Volatility of Semiconductor Companies

Toshifumi Takada
https://orcid.org/0000-0003-4606-0909
National Chung Cheng University, Taiwan

INTRODUCTION

The objective of this article is to evaluate the volatility of semiconductor manufacturing companies in Taiwan and Japan. Auditors must evaluate volatility that resides in client companies. The procedure of the evaluation must be done at the beginning of the audit. Volatility is called an inherent risk or risk of material misstatement in auditing practice, and it is also called business risk in the new audit guideline. In this article, we define volatility as equivalent to inherent risk, risk of material misstatement, or business risk.

BACKGROUND

The Statement of Audit Standard #315 (2020) of the Japanese Institute of Certified Public Accountants defines inherent risk as follows: "Inherent risk is the events and environments influencing misrepresentations of financial statements when the necessary internal controls don't exist in the client's company. The factors of inherent risk occur on the side of client companies." Inherent risk is recognized by factors such as rapid change of the market, fluctuated profit and loss of the companies, speed of innovation, bankruptcy of related companies, etc. Volatility can be evaluated by observing and measuring factors in the client companies.

This article is a case study to evaluate volatility of top 10 listed semiconductor companies in Taiwan and Japan using their financial statements and stock prices. The financial statements are disclosed at the stock market and we can get them by Market Observation Post System (MOPS) at Taiwan Stock Exchange and Electronic Disclosure for Investors' Network (EDINET) at Tokyo Stock Exchange. In this article, we use income momentums and fluctuations calculated as the rate of change of sales, ordinal profit, and net profit data from the financial statements. We also use stock price as it represents an objective value of the companies in the stock market.

The reason why we focus on semiconductor companies in Taiwan and Japan is that semiconductor companies in Taiwan show very high performance during the past 10 years, and on the contrary Japanese semiconductor companies' performance fell during the same period. By comparing Taiwanese and Japanese companies' volatility, we can show the significance of evaluating volatility by auditors. This can contribute to improve the audit practice of risk-based procedure.

DOI: 10.4018/978-1-7998-9220-5.ch002

FOCUS OF THE ARTICLE

V

Analysis of Risk-based Audit Procedure

Modern auditing practice is done by a risk-based procedure. The audit practice guideline shows its theoretical framework. First, we analyze the framework by using stochastic probability numbers. Applying Bayes Theorem, we show how to revise the detection risk and we also show that the evaluation of volatility is a starting line of the risk-based auditing procedure.

Case Study of Taiwanese Semiconductor Companies

Semiconductor companies have led the Taiwanese economy for the past 10 years. The Taiwanese government established a science park in Hsinchu in the 1980s. People who studied IT technologies in the US returned to Taiwan and they started IT businesses there. A few universities and the public research organizations have had alliances with them. One of the success factors of Taiwanese semiconductor companies is said to be that some of them focused on the pre-process of semiconductor manufacturing called a foundry business model.

Our case here deals with top 10 Taiwanese semiconductor companies. We use their financial statements disclosed at the Taipei Stock Market's MOPS. As the contents of financial statements are level data, we process them into income momentums (rate of change of sales, ordinal profit, net profit, and total assets) for the most recent 10 years. We also use the rate of change of stock prices in the same period. Volatility as a business risk is evaluated by fluctuations recognized by the negative income momentums.

Case Study of Japanese Semiconductor Companies

Japanese semiconductor companies used to be ranked among the top three in the world in the 1990s and occupied 50% of the global market share. Because of several reasons, they have descended since the end of the 1990s and the market share declined to 6% in 2020. There were big semiconductor manufacturing companies all over Japan in the 1990s but many of them have closed. One of the characteristics of Japanese semiconductor companies is that most of them are not foundries but some of them are computer manufacturing companies, electric appliance manufacturing companies, and so on.

We use the financial statements disclosed at the Tokyo Stock Exchange and we can download them by EDINET. To compare the Japanese companies with Taiwanese companies, we also calculate income momentums and fluctuations, and we evaluate volatility.

Basics of Risk-based Audi Procedure

The theoretical relationship of Audit Risk (AR), Inherent Risk (IR), Control Risk (CR), and Detection Risk (DR) was defined in Audit Standards and its practice guidelines as follows.

$$AR = IR \times CR \times DR \tag{1}$$

Here the risks in the equation above were defined as
Audit Risk: the misstatement probability after the audit
Inherent Risk: the misstatement probability when internal control doesn't exist in a client company