

Research on Mathematical Measurement Model of Fair Value Based on Big Data and Cloud Computing

Shiyu Zhang *

Shanghai Rongyue Private Entry-Exit Services Co., Ltd, 201103

* Corresponding Author Email: zhangshiyu@shu.edu.cn

Abstract. New generation information technologies such as big data are very important for the development and application of fair value in the measurement model of financial instruments. This paper discusses the relevant theories of measurement of fair value, and analyzes the application scope of fair value in the measurement of financial instruments and the impact of the revision of international standards of financial instrument on the convergence of similar standards in China. Finally, based on the technical support of big data, this paper expounds the fair value in the measurement model of financial instruments, and puts forward the relevant improvement suggestions.

Keywords: Big data; model of financial measurement of instrument; fair value.

1. Relevant theories of measurement of fair value

1.1. Concept connotation

Fair value is the fair present value. And the sales price can be divided into fair value. What's more, it not only reflects its present value, but also follows the principle of fair market transaction. However, the purchase price may be affected by many factors and cannot accurately reflect the real value of assets. Therefore, the understanding of the concept of fair value should be refined from the context and interpreted from the use.

1.2. Basic characteristics of fair value

The so-called fair value refers to the price paid when transferring liabilities or selling assets in an orderly manner. The measurement is to determine the bidding price of hypothetical transactions, while orderly transactions refer to the information disclosed to the market before the measurement date. It can be seen that the fair value presents three obvious characteristics, what are, fairness, uncertainty, as well as timeliness.

1.3. Realistic basis of fair value

1.3.1. Meeting the needs of information users.

Fair value could effectively reflect the financial situation of the enterprise, so as to effectively improve the relevance of financial information. When prices rise, both liabilities and *non-monetary* assets will be undervalued in the balance sheet with history as the carrier. Such statements are difficult to effectively show the real financial situation of the enterprise, and may have some negative impact on the company's decision-making.

1.3.2. Meeting the requirements of financial relevance and the matching principle.

In terms of current developments, especially in terms of measurement attributes, there is no matching between expenses, income and costs. In order to be more consistent with the matching principle of financial accounting, it is necessary to use fair value for financial measurement.

1.3.3. Reflecting the financial situation of the enterprises reasonably.

Compared with the historical cost, cash flow disclosed by fair value is more accurate, reasonable and scientific, and the basic profile of the enterprise reflected by fair value is more comprehensive and accurate.

2. Application scope of fair value in financial measurement of instrument

FASB, IASB and China have fully considered the feasibility of applying fair value in the measurement of financial instruments and determined the scope of application of fair value. Although the ultimate goal determined by FASB and IASB is to measure all financial assets and financial liabilities at fair value and establish a comprehensive model of fair value, the current standards show that fair value is only the most relevant measurement attribute of some financial instruments. And there are still many financial assets and financial liabilities measured at amortized cost. Besides, FASB and IASB expect that the practice of adopting different attributes will continue. This shows that a single measurement of attributes of fair value cannot fully achieve the measurement objectives of financial instruments.

3. The impact of the revision of international standards of financial instrument on the convergence of similar standards in China

After the financial crisis, in response to the G20's initiative to establish a globally high-quality financial standard, China promised to achieve continuous convergence with international standards. IASB issued IFRS 9 - financial instruments in 2009, replacing the relevant provisions in the original IFRS 39 - financial instruments: recognition and measurement. The potential impact of this change on China cannot be ignored. In China's listed companies, the financial assets measured at fair value and whose changes would be included in the current profits and losses account for less than 5% of all financial assets, and the rest are held to maturity investments, loans and receivables and available for sale financial assets, which are the categories transformed by the new international standards. China's capital market is not perfect, and the expansion of the scope of measurement of fair value will cause substantial fluctuations in the profits of China's listed companies, which is not conducive to the healthy and orderly development of China's economy. Based on China's national conditions and the principle of joint determination, China's standard setting institutions retain the cautious attitude towards fair value, which is in line with the goal and purpose of standard setting of finance.

4. Technical support of big data in fair value

4.1. Big data acquisition

The first difficulty in fair value is to obtain market information and find assets or liabilities that are the same or similar to the subject matter. The fair value model in the model of financial measurement of instrument collects data with the help of the big data of the cloud database platform service provider, and collects relevant market information with crawler technology and network interface. For example, the supply and demand information of some houses and buildings existing on public social platforms such as the post bar and micro blog need to be collected and summarized by using technology of big data.

4.2. Big data processing

At present, China has not formed a unified and orderly financial assets trading platform, and the only trading websites are incompatible and the data format is not standardized. The collected sources of market information are different and the data quality is different. To make fair value as well as achieving process and standardization, it is necessary to convert the collected data sets into data of single structured that is easy to process and analyze, which is equivalent to entity sets and through ETL (data extraction, transformation and monitoring) tools such as flume and kettle.

4.3. Big data storage

At present, measurement of fair value has become a method of financial measurement keeping pace with historical cost measurement. There is an urgent need to form a unified and shared fair value

database to make financial information more transparent. According to China's enterprise financial standards, accounting items involving measurement of fair value include: provision for impairment of relevant assets, financial assets, investment real estate measured at fair value, exchange of nonmonetary assets, government subsidies, debt restructuring, disposal of non-current assets, and the business merger not under the same control, etc. The amount of relevant information produced behind it is huge. The important characteristics of distributed file storage systems such as Hadoop, such as low hardware, high throughput and high fault tolerance, just provide convenience for the storage of valuation data. In addition, the high-speed reading of big data storage also provides support for the traversal and matching of target and market information.

4.4. Data visualization

The development of measurement of fair value continues to be controversial, because its subjective estimation characteristics give listed companies the opportunity of earnings management. Furthermore, it reduces the space of the management of listed companies on the fair value, but also closes the valuation process in the black box of the system source code, making it more difficult for auditors. Big data visualization technology provides an idea to solve this problem, and displays the key parameters and process results of fair value in the measurement model through a beautified interface. For example, the parameter characteristics of the assets or liabilities to be valued, the entity data of the matched same or similar assets or liabilities, the weight distribution used in the matching valuation, etc. On the one hand, it is convenient for the auditee to review the fair value information. On the other hand, it provides audit evidence for the work of external auditors.

5. Suggestions on improving measurement of fair value in China

5.1. Improving criteria

To strengthen theoretical research and financial supervision, the key point is whether the fair value can be used reasonable principles, theoretical research and external supervision. In order to facilitate control and skilled use, China's relevant leading departments should strive to optimize the implementation rules, correctly use the fair value and try to avoid wrong use. On this basis, reasonably and effectively improve the relevant regulatory standards. Carry out ideological education to prevent enterprises from taking advantage of illegal acts.

5.2. Improving the market mechanism

Strengthening the reliability of the measurement of fair value model is closely related to whether the fair value can be obtained reliably, which is the market success of China's economy. In addition, according to China's current market conditions, it is difficult to obtain fair value due to imperfect market system and lack of strict market supervision. The first way to improve the market mechanism is to improve the capital market activities, also focus on cultivating multi-level markets, together with enabling economic subjects to participate in the market economy, and gradually have the free competition between foreign capital and private capital. In addition, the government needs to vigorously carry out the development of the secondary market, not only to ensure the transparency of the transaction, but also to ensure the openness of the transaction, but also to ensure that the price is reasonable. In this case, the acquisition of fair value will become more reliable and easy.

5.3. Establishing an effective financial supervision system

First of all, enterprises should start from themselves, effectively improve the internal audit procedures, strive to strengthen internal control, and strive to improve their own governance level, enhance legal awareness, standardize the management mode, and timely improve the internal implementation of measurement of fair value. Fundamentally refuse to use fair value for income manipulation. Secondly, the government should strengthen the punishment of profit manipulation,

increase the cost of fraud, strengthen cooperation with regulators, speed up the establishment and improvement of laws and regulations system, and establish regulatory norms in line with the measurement of fair value model as soon as possible. Third, strengthen the independence of financial firms, the media and the public should actively report and expose financial violations, so as to make use of fair value more open and transparent.

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