	0.891	0.943	1.043
AQI	NMMI=1.039, MMI=1.254	0.901	0.788	1.045	1.804	0.730
SGI	NMMI=1.134, MMI=1.607	0.946	0.909	1.086	1.061	1.003
TATA	NMMI=0.018, MMI=0.031	-0.079	-0.109	-0.034	0.020	-0.120

Table 2: POSCO, KT Corp, KEPCO, LG Display, Gravity, and SK Telecom

Models or Ratios	Benchmark	2014					2014	2008
		Posco	KT Corp.	KEPCO	LG Display	Gravity	SK Telecom	
Quality of Earnings	1.0<x: good	6.049	-2.036	4.304	3.122	0.293	2.044	3.391
Quality of Revenues	1.0<x: good	0.998	1.018	0.997	0.988	1.004	0.992	0.991
Sloan Accrual Measure	0.1<x: bad	0.008	0.000	0.033	0.046	-0.192	0.041	-0.004
Altman Z-Score	1.8>x: bad, 3.0<x: good	2.111	1.350	0.861	2.537	5.748	2.885	2.371
x1	1.8~3.0: inconclusive	0.126	-0.036	-0.029	0.074	0.562	-0.012	0.035
x2		0.477	0.254	0.216	0.325	-0.504	0.508	0.420
x3		0.054	-0.012	0.045	0.063	-0.172	0.208	0.073
x4 (12/31 Market Cap)		0.601	0.623	0.160	1.055	9.523	1.479	1.459
x5		0.754	0.702	0.349	1.152	0.632	0.614	0.624
Beneish Z-Score	-1.99<x: bad	2.367	-3.408	-2.798	-2.615	-2.512	-2.276	-2.627
DSRI	NMMI=1.031, MMI=1.465	0.966	0.931	0.962	1.125	1.156	1.026	0.906
GMI	NMMI=1.014, MMI=1.193	0.985	-0.481	0.058	0.906	1.803	1.014	1.418
AQI	NMMI=1.039, MMI=1.254	1.009	1.039	0.9908	1.010	0.5809	1.039	0.879
SGI	NMMI=1.134, MMI=1.607	1.048	0.986	1.0635	0.979	0.8365	1.033	1.182
TATA	NMMI=0.018, MMI=0.031	0.060	-0.100	-0.0476	-0.122	-0.1430	-0.055	-0.166

Appendix A: Red flag models and ratios

Models or Ratios	Formula
Quality of Earnings	$\frac{\text{Operating Cash Flow}}{\text{Net Income}}$
Quality of Revenues	$\frac{\text{Revenues}-(\text{Increase in Accounts Receivable})}{\text{Revenues}}$
Sloan Accrual Measure	$\frac{\text{Net Income}-\text{Free Cash Flow}}{\text{Average Total Assets}}$
Altman Z-Score x1 x2 x3 x4 (12/31 Market Cap) x5	$1.2*x1+1.4*x2+3.3*x3+0.6*x4+1.0*x5$ Working Capital/Total Assets Retained Earnings/Total Assets EBIT/Total Assets Market value of Equity/Total Liabilities Revenues/Total Assets
Beneish Z-Score	$-4.84+0.92*DSRI+0.528*GMI+0.404*AQI+0.892*SGI+4.679*TATA$
DSRI	$\frac{\text{Accounts Receivable}(t)/\text{Sales}(t)}{\text{Accounts Receivable}(t-1)/\text{Sales}(t-1)}$
GMI	$\frac{\text{Gross Profit}(t-1)/\text{Sales}(t-1)}{\text{Gross Profit}(t)/\text{Sales}(t)}$
AQI	$\frac{1-[(\text{Current Asset}(t)+\text{Net Fixed Asset}(t))/\text{Total Assets}(t)]}{1-[(\text{Current Asset}(t-1)+\text{Net Fixed Asset}(t-1))/\text{Total Assets}(t-1)]}$
SGI	$\text{Sales Revenue}(t)/\text{Sales Revenue}(t-1)$
TATA	$\frac{\text{Changes in Working Capital}-\text{Changes in Cash}}{-\text{Changes in Current Taxes Payable}-\text{Depreciation and Amortization}}$ Total Assets

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