

Altman Z, Messod Beneish M, Piotroski F-scores of Samsung Electronics Limited

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Abstract — This paper discusses about bankruptcy risk through Altman Z-score, distress of business trend through Piotroski F-Score, risk of earnings manipulation through Messod Beneish M-score models of Samsung Electronics Ltd. Altman Z-score model which is an accurate forecaster of failure up to two years prior to distress. It can be considered the assessment of the distress of industrial corporations, business trend (Piotroski F-Score), Messod Beneish M score can be used to detect the risk of earnings manipulation.

Keywords — Bankruptcy Risk; Distress of Business Trend; Risk of Earnings Manipulation.

1. Introduction

Global electronics industry is the largest industrial sector in the global economy that generating more revenue than any other sector. If national economy should be on electronics industry which plays an extremely significant role in modernization. Technological progress will revitalize the national economy. To develop production and improve the economic performance and accelerate the pace of technological upgrading the electronics industry needs to steadfastly serve traditional industries by providing them with modern electronic equipment and whereby the nation's economy will take off. The electronics industry should play a leading role in the new technological revolution in order to better provide services. To make common progress both the modern electronic and traditional industries should closely integrate, support and reinforce each other.

When an organisation is unable to honour its financial obligations or make payment to its creditors, it files for bankruptcy. In India if you file for bankruptcy it will reduce your credit rating, but it would save you from any financial trouble. With the help of Altman Z-score we can identify the zones of discrimination such as When Z-Score is less than 1.81, it is in Distress Zones. It is in Safe Zones if Z-Score is greater than 2.99. If Z-Score is between 1.81 and 2.99, it shows Grey Zones.

X1: Working Capital /Total Assets (WC/TA) ratio is least significant of the five factors. It is the net liquid assets of the firm associated to the total capitalization. Working capital=current assets - current liabilities. Current assets shrink in relation to total assets when a firm experience consistent operating losses. Altman found that it is the most valuable liquidity ratio evaluate with the current ratio and the quick ratio.

X2: Retained Earnings: The leverage of a firm can be measured by RE/TA. Retained earnings are considered as reinvested earnings or losses of a firm over its life time. When a firm has retained its profits, it will utilise less debt and has high RE, relative to TA.

X3: Earnings Before Interest and Taxes/Total Assets (EBIT/TA): The productivity of the firm's assets, independent of any tax or leverage factors can be measured by this formula. Corporate failure can be identified on the earning power of its assets. This ratio outperforms all other profitability measures, including cash flow.

X4: Market Value of Equity/Book Value of Total Liabilities (MVE/TL): To identify whether a company is insolvent we should measure how much the firm's assets can decline in value (measured by market value of equity plus debt) prior to the liabilities go beyond the assets. This can be measured with the help of this formula.

X5: Revenue/Total Assets (S/TA): the ability of the firm's assets through sales can be measured by this capital-turnover ratio.

$$Z = 1.2 * X1 + 1.4 * X2 + 3.3 * X3 + 0.6 * X4 + 1.0 * X5$$

Table 1: Z-Score of each year

Year	WC/TA	RE/TA	EBIT/TA	EQ/TL	S/TA	Zscore	FINDINGS
2007	0.144	0.966	0.957	2.202	1.31	5.579	SAFE
2008	0.144	1.022	0.561	2.184	1.13	5.041	SAFE
2009	0.144	0.756	0.396	0.81	1.05	3.156	SAFE
2010	0.156	0.756	0.33	0.828	1.05	3.12	SAFE
2011	0.192	0.728	0.198	0.822	1.15	3.09	SAFE
2012	0.252	0.756	0.33	0.882	1.17	3.39	SAFE
2013	0.192	0.882	0.462	1.188	1.15	3.874	SAFE
2011	0.204	0.868	0.363	1.11	1.05	3.595	SAFE
2012	0.264	0.924	0.528	1.218	1.11	4.044	SAFE
2013	0.336	0.966	0.561	1.752	1.06	4.675	SAFE

2. Messod Beneish M score

To detect the risk of earnings manipulation we can use the M-score created by Professor Messod Beneish with a combination of eight different indices:

- *DSRI* = Days Sales in Receivables Index - large increase in DSR indicates revenue inflation.
- *GMI* = Gross Margin Index. Index is above 1-Gross margin decreases and likely to manipulate earnings.
- *AQI*= Asset Quality Index AQI. Asset quality is calculated as the ratio other than plant, property and equipment to total assets.
- *SGI*= Sales Growth Index T growth companies, to keep up appearances are under pressure to manipulate.
- *DEPI* = Depreciation Index DEPI >1 = assets are being depreciated at a Slower rate. So the firm might be revising useful asset life, or adopting new method which increases its income.
- *SGAI* = Sales, General and Administrative expenses Index. SGA expense index>1 means that the company is generating less sales.
- *LVGI* = Leverage Index .An LVGI>1 indicates an increase in leverage
- *TATA* = Total Accruals to Total Assets. Change in working capital accounts other than cashless depreciation can be calculated as total accruals.

Table 2: M score variables

Year	DSR I	GMI	AQI	SGI	DE PI	SGA I	LV GI	TATA
2013	0.94	0.952	1.15	1.15	0.86	0.7	0.97	-0.053
2014	1.012	0.89	0.96	1.06	1.015	1.67	0.95	-0.05
2015	0.9	0.88	0.97	1.3	1.03	1.04	0.91	-0.07
2016	0.91	0.92	0.92	1.15	0.96	1.04	0.92	-0.07
2017	4.59	4.19	1.19	0.211	0.83	1.08	0.95	-0.02

$$M = -4.84 + 0.92 * DSRI + 0.528 * GMI + 0.404 * AQI - 0.892 * SGI + 0.115 DEPI - 0.172 * SGAI + 4.679 * TATA - 0.327 * LVGI$$

An M-Score of less than -2.22 proposes that the company is not a manipulator. Similarly, if it's greater than -2.22, then the company is likely to be a manipulator.

Table 3: M Score

Year	DS RI	GM I	AQ I	SGI	DE PI	SG AI	LV GI	TA TA	M Score	
2013	-4.84	0.86	0.50	0.46	1.02	0.09	0.12	0.31	-0.24	-1.69
2014		0.93	0.46	0.38	0.94	0.11	0.28	0.31	-0.23	3.21
2015		0.82	0.46	0.39	1.15	0.11	0.17	0.29	-0.32	3.11
2016		0.83	0.48	0.37	1.025	0.11	0.17	0.30	-0.32	2.98
2017		4.22	2.21	0.48	0.18	0.095	0.18	0.31	-0.09	7.60

3. Piotroski F-Score

Joseph D. Piotroski, the developer of the system, graduated from the University of Illinois with a B.S. in accounting in 1989, with an M.B.A. from Indiana University in 1994. In 1999, he earned a Ph.D. in accounting from the University of Michigan and became an associate professor of accounting at the University of Chicago. He wanted to introduce a system (simple nine-point scoring) which can boost the returns of investing in low price to book value companies. He found that buying such companies with highest score (8 or 9) on his nine-point scale, led to an average out-performance over the market of 13.4%. By introducing a strategy of investing in the highest F-Score companies (8 or 9) and shorting companies with the lowest F-Score (0 or 1) led to an average yearly return of 23% and outperforming the average S&P 500 index return of 15.83% .

The zones of discrimination were, high score = 7, 8, 9 and Bad or low score = 0, 1, 2, 3

Q1. Return on Assets (ROA) = 1 interprets positive , 0 if negative.

Q2. Cash Flow Return on Assets (CFROA) = 1 interprets positive, 0 if negative.

Q3. Change in Return on Assets = 1 interprets positive , 0 if negative.

Q4. Quality of Earnings (Accrual) CFROA > ROA =1, 0 if CFROA <= ROA= 0

Q5. Change in Gearing or Leverage 0 interprets high gearing otherwise 1.

Q6. Change in Working Capital (Liquidity) 1 interprets higher, 0 if lower.

Q7. Change in Shares in Issue. If there is larger number of issue of shares =0 otherwise=1.

Q8. Change in Gross Margin. If the gross margin is higher =1, 0 if it's lower.

Q9. Change in asset turnover. If this year's asset turnover ratio is higher=1, 0 if it's lower

$$\text{Piotroski F-Score} = Q1+Q2+Q3+Q4+Q5+Q6+Q7+Q8+Q9$$

Table 4: Piotroski F-Score

YEAR	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	F SCOR E	Findi ngs
2008	1	1	1	0			1		1	5	STAB LE
2009	1	1	0	0	0	0	1	0	0	3	BAD
2010	1	1	0	0	0	1	1	0	0	4	STAB LE
2011	1	1	0	0	1	1	1	0	0	5	STAB LE

2012	1	1	1	0	0	1	0	1	1	6	STABLE
2013	1	1	1	0	0	0	1	1	0	5	STABLE
2014	1	1	0	0	0	1	1	0	0	4	STABLE
2015	1	1	1	0	0	1	1	1	1	7	GOOD
2016	1	1	1	0	0	1	1	1	0	6	GOOD
2017	1	1	0	0	0	1	1	0	0	4	STABLE

4. Results

Altman Z-Score Samsung Electronics Co Ltd has a Z-score greater than 2.99 for all the years from 2008 to 2017, indicating it is in Safe Zones. This implies the Z-Score is strong. *An M-Score* of less than -2.22 during 2014,2015,2016,2017 suggests that the company will not be a manipulator. An M-Score of greater than -2.22 only in the year 2013 signals that the company is likely to be a manipulator. *Piotroski F-Score* Samsung Electronics Co Ltd has an F-score of 5(2008), 4(2010) , 5(2011), 6(2012), 5(2013), 4(2014), 4(2017) indicating the company's financial situation is typical for a stable company. Samsung Electronics Co Ltd has an F-score of 7(2015), 6(2016) indicates the company's financial situation is good.

5. Discussions

- Higher cost of credit increases bankruptcy risk so policies can be designed to implement productivity improvement measures for reducing bankruptcy risk in the manufacturing sector.
- Factors which contribute to market forecasting errors are long lead times, seasonal demand, high product variety and short product life cycles.
- Suppliers of consumer electronic products face increasingly fast time-to-market orders because of their short product life cycles, ranging from three to 18 months, with a quick end-of-life time frame.
- Increases in the number of new products introduced are generating challenges for suppliers.
- Production fluctuations lead to increased demand volatility to suppliers upstream. Planned product replacements can be adapted to tackle this problem.
- Centralized customer demand information through better planning on the part of buyers and better communication, when shared with the suppliers, can help eliminate the causes of the bullwhip effect.

- Based on the forecast order from the Sales Department, the Production Department can map out the production plan and resource needs, taking into account five key elements: worker turnover rate, defect rate, machinery status and material status.
- Unanticipated demand for short-term labour can be handled by specifying a number of extra workers as a buffer to be included in the total recruitment target. In addition to the formal channel to generate labour estimates, the HR department also should rely on frequent and informal information exchanges with industrial engineers in order to understand the needs.
- Industrial engineers and production managers then can work out the estimated human resources needed in terms of working hours, and translate it into a number of workers.
- The most common bottleneck in the recruitment process is obtaining a sufficient number of candidates. To avoid this recruitment procedure should be highly efficient.
- To manage the challenges represented by increased costs and competition to hire and retain workers, various strategies, like as automation, relocating to inland areas, lowering material costs and investing in building their workers' loyalty should be developed by the companies.
- The factory should have more control to avoid risks like lack of support and communication with the workers which might lead to dissatisfaction, disputes and lower productivity among worker and that would raise production costs and impact negatively on the workforce.
- Labour laws have been relaxed, since the global economic crisis that began in 2008 to hire temporary workers for longer periods in response to the weak growth in jobs.

6. Conclusion

The Indian electronics industry, however, lags far behind the world's advanced level and has a long way to go to meet the needs of domestic development. Therefore, the Indians need to develop this industry more quickly, so that it can supply the national economy with electronic technology and equipment, and provide the people with electronic products to enrich their cultural lives. Efficient production planning and accurate labour estimates are one of the good human resource strategies to reach the goal.

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