International Journal of Multidisciplinary Research and Development
www.allsubjectjournal.com
Online ISSN: 2349-4182, Print ISSN: 2349-5979
Received: 01-11-2021, Accepted: 17-11-2021, Published: 02-12-2021
Volume 8, Issue 12, 2021, Page No. 12-22

The value relevance of other comprehensive income of listed companies in China

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Abstract
The value relevance of other Comprehensive Income is of its significance for accounting theory and standard-setting, but little attention was paid to in Chinese accounting academics. What is dirty surplus accounting (DSA) and its practice in China was discussed, and the mian literature of DSA was reviewed in the paper. Using Wilcoxon signed rank test, with the index of excess value created (EVC), the value relevance of Chinese DSAF was explored by selecting the samples from the 2019, 2020 annual reported data of listed companies of A-shares in Shenzhen Stock Exchanges. Such research field was also expanded in the study by investigating the way to revise the disclosure mode of accounting information to improve the value relevance of accounting surplus of the income statement.

Keywords: clean surplus relationship; other comprehensive income; value relevance; excess value created (EVC)

Introduction

As accounting measurement is widely used for contractual purposes and company pricing, the value relevance of accounting information, especially surplus information, is an important subject in accounting academic circles and accounting practice circles. The Residual Income Model (RIM) established by Ohlson and Feltham *et al*. based on the Clean Surplus Relationship (CSR) shows that accounting information is directly related to company value [4,5]. Thus CSR becomes one of the most basic assumptions used to express the value of the company under the available accounting information [6-9]. Accounting practices, however, often run counter to CSR, known as Dirty Surplus Accounting(DSA), the consequences of dirty surplus accounting, especially the value relevance of dirty surplus accounting information, has become one of the hot topics in the western accounting theory circles.

The research of dirty surplus accounting is paid less attention by the accounting theory circle of our country. Based on the sample of listed companies in China, the article discusses the value relevance of other comprehensive income of listed companies in China, and expands the research fields in this respect, this paper makes a study on the feasibility and rationality of improving the accounting information disclosure model.

The meaning and literature review of dirty surplus accounting

The meaning of dirty surplus accounting

The accounting that satisfies the Clean Surplus Relationship (CSR), that is, the Clean Surplus Accounting (CSA), refers to the accounting that all accounting surplus should be included in the income statement, rather than directly included in the balance sheet. That is, under CSA, the accounting surplus included in the income statement should satisfy the following relationship:

$$bv_{t+1} = bv_t + E_{CS,t+1} - d_{t+1} + S_{t+1} = bv_t + E_{CS,t+1} - \tilde{d}_{t+1} \quad (1)$$

Among them, bv_t represents the book value of the net assets of the enterprise at the end of the t period; and, $E_{CS,t+1}$, d_{t+1}, S_{t+1} represent the company's accounting surplus, the cash dividends issued and the value of the equity capital issued between t and t+1, respectively. $\tilde{d}_{t+1} = d_{t+1} - S_{t+1}$ indicates the net amount of all cash dividends issued by the company between t and t+1 after deducting the increased equity capital investment, referred to as net dividend.

Take r as the discounted interest rate, denoted as:

$$RI_{CS,b+s} = E_{CS,t+s} - r \cdot bv_{t+s-1} \quad (2)$$

It is the net residual income between t+s-1 and t+s under clean surplus accounting. Let $g_{cs,t} = \sum_{\tau=1}^{\infty} RI_{cs,t+\tau} / (1+r)^{\tau}$, $IV_t = \sum_{\tau=1}^{\infty} \tilde{d}_{t+\tau} / (1+r)^{\tau}$ be the dividend discount model, IV_t represents the enterprise's intrinsic value (Intrisic Value; IV) in the t period. Under the assumption $lim_{\tau\to\infty} bv_{t+\tau} / (1+r)^{\tau} = 0$ that the accounting reporting system is clean surplus accounting and, the available Residual Income Model (RIM) is as follows [4]:

$$IV_t = bv_t + \sum_{\tau=1}^{\infty} RI_{cs,t+\tau} / (1+r)^{\tau} = bv_t + g_{cs,t} \quad (3)$$

The limitation of RIM is that there is no way to directly use accounting statements to predict the market value of an enterprise. The right-hand formula of (3) contains the predicted value. Ohlson (1995) introduced the following Dynamics of Linear Information (LID) [4]:

$$\square RI_{cs,t+1} = \omega \square RI_{cs,t} + v_t + \tilde{\varepsilon}_{1,t+1} \quad (4)$$

$$\tilde{v}_{t+1} = \gamma v_t + \tilde{\varepsilon}_{2,t+1} \quad (5)$$

The superscript ~ indicates that the variable is a random variable, and the mean value of $0 \le \omega, \gamma < 1$, $\tilde{\varepsilon}_{1,t+1}$, $\tilde{\varepsilon}_{2,t+1}$ is 0, which is information other than accounting information. Using RIM, under the assumptions of (4) and (5), the pricing model obtained by Ohlson is as follows [4]:

$$IV_t = b_t + \alpha_1 RI_{cs,t} + \alpha_2 v_t \quad (6)$$

Among them $\alpha_1 = \omega/(1+r-\omega)$, $\alpha_2 = \omega/[(1+r-\omega)(1+r-\gamma)]$.

The introduction of LID is considered to be Ohlson's great contribution to the enterprise market value pricing model based on accounting information [10, 11]. Feltham and Ohlson further applied this analysis framework, namely Feltham/Ohlson analysis framework, to analyze enterprise value pricing involving financial assets, operating assets, depreciation and other factors [5, 12]. The significance of this pricing model lies in that the book value, accounting surplus and enterprise value can be directly linked, so that it can theoretically explain why accounting information has value relevance.

The above-mentioned important theoretical results are obtained under the clean surplus accounting disclosure model and other important theoretical assumptions. Therefore, clean surplus accounting is of great significance to accounting theory and practice. However, accounting practice that violates the relationship between clean surplus is usually used, that is, Dirty Surplus Accounting (DSA), this phenomenon has attracted the attention of foreign accounting theory circles. For example, Linsmeieretal *et al*. believe that Dirty Surplus Accounting Flows (DSAFs) are those accounting surplus items that bypass the income statement and are directly included in the balance sheet of the changes in the owner's equity under the DSA, which will affect the clean surplus relationship. The application of residual income valuation model is the source of all errors in value measurement based on accounting information [13].

From an international perspective, the current accounting practice is dirty surplus accounting rather than clean surplus accounting. For example, the UK's dirty surplus accounting flow items include goodwill amortization (now abolished), asset revaluation, currency conversion differences, and previous year profit and loss adjustments. France's dirty surplus accounting flow items include goodwill amortization, asset revaluation, currency conversion differences, previous year's profit and loss adjustments, subsidies, merger adjustments, and adjustments caused by changes in accounting policies. Germany's dirty surplus accounting flow items include goodwill amortization, currency conversion differences, previous year profit and loss adjustments, specific merger adjustments and unrealized investment income. The United States' dirty surplus accounting flow items include unrealized income of securities, currency conversion differences, and adjustments to minimum pension liabilities.

The accounting flow of dirty surplus required by the International Accounting Standards is reflected in the "other comprehensive income" stipulated in the seventh paragraph of the "International Accounting Standard No. 1-Financial Statement Presentation" (revised in September 2007) revised in September 2007[23], including the following items: (1) Actuarial gains and losses of defined benefit plans recognized in accordance with paragraph 93A of International Accounting Standards No.19-Employee Benefits; (2) Gains arising from the translation of financial statements of foreign operations And loss [23]; (3) changes in revaluation surplus; (4) remeasurement of the gains and losses of available-for-sale financial assets [23]; (5) the effective part of the gains and losses of hedging instruments in cash flow hedging [23]; (6) Pension liability adjustment; (7) Others.

In January 2014, the Ministry of Finance revised the "Accounting Standards for Business Enterprises No. 30-Presentation of Financial Statements" (hereinafter referred to as CAS 30) [21], clarifying the meaning of other comprehensive income: Other Comprehensive Income (OCI) refers to the net amount of various gains and losses that have not been recognized in the profit and loss according to the Accounting Standards for Business Enterprises after deducting the effect of income tax[21]. CAS 30 lists the accounting contents of "other comprehensive income"[22], and divides it into "other comprehensive income items that cannot be reclassified into profit and loss" and future accounting according to whether it can be reclassified into profit and loss in the future accounting period. During the period, when the prescribed conditions are met, the two categories of "other comprehensive income items that will be reclassified into profit and loss" are presented separately [22]. The new CAS 30 standard adopts the enumeration method for other comprehensive income accounting content [22], "Other comprehensive income reclassified into profit and loss" mainly includes but not limited to "1. Other comprehensive income that can be transferred to profit or loss under the equity method, 2. Other Changes in the fair value of debt investments, 3. Gains and losses from changes in the fair value of available-for-sale financial assets, 4. Reclassification of financial assets and included in other comprehensive income, 5. Reclassification of held-to-maturity investments as gains and losses of available-for-sale financial assets, 6. Other debt investment credit impairment reserves, 7. Cash flow hedge reserve, 8. Foreign currency financial statement translation difference"[21]; "Other comprehensive income that cannot be reclassified into profit and loss" mainly includes but is not limited to "1. Renew Measure changes in defined benefit plans, 2. Other comprehensive income that cannot be transferred to profit or loss under the equity method, 3. Changes in the fair value of other equity instrument investments, 4. Changes in the fair value of the enterprise's own credit risk" [21].

1.2 Literature review

Domestic scholars have not yet set foot in the research on dirty surplus accounting, and relatively few researches on other comprehensive income related issues, mainly focusing on the research on comprehensive income related issues, including: (1) Does the comprehensive income model conform to my country's national conditions [14]; (2) Research on the necessity and reporting mode of comprehensive income reporting [15-22]; (3) Value relevance of comprehensive income [13-16].

As early as the 1940s of this century, there were a large number of relevant literatures on dirty surplus accounting in foreign countries. During this period, some researchers usually paid attention to the lack of transparency in other

comprehensive income. They believed that other comprehensive income always provided opportunities for surplus management and would give Negative impact caused by business management [27-29]. Some subsequent studies also support this view [20-22].

In terms of the value relevance of other comprehensive income, the evidence that can prove the importance of other comprehensive income in enterprise value evaluation is complicated. Dhaliwal and other researchers used relevant data from U.S. listed companies to prove through empirical research that there is a connection between dividends and other comprehensive income of the same period; they found that there is a certain relationship between dividends and unrealized returns of available-for-sale securities. This kind of connection, but the overall connection between dividends and other comprehensive income is very weak [23]. In 2005, ACSB (Canadian Accounting Standards Board) announced the relevant policies for the confirmation, measurement and disclosure of comprehensive income items in financial statements. After the release of this policy, Kanagaretnam and other related researchers used the relevant accounting data during and after the implementation of SFAS 130 "Comprehensive Income Report" (Financial Accounting Committee, 1997) and found that there is a comparison between other comprehensive income and dividends. Strong connection. The results of this empirical study show that there is a relationship between other comprehensive income and dividends more than the results reported by Dhaliwal [23] and other researchers [24]. The empirical study of Biddle and Choi in 2006 showed that the comprehensive income of US listed companies has a stronger relationship than the net income and dividends [25]. Cahan and other related researchers conducted an empirical study on the relevant data of New Zealand listed companies, and the results showed that there is a relationship between other comprehensive income and stock prices [26]. Pinto uses equity valuation model research to show that foreign currency translation adjustment is the largest among other comprehensive income items, and the currency adjustment component of comprehensive income is value-related [27]. O'Hanlon and Pope have studied the relevant data of UK listed companies and found that there is only a very weak connection between dividends over a long period of time and other comprehensive income accumulated during this period [28]. Isidro and other researchers found that there is a weak relationship between the market value to book value ratio of an enterprise and other comprehensive income predicted from a perfect perspective, which has been verified in France, Germany, the UK and the US [29].

From the above literature review, foreign research conclusions on other comprehensive income related issues are quite contradictory, which undoubtedly increases the complexity and difficulty of other comprehensive income value-related issues. According to relevant foreign studies, it is worth exploring whether other comprehensive income in China has incremental information content, which is also the direct reason for this paper to study the value correlation of other comprehensive income**.**

Research hypotheses and models

Research hypothesis

As mentioned above, under clean surplus accounting, all accounting surpluses are included in the income statement. Under certain theoretical assumptions, the book value of a company's net assets and accounting surplus can be directly related to the value of the company, that is, only the income statement is needed. The information on accounting profits and net assets in the balance sheet can provide necessary information for corporate valuation. However, under dirty surplus accounting, part of the accounting surplus is included in the income statement, and part of the accounting surplus is directly included in the balance sheet by bypassing the income statement. If other comprehensive income is the information necessary for business valuation, then only use the income statement The accounting profit of the company ignores other comprehensive income information, which may cause deviations in the valuation of the company.

The above analysis implies a basic concept: the form of accounting information disclosure may affect its value relevance, and at least affect the cost of using information for investors. Otherwise, accounting information disclosure does not need to set up multiple reports, only one with all-encompassing content. The report can be. Based on this concept, it can be assumed that investors only use the accounting profits in the income statement and ignore other comprehensive income information. Therefore, if the income statement and balance sheet are required to obtain the complete surplus information necessary for corporate valuation, then The use of dirty surplus accounting in accounting practice may mislead investors. Therefore, it is necessary to study whether such "misleading" exists from the level of theoretical and empirical research. Studying the value relevance of other comprehensive income is to study this "misleading" problem. Its fundamental purpose is to study whether the form of accounting surplus disclosure will affect its value relevance, and to provide a certain theoretical basis for the form of accounting information disclosure.

This article uses the "Excess Value Created (EVC)" indicator EVC [20] used by O' Hanlon et al. to explore the value relevance of other comprehensive income. This indicator is used to measure the extraordinary economic performance created by enterprises over multiple periods and can be expressed as follows:

$$EVC^{t}_{t+T} = MV_{t+T} - I^{t}_{t+T} \quad \textbf{(7)}$$

Among them, EVC^{t}_{t+T} represents EVC from the end of t to the end of t+T; MV_{t+T} represents the actual value of the company's net assets at the end of period t+T; I^{t}_{t+T} represents the theoretical value of net assets at the end of t+T period at the end of period t, I^{t}_{t+T} can be defined as follows:

$$\begin{aligned} I^{t}_{t+T} &= MV_t(1+r)^T + \sum_{s=1}^{T} S_{t+s}(1+r)^{T-s} - \sum_{s=1}^{T} d_{t+s}(1+r)^{T-s} \\ &= MV_t(1+r)^T - \sum_{s=1}^{T} \tilde{d}_{t+s}(1+r)^{T-s} \end{aligned} \quad (8)$$

Among them, $\tilde{d}_{t+s} = d_{t+s} - S_{t+s}$ represents all cash dividends issued by the company between t + s-1 and t + s after deducting the increased equity capital investment, referred to as net dividends; it represents the cost of equity. Thus

$$EVC_{t+T}^{t} = MV_{t+T} - MV_t(1+r)^T + \sum_{s=1}^{T} \tilde{d}_{t+s}(1+r)^{T-s} \quad (9)$$

In addition to measuring the extraordinary value created by an enterprise, EVC is also important for enterprise valuation. According to (9), then

$$MV_{t+T} = MV_t(1+r)^T - \sum_{s=1}^{T} \tilde{d}_{t+s}(1+r)^{T-s} + EVC_{t+T}^{t} \quad (10)$$

If EVC_{t+T}^{t} is predictable, from (10), the company can be valued based on it. However, if there are deviations in the measurement of EVC, it may lead to deviations in the expectations, and ultimately lead to deviations in the valuation of the enterprise. What needs to be studied is that if only the accounting profit information in the income statement is used and the surplus accounting flow information in the balance sheet is ignored, whether there will be deviations in the EVC measurement.

First of all, it is necessary to discuss that under the current dirty surplus accounting disclosure model, if investors only use the accounting profit information in the income statement, but do not use other comprehensive income information, whether there will be deviation in EVC measurement and deviation in enterprise valuation. Therefore, the following hypothesis to be tested can be put forward.

Hypothesis 1: In China's capital market, only using the accounting profit information in the income statement while ignoring all other comprehensive income will produce measurement deviation for EVC;

Another important issue that needs to be explored is whether the current dirty surplus accounting disclosure model can be changed to improve the value relevance of accounting information. In order to simplify the study of the problem, it is assumed that among the currently disclosed dirty surplus accounting items, only one other comprehensive income item is included in the balance sheet, and the others are included in the income statement. Explore this new type of dirty surplus accounting disclosure Under the model, ignoring the single item of dirty surplus accounting items will produce measurement deviation of EVC. Therefore, the following hypothesis 2 to be tested can be put forward.

Hypothesis 2: In China's capital market, using the accounting profit information in the income statement while ignoring a certain other comprehensive income item will cause significant measurement bias to EVC.

Hypothesis 2 is a basic work, and the research on this issue can further explore how to improve information disclosure.

EVC measurement model

Record the total accounting surplus of the enterprise between t+s-1 and t+s as TE_{t+s}. Under the clean surplus accounting, the accounting surplus included in the income statement is $E_{CS,t+s}$, then $TE_{t+s} = E_{CS,t+s}$; record the profit in the income statement under the dirty surplus accounting is $E_{DS,t+s}$, and the total amount included in other comprehensive income is $TDSF_{t+s}$, then $TE_{t+s} = E_{DS,t+s} + TDSF_{t+s}$. Regarding accounting surplus, there is the following relationship under clean surplus accounting and dirty surplus accounting:

$$TE_{t+s} = E_{CS,t+s} = E_{DS,t+s} + TDSF_{t+s} \quad (11)$$

Under clean surplus accounting, all surpluses are included in the income statement, so the accounting surplus satisfies the following relationship:

$$\begin{aligned} bv_{t+1} &= bv_t + TE_{t+1} - d_{t+1} + S_{t+1} \\ &= bv_t + TE_{t+1} - \tilde{d}_{t+1} \\ &= bv_t + E_{CS,t+1} - \tilde{d}_{t+1} \end{aligned} \quad (12)$$

Where bv_t represents the book value of the net assets of the enterprise at the end of the t period. From (11) and (12), under the dirty surplus accounting, the accounting surplus satisfies the following relationship:

$$bv_{t+1} = bv_t + E_{DS,t+1} + TDSF_{t+1} - \tilde{d}_{t+1} \quad (13)$$

Denoted as:

$$RI_{b+s} = TE_{t+s} - r \cdot bv_{t+s-1} \quad (14\text{-}1)$$

It is the net residual income during the period t+s-1 and t+s. Correspondingly, denoted as:

$$RI_{CS,b+s} = E_{CS,t+s} - r \cdot bv_{t+s-1} \quad (14\text{-}2)$$

$$RI_{DS,b+s} = E_{DS,t+s} - r \cdot bv_{t+s-1} \quad (14\text{-}3)$$

They are the net residual income during the t+s-1 and t+s periods under clean surplus accounting and dirty surplus accounting. From (11), there is the following relationship between net residual income in clean surplus accounting and dirty surplus accounting:

$$RI_{t+s} = RI_{CS,\ t+s} = RI_{DS,b+s} + TDSF_{t+s} \quad (15)$$

According to (14) and (15), the calculation of net residual income only needs to use the information of the income statement under the clean surplus accounting, while under the dirty surplus accounting, it needs the surplus information in the income statement and the balance sheet. Therefore, under dirty surplus accounting, if only the surplus information in the income statement is used to calculate net residual income, it may lead to measurement errors of net residual income. By (14), $E_{CS,t+s} = r \cdot bv_{t+s-1} + RI_{CS,t+s}$, under clean surplus accounting,

$$bv_{t+T} = bv_{t+T-1} + E_{CS,t+T} - \tilde{d}_{t+T} = (1+r)bv_{t+T-1} + RI_{CS,t+T} - \tilde{d}_{t+T}$$
$$= (1+r)[bv_{t+T-2} + E_{CS,t+T-1} - \tilde{d}_{t+T-1}] - \tilde{d}_{t+T}$$
$$= (1+r)^2 bv_{t+T-2} + (1+r)RI_{CS,t+T-1} + RI_{CS,t+T} - (1+r)\tilde{d}_{t+T-1} - \tilde{d}_{t+T}$$
$$= \cdots\cdots$$
$$= (1+r)^T bv_t + \sum_{s=1}^{T} RI_{CS,t+s}(1+r)^{T-s} - \sum_{s=1}^{T} \tilde{d}_{t+s}(1+r)^{T-s}$$

So,

$$\sum_{s=1}^{T} \tilde{d}_{t+s}(1+r)^{T-s} = (1+r)^T bv_t - bv_{t+T} + \sum_{s=1}^{T} RI_{CS,t+s}(1+r)^{T-s} \quad (16)$$

Substitute (16) into (9) to get:

$$EVC^t_{t+T} = \sum_{s=1}^{T} RI_{CS,t+s}(1+r)^{T-s} + MV_{t+T} - bv_{t+T} - (MV_t - bv_t)(1+r)^T$$
$$= \sum_{s=1}^{T} (RI_{DS,t+s} + TDSF_{t+s})(1+r)^{T-s} + MV_{t+T} - bv_{t+T} - (MV_t - bv_t)(1+r)^T \quad (17)$$

Among them, the first and second equations respectively represent EVC measurement expressions under clean surplus accounting and dirty surplus accounting, and the difference lies in the measurement of residual income.

To measure EVC under dirty surplus accounting, if you only use the surplus data in the income statement to measure residual income without using other comprehensive income information, it is equivalent to ignoring $\sum_{s=1}^{T} TDSF_{t+s}(1+r)^{T-s}$ in the second equation of (17), then the EVC measurement expression $EVC^t_{IgnorDS,t+T}$ can be set as follows:

$$EVC^t_{IgnorDS,t+T} = \sum_{s=1}^{T} RI_{DS,t+s}(1+r)^{T-s} + MV_{t+T} - bv_{t+T} - (MV_t - bv_t)(1+r)^T \quad (18)$$

Then the measurement deviation of EVC caused by ignoring other comprehensive income is expressed as follows:

$$EVC^t_{t+T} - EVC^t_{IgnorDS,t+T} = \sum_{s=1}^{T} TDSF_{t+s}(1+r)^{T-s} \quad (19)$$

Shows that the reporting mode without distinguishing between dirty surplus accounting and clean surplus accounting only uses the accounting profit in the income statement to measure residual income under dirty surplus accounting, and the deviation of EVC measurement value is $\sum_{s=1}^{T} TDSF_{t+s}(1+r)^{T-s}$. In order to study whether other comprehensive income has value correlation in China's capital market, it only needs to study whether the measurement deviation of EVC has statistical significance, that is, in empirical research, it only needs to test whether the left-hand form of (19) is significantly zero. However, due to the large difference in enterprise scale between samples, in order to eliminate this influence, (19) can be modified as follows:

$$\left(EVC^t_{i,t+T} - EVC^t_{IgnorDS,i,t+T}\right)/MV^t_i = \sum_{s=1}^{T} TDSF_{i,t+s}(1+r)^{T-s}/MV^t_i \quad (20)$$

The subscript i represents firm i, and MV^t_i represents the market value of firm i at the end of the t period. The left form of (20) represents the ratio of the EVC measurement deviation caused by ignoring other comprehensive income items to the initial stock market value, referred to as "error index EI". The right form of (20) shows that this deviation value It can be expressed as "other comprehensive income". In empirical research, the test of whether this deviation value is significantly zero is a test of whether the right formula of (20), that is, $\sum_{s=1}^{T} TDSF_{i,t+s}(1+r)^{T-s}/MV^t_i$, is significantly zero.

Empirical analysis

Sample selection and experimental design

Taking into account the differences in the disclosure of new relevant data and accounting subjects before and after the implementation of the new accounting standards, the accuracy of the data, and the size of the sample size, this article selects the annual report data of the A-share listed companies issued by the Shenzhen Stock Exchange in 2019 and 2020 (i.e., the data disclosed in 2020 and 2021) as samples, we exclude listed companies with incomplete financial data, listed companies in the financial industry such as banking and securities, listed companies that have been issued non-standard audit opinions, and ST and PT listed companies, and finally get A total of 292 listed companies are used as research objects. Relevant data is mainly collected from Juchao Information Annual Report. Other sample data comes from RESSET's financial research database and Wind Information Financial Terminal. Other comprehensive income items in the sample include: "Gains from changes in fair value of available-for-sale financial assets[21]", "Other comprehensive income that can be converted to profit and loss under the equity method[21]", "Cash flow hedging reserve[21]" , "Difference in translation of foreign currency statements[21]", "other factors affecting comprehensive income".

Since the annual financial reports of listed companies are published before April 30 of the following year, and considering that there may be a certain lag in the response of China's capital market to accounting information, the stock prices at the end of June, i.e., 2020 and June 30, 2021, are selected in this paper.

The discounted interest rate used in this article is a 29-month interest rate sample selected from the Guotai Junan Securities database from February 2019 to June 2021.

According to the formula $r = [\prod_{i=Feb.2019}^{Jun.2021}(1+r_i)]^{12/29} - 1$, the average annual interest rate in the sense of compound interest, the final interest rate is 0.0245.

In order to examine the EVC measurement deviation caused by ignoring other comprehensive income items, it is necessary to obtain the sample of "deviation indicator EI". Taking other comprehensive income items disclosed in the 2019 and 2020 statements of Shenzhen A-shares as samples, this paper converts sample I, namely, A certain other comprehensive income item J of Enterprise I in 2019 and 2020, into the final value of 2020 at the interest rate of 0.0245. Take the market value of Enterprise I on June 30, 2020 as the market value at the beginning of the period. Then, the ratio of EVC measurement deviation caused by enterprise I neglecting some other comprehensive income item J to the initial stock market value of the enterprise can be obtained, that is, the deviation index EI(j). The formula can be expressed as follows:

$$EI_i^{(j)} = (TDSF_{i,2019}^{(j)}(1+0.0245) + TDSF_{i,2020}^{(j)}) / MV_i^{2020.6.30}$$

Among them, $EI_i^{(j)}$ means that enterprise i ignores the deviation index of specific other comprehensive income items (j), as shown in Table 1. Ignoring all other comprehensive income items, the "deviation index EI" is

$$EI_i = \sum_{j=1}^{5} EI_i^{(j)}.$$

Table 1: Definition of Deviation Index

Deviation index	Definition
$EI^{(1)}$	the deviation indicator caused by ignoring the "changes in the fair value of available-for-sale financial assets"
$EI^{(2)}$	the deviation indicator caused by ignoring the "Other comprehensive income that can be converted to profit or loss under the equity method"
$EI^{(3)}$	the deviation indicator caused by ignoring the "Cash flow hedging reserves"
$EI^{(4)}$	the deviation indicator caused by ignoring the "Difference in translation of foreign currency statements"
$EI^{(5)}$	the deviation indicator caused by ignoring the "other factors affecting comprehensive income"
EI	$EI= EI^{(1)}+EI^{(2)}+\ldots+ EI^{(5)}$, means the deviation indicator for "all other comprehensive income items" is ignored

Descriptive statistical analysis of samples

Descriptive statistics of bias index EI samples are shown in Table 2. In Table 2, the mean deviation indicators are small, no more than 2%, which seems negligible. However, this is an illusion, because the deviation indicator indicates that the EVC measurement deviation caused by ignoring other comprehensive income accounts for the share of the initial market value of the enterprise. If EVC only accounts for 5% of the initial market value of the enterprise, then the 1% deviation indicator means that the EVC measurement deviation is 20% (1%÷5%).

It can be seen from Table 2 that, on the whole, the measurement deviation of the economic value indicator EVC caused by ignoring all other comprehensive income accounted for 1.1% of the initial stock market value, which may be quite large and may have an impact on the stock market value of the capital market. Bring potential adverse effects. Among them, ignoring the EVC measurement deviation caused by changes in the fair value of available-for-sale financial assets and the average value of the initial stock market value is the largest, which is 1%; that is, ignoring the EVC caused by the change in the fair value of one unit of available-for-sale financial assets.

The measurement deviation is equivalent to 1% of the stock market value at the beginning of the period. This effect may be very large and cannot be ignored. Ignoring the one-unit profit and loss method, the EVC measurement deviation caused by the changes in other owners' equity of the investee and other factors affecting comprehensive income is equivalent to 0.3% and 0.6% of the initial stock market value; at the same time, the fair value of available-for-sale financial assets Under the change and profit and loss method, other owners' equity changes of the investee and other factors affecting comprehensive income have a relatively large standard deviation of the relevant ratios of these three items. The main reason is that the uncertainty of these three factors is large, which is affected by the capital market. The impact of environmental changes is more obvious.

Table 2: Descriptive statistics of deviation index EI

	N	Minimum	Maximum	Mean	Standard deviation
$EI^{(1)}$	146	-0.103	0.694	0.010	0.062
$EI^{(2)}$	146	-0.018	0.315	0.003	0.026
$EI^{(3)}$	146	-0.003	0.004	1.17E-05	4.67E-04
$EI^{(4)}$	146	-0.045	0.015	3.54E-04	4.15E-3
$EI^{(5)}$	146	-0.106	0.005	0.006	0.011
EI	146	-0.103	0.694	0.011	0.067
Remark : *The meanings of EI (j) and EI are shown in Table 1*					

Empirical test

The t-test of OCI value relevance

From Table 2, the t-value of each deviation index EI can be calculated as shown in Table 3, where t-value = mean value/standard deviation. From Table 3, the t-values of the deviation indicators EI are very small, all less than 1. If the deviation indicators EI follow a normal distribution, the null hypothesis that EI(j) and EI are zero cannot be rejected. Therefore, hypotheses 1 and 2 proposed in this article can be rejected.

Table 3: t-value of deviation index EI

	t-value
$EI^{(1)}$	0.161
$EI^{(2)}$	0.115
$EI^{(3)}$	0.025
$EI^{(4)}$	0.085
$EI^{(5)}$	0.545
EI	0.164
Remark：*The meanings of EI(j) and EI are shown in Table 1*	

Table 4: Kolmogorov-Smirnov normality test of EI

	N	**K-S value**	**p-value (two-sided)**
$EI^{(1)}$	146	4.908	0.000
$EI^{(2)}$	146	5.608	0.000
$EI^{(3)}$	146	5.837	0.000
$EI^{(4)}$	146	5.045	0.000
$EI^{(5)}$	146	6.137	0.000
EI	146	4.608	0.000
Remark①*The meanings of EI(j) and EI are shown in Table 1* ②The null hypothesis of this test is H0: the population obeys a normal distribution.			

However, the t-test is not robust. If the population does not follow a normal distribution, the risk of using the t-test is relatively high. Therefore, it is necessary to test whether each deviation index obeys a normal distribution. The Kolmogorov-Smirnov test is used here. From Table 4, the K-S value of each item is large, the p-value is 0.000, and the deviation indexes EI(j) and EI do not obey the normal distribution. Therefore, the use of t-test is not robust enough, and non-parametric testing methods need to be used for further testing.

Wilcoxon sign rank test for OCI value correlation

This paper uses the Wilcoxon signed rank test in the non-parametric test method to further verify whether ignoring other comprehensive income items will produce measurement bias problems for the economic value indicator EVC.

The basic idea of Wilcoxon signed Rank test is to first calculate the difference $x_i - M_0$ between the observed value x_i of the sample and the central position of the null hypothesis, that is, the median value M_0, and then arrange them according to the absolute value $|x_i - M_0|$ from the smallest to the largest. The samples whose difference value is 0 are excluded, and the Rank of the lowest one is 1, and so on. If there are several differences in the order in which the absolute values of $|x_i - M_0|$ are equal, the average of the rank is taken as the rank of these differences. Let W+ represent the sum of the rank of $x_i - M_0 > 0$ and W⁻ represent the sum of the rank of $x_i - M_0 < 0$. For the two-sided test $H_0 : M = M_0 \Leftrightarrow H_1 : M \neq M_0$, the smaller rank sum is chosen as the test statistic W, that is $W = min(W^+, W^-)$, where p-value $= 2P(W < w)$ and w is the observed value of W. According to the W value obtained, the p − value can be obtained under the null hypothesis by looking up the distribution table of Wilcoxon signed rank test. For the case of multiple variables, the normal approximation can be used to obtain the value of a normal random variable Z related to W, and then the p− value can be obtained by looking up the table. The calculation formula is as follows:

$$Z = \frac{W - n(n+1)/4}{\sqrt{n(n+1)(2n+1)/24}} \to N(0,1), \quad (n \to \infty)$$

If the p-value is small (less than or equal to the given significance level), the null hypothesis can be rejected.

Table 5: Wilcoxon signed rank test of DSAFs value correlation H_0 : M_0=0 ↔ H_1 : M_0≠0

	***EI*$^{(1)}$**	***EI*$^{(2)}$**	***EI*$^{(3)}$**	***EI*$^{(4)}$**	***EI*$^{(5)}$**	***EI*=*EI*$^{(1)}$+…+*EI*$^{(5)}$**
Statistics	*z*=-2.521	*z*=-2.186	*z*=-0.944	*z*=-2.070	*z*=-1.589	*z*=-2.503
p-value	0.012	0.029	0.347	0.038	0.113	0.012
Test result	Reject the null hypothesis on $\alpha \geq 0.012$	Reject the null hypothesis on $\alpha \geq 0.029$	Can not reject the null hypothesis for $\alpha < 0.347$	Reject the null hypothesis on $\alpha \geq 0.038$	Can not reject the null hypothesis for $\alpha \geq 0.113$	Reject the null hypothesis on $\alpha \geq 0.012$
Conclusion	The median is not 0	The median is not 0	The median is 0	The median is not 0	The median is 0	The median is not 0
Remark：*The meanings of EI(j) and EI are shown in Table 1.*						

It can be seen from Table 5 that the median of EI is significantly different from zero, and hypothesis 1 is verified. It can be seen that other comprehensive income information is very important. If accounting profit information in the income statement is only used, but these other comprehensive income information is not used, that is, all dirty surplus items are ignored, the measurement deviation of EVC is statistically significant.

The median of $EI^{(1)}$, $EI^{(2)}$, and $EI^{(4)}$ is significantly different from zero, while the median of $EI^{(3)}$ and $EI^{(5)}$ is significantly zero, that is, hypothesis 2 is for specific other comprehensive income Project, can not get a consistent conclusion. If only “profits and losses from changes in the fair value of available-for-sale financial assets” are ignored, or “other comprehensive income that can be transferred to profit and loss under the equity method” is ignored, or other comprehensive income items such as “differences arising from translation of foreign currency statements” are ignored, and other dirty surplus accounting flow items are not ignored, which will produce significant measurement

deviations for EVC (that is, hypothesis 2 is verified for these items); however, if only “cash flow hedging reserves” or “other factors affecting comprehensive income” are ignored Such other comprehensive income items, while other dirty surplus accounting flow items have not been ignored, will not produce significant measurement deviations for EVC (that is, hypothesis 2 is rejected for these items).

The above-mentioned research results are important for improving the current disclosure model. From this, it can be determined which of the current dirty surplus items are key items that need to be directly included in the balance sheet.

3.3.3 Wilcoxon signed rank test for reconstructing the rationality of the information disclosure model

In foreign research on the value relevance of other comprehensive income, usually only the above-mentioned hypothesis 1 and hypothesis 2 are studied, such as the literature [28~30]. Yu discusses how to improve the current accounting information disclosure model to increase the value relevance of accounting surplus in the income statement.

Since Hypothesis 1 is verified by Wilcoxon's signed rank test, if only the accounting profit information in the income statement is used instead of other comprehensive income information, that is, all dirty surplus items are ignored, a significant measurement deviation will be produced for EVC. In view of the fact that EVC can be used to measure the extraordinary value created by enterprises, it is also important for enterprise valuation, China's current accounting information disclosure model may mislead investors, at least it may increase the cost of information use.

In order to improve the value relevance of accounting surplus, all dirty surplus items can be moved to the income statement, which can improve the value relevance of accounting information, that is, model 6 in Table 7. This means that we must comprehensively change the current accounting information disclosure model, from the dirty surplus accounting disclosure model to the clean surplus accounting disclosure model. However, because dirty surplus accounting is considered to have the following advantages: other comprehensive income irrelevant to the value is directly included in the owner’s equity, which helps to improve the quality of surplus and can better convey the company’s internal information. The surplus accounting disclosure model is totally negated and may not be feasible. A reasonable and feasible method should be incremental improvement, but it must be able to exert the greatest effect.

The basic idea of progressive improvement is to reclassify all the current dirty surplus items, some into the balance sheet directly, and some into the income statement, so as to improve the value correlation of accounting surplus in the new disclosure mode. For example, the "cash flow hedge reserve" is recorded in the balance sheet as other comprehensive income items, while the other four dirty surplus accounting flow items are moved to the income statement, thus obtaining the new dirty surplus accounting disclosure, namely Mode 1 in Table 7; Or the "other factors affecting comprehensive income" as other comprehensive income items into the balance sheet, and the other four dirty surplus accounting flow items are moved to the income statement, also get the new dirty surplus accounting disclosure mode, namely mode 2 in Table 7. According to Table 5, ignoring all other comprehensive income of disclosure modes 1 and 2 (i.e., "cash flow hedge reserve" or "other factors affecting comprehensive income") will not result in significant measurement bias for EVC (i.e., hypothesis 1 is rejected for these items of disclosure modes 1 and 2).

However, Mode 1, 2 and Mode 6 have common shortcomings, which means that the current dirty surplus accounting disclosure mode will be changed significantly. For this reason, this article adopts a "step-by-step construction" method on this basis to further explore The construction method of dirty surplus accounting information disclosure model. Tables 6 and 7 summarize the new disclosure model constructed by this method and its rationality and feasibility.

According to Table 5, the median of $EI^{(3)}$ and $EI^{(5)}$ is significantly zero. In the new dirty surplus accounting model, "cash flow hedge reserve" and "other factors affecting comprehensive income" should be regarded as the key items of other comprehensive income in the balance sheet. Therefore, a relatively simple new disclosure mode of dirty surplus accounting is firstly constructed, namely Mode 3 in Table 7: these two items are directly recorded into the balance sheet as other comprehensive income items, while the other three dirty surplus accounting flow items are moved to the income statement. The measurement bias of EVC generated by ignoring all other comprehensive returns of disclosure mode 3 (i.e., these two other comprehensive returns) is $EI_{3,5}=EI^{(3)}+ EI^{(5)}$. Wilcoxon signed rank test cannot reject the null hypothesis that the median of $EI_{3,5}$ is zero. This means that ignoring all other comprehensive income in disclosure mode 3 (i.e., these two other comprehensive income) will not result in a significant measurement bias for EVC (i.e., rejection of hypothesis 1 for these items).

On the basis of Dirty surplus Accounting Disclosure Mode 3, the "differences arising from the translation of foreign currency statements" are included in the balance sheet as other comprehensive income items, and the Dirty surplus Accounting Disclosure Mode 4: "Cash Flow Hedging Reserve", "differences arising from the translation of foreign currency statements" is included in the balance sheet. "The difference arising from the conversion of statements" and "other factors affecting comprehensive income" are directly included in the balance sheet as other comprehensive income items, while the other two dirty surplus accounting flow items are moved to the income statement. Ignoring all other comprehensive income of Disclosure Mode 4 (that is, these three other comprehensive incomes), the measurement deviation of EVC is $EI_{3,4,5}=EI^{(3)}+EI^{(4)}+EI^{(5)}$, Wilcoxon signed rank test The null hypothesis that the median of $EI_{3,4,5}$ is zero cannot be rejected. This means that ignoring all other comprehensive income of Disclosure Mode 4 (that is, these three other comprehensive income) will not produce a significant measurement bias for EVC (that is, rejecting Hypothesis 1 for these items).

On the basis of dirty surplus accounting disclosure mode 4, "other comprehensive income that can be converted to profit and loss under equity method" is recorded into the balance sheet as other comprehensive income items, and then dirty surplus accounting disclosure Mode 5 is obtained: "Other comprehensive income transferable to profit and loss under equity method", "cash flow hedge reserve", "differences arising from translation of foreign currency statements" and "other factors affecting comprehensive income" were recorded into the balance sheet as other comprehensive

income items, while the remaining dirty surplus accounting flow item was moved to the income statement. The measurement bias of EVC generated by ignoring all other comprehensive returns of disclosure mode 5 (i.e., the four other comprehensive returns) is $EI_{3,\ 4,\ 5}=EI^{(2)}+EI^{(3)}+EI^{(4)}+EI^{(5)}$. Wilcoxon signed rank test cannot reject the null hypothesis that the median of $EI_{3,\ 4,\ 5}$ is zero. This means that ignoring all other comprehensive income in Disclosure mode 5 (i.e., these four other comprehensive income) will not result in a significant measurement bias for EVC (i.e., rejection of hypothesis 1 for these items).

Other construction methods are unreasonable, as shown in Table 6 and 7.

In short, without major changes to the current disclosure model, model 5 is the best disclosure model.

Table 6: Wilcoxon signed rank test for the value correlation of DSAFs of reconstructed DSA $H_0{:}M_0=0 \leftrightarrow H_1: M_0\neq 0$

	$EI_{3,5}= EI^{(3)}+ EI^{(5)}$	$EI_{3,4,5}= EI^{(3)}+EI^{(4)}+ EI^{(5)}$	$EI_{2,3,4,5} =EI^{(2)}+EI^{(3)}+ EI^{(4)}+ EI^{(5)}$	$EI_{1,3,5} =EI^{(1)}+EI^{(3)}+ EI^{(5)}$	$EI_{2,3,5} =EI^{(2)}+EI^{(3)}+ EI^{(5)}$	$EI_{1,3,4,5} =EI^{(1)}+EI^{(3)}+ EI^{(4)}+ EI^{(5)}$	$EI= EI^{(1)}+\cdots+ EI^{(5)}$
Statistics	z=-1.500	z=-0.932	z=-1.375	z=-2.414	z=-2.563	z=-1.884	z=-2.503
p-value	0.1336	0.3524	0.1676	0.016	0.0104	0.06	0.012
Test result	Can not reject the null hypothesis for $\alpha <$ 0.1336	Can not reject the null hypothesis for $\alpha <$ 0.3524	Can not reject the null hypothesis for $\alpha <$ 0.1676	Reject the null hypothesis on $\alpha \geq$ 0.012	Reject the null hypothesis on $\alpha \geq$ 0.029	Reject the null hypothesis on $\alpha \geq$ 0.06	Reject the null hypothesis on $\alpha \geq$ 0.012
Conclusion	The median is 0	The median is not 0	The median is 0	The median is not 0	The median is not 0	The median is not 0	The median is not 0
Remark: *The meanings of EI(j) and EI are shown in Table 1.* $\alpha < 0.3524$							

Table 7: Reconstruction of Accounting Information Disclosure Model

Restructured disclosure model	Dirty surplus items of the balance sheet [1]	Dirty surplus items moved to the income statement [1]	Ignoring all the EVC measurement deviations caused by dirty surplus items, is it statistically significant? [2]	Is the new model reasonable?	Feasibility of the new model
Disclosure model 1	(3)	(1)、(2)、(4)、(5)	NO	YES	Poor
Disclosure model 2	(5)	(1)、(2)、(3)、(4)	NO	YES	Poor
Disclosure model 3	(3)、(5)	(1)、(2)、(4)	NO	YES	General
Disclosure model 4	(3)、(4) 、(5)	(1)、(2)	NO	YES	High
Disclosure model 5 [3]	(2)、(3)、(4) 、(5)	(1)	NO	YES	Highest
Disclosure model 6	None	(1)、(2)、(3)、(4) 、(5)	NO	YES	Worse
Disclosure model 7	(1)、(3)、(5)	(2)、(4)	YES	NO	Not feasible
Disclosure model 8	(2)、(3)、(5)	(1)、(4)	YES	NO	Not feasible
Disclosure model 9	(1)、(3)、(4) 、(5)	(2)	YES	NO	Not feasible

Remarks: 1. (1)~(5) in the table respectively indicate: (1) gains and losses from changes in the fair value of available-for-sale financial assets, (2) other comprehensive income that can be converted to gains and losses under the equity method, and (3) cash flow hedging reserve, (4) the difference arising from the conversion of foreign currency statements, (5) other factors affecting comprehensive income
2. "Whether the EVC measurement deviation caused by ignoring all the dirty surplus items is statistically significant" is obtained based on the results of the Wilcoxon signed-rank test of the value correlation of DSAFs in Tables 5 and 6.
3. Without major changes to the current disclosure model, model 5 is the best disclosure model.

The conclusion

Although accounting that follows the clean surplus relationship is of great significance to accounting theory and practice, from an international perspective, most accounting practices adopt dirty surplus accounting that violate the net surplus relationship, and my country is gradually approaching net surplus accounting. The value relevance of other comprehensive income has important implications for accounting practice: other comprehensive income with irrelevant value is directly included in the owner's equity, which helps to improve the quality of surplus and better convey the company's internal information; while value-related other comprehensive income is directly included in owner's equity. Other comprehensive income may be reduced to a tool of surplus management. By eliminating this other comprehensive income in surplus, this value-related information can be hidden and used to manipulate profits to achieve the purpose of surplus management [21]. Therefore, the value relevance of other comprehensive income is crucial for the formulation of standards.

From the perspective of whether other comprehensive income will cause the measurement deviation of EVC, this paper discusses the value correlation of other comprehensive income disclosed by Chinese listed companies in China's capital market by using the relevant data of shenzhen listed companies. The total amount of

other comprehensive income disclosed by listed companies in China has value relevance. Therefore, if accounting profit information is only used in the income statement and no other comprehensive income information is used, that is, all dirty surplus items are ignored, there will be significant measurement deviation for EVC. Considering that EVC is not only used to measure the extraordinary value created by enterprises, but also important for enterprise valuation, China's current accounting information disclosure model may mislead investors, or at least increase the cost of information use.

If a listed company only discloses "profits and losses from changes in the fair value of available-for-sale financial assets [21]", or only "other comprehensive income that can be converted to profit and loss under the equity method [21]", or only "the difference arising from the translation of foreign currency statements [21]", and there are no other comprehensive income items. Accordingly, the above-mentioned other comprehensive income items have value relevance; "cash flow hedging reserve [21]" and "other factors affecting comprehensive income" have no value Correlation.

This article expands the field of foreign research on the value relevance of other comprehensive income, and uses this research to explore how to improve the current accounting information disclosure mode to improve the value relevance of accounting earnings in the income statement. To this end, on the basis of relevant basic research conclusions, through a "step-by-step construction" method, a disclosure model that can improve the value relevance of accounting earnings is constructed. In a nutshell, the importance of the value relevance of other comprehensive income for the formulation of standards is an important research area worthy of discussion. Based on this, it can not only evaluate the current dirty surplus accounting information disclosure model, but also be used to study the issue of "how to improve the accounting information disclosure model", and thus can provide policy recommendations for standard formulation.

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