Historical Development of Earnings Management Models

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Abstract.

Research background: Contribution responds to the current issue of Earnings Management (hereafter „EM") initiatives. Authors have been dealing with EM initiatives since at least the 1960s. Initial studies came from the USA. Due to the globalization, awareness of EM techniques and models created abroad is also reaching European countries. Especially after the recent economic fluctuations (financial crisis in 2009; COVID-19 in 2020), the application of EM principles in companies with an effort to achieve a balanced profit can be assumed. The issue of earnings management has begun to be associated with the issue of its measurement. The problem is a large number of models, so choosing one is not easy. Although earnings management issue has been investigated under various hypotheses, there is no agreement on a uniform detection or measurement of earnings management practices. A number of earnings management models can be found in studies. Many of them were created recently, others are older. Most originated abroad.
Purpose of the article: The aim of the paper is to clarify the historical development of earnings management models.
Methods: Bibliometric analysis for historical development of EM models.
Findings & Value added: The added value of the contribution is in the clarification of the historical development of the EM model as well as clarify the development of profit models.

Keywords: *accruals; earnings; earning management; model*

JEL Classification: *M41; M42; F63*

1 Introduction

Mainly foreign authors have been dealing with the issue of earnings management. Initial studies were developed in the 1960s. The authors focused on the relation between capital markets and earnings management practices. The beginnings of studies are associated with two types of hypotheses within earnings management, namely the mechanistic hypothesis

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and the efficient market hypothesis. Both types of hypotheses were aimed at examining the impact of accounting choices on the profit amount. Unlike the mechanistic hypothesis, the basic premise of an effective market hypothesis was that the stock prices are sensitive to publicly available information regarding accounting policy. Later published studies have begun to deal with the issue of the relationship between earnings management practices and the non-capital market. There were significantly fewer published studies on this issue, and very quickly the academic public has begun to address the issue of earnings management and its connection with the capital market again. Interest in earnings management issue is constantly growing. The issue of earnings management has begun to be associated with the issue of its measurement. A number of earnings management models can be found in studies. Many of them were created recently, others are older. Most originated abroad. The aim of the paper is to clarify the historical development of earnings management models.

1.1 Literature review

The beginnings of earnings management can be dated back to the 20th century, where one of its forms - income smoothing – was defined. Author Hepworth said that managers use *"income smoothing"* to improve relationships with creditors, employees or investors, as well as to obtain tax benefits. In the study, the author emphasizes the importance of distinguishing between real and reported income and describes various techniques of accounting methods in order to smooth out reported income, e.g. by inventories, assets as well as reserves accounting. [1] Subsequently, author Gordon came up with the idea that income smoothing increases the level of shareholder satisfaction and the stability of the company's income, but within the limits of accounting rules. [2] Gordon, along with other authors Horwitz and Meyers, confirmed the relationship between the tax relief referred to as income smoothing tool and the return on equity referred to as the purpose of income equalization. [3] Some studies dealt with the effect of the chosen instrument on income smoothing. Authors Dopuch and Drake examined the accounting treatment of the profit or loss on securities. [4] Author Archibald dealt with the used depreciation method and its impact on the income equalization. [5] In 1973, Beidleman stated for the first time that R&D costs, selling or advertising costs as well as pension costs were used for income equalization practices. [6]

During this period, the authors have also begun to deal with the issue of the optimal time interval for concluding that managers manipulate profits. Copeland defined earnings management as compensating for year-on-year fluctuations in profits, by moving them from the most successful periods, where profits are highest, to less successful periods, when profits are lowest, which is intended to mitigate these fluctuations. It is therefore a balancing of profits that involves a repeated choice of accounting methods and rules, the purpose of which is to show a smaller deviation from the trend than would have occurred without the application of those rules. [7,8]

Author Healy presents the results of a study of managerial practices in relation to profit and accruals. His model was the first in the literature to estimate the systematic management of earnings existing in each period. Healy's model uses the average of total accruals to express the height of discretionary accruals. The author answered how managers manipulate accruals and make decisions about accounting procedures with the aim to increase profits and thus adjust their bonus contracts. [9] DeAngelo used total accruals for the previous period in her model as a measure of non-discretionary accruals. Authors McNichols and Wilson found a systematic negative relationship between operating cash inflows and discretionary accruals, mainly managers tend to reduce or increase profits when operating cash flows are unusually high or low. [10] In her study, author Jones tested whether companies that would benefit from import concessions are trying to manage profits

- to reduce profits during the US Commission's International Trade Commission's investigation of import concessions. The lower the profit is, the higher the chance of gaining independence from imports. Its model is considered to be one of the best-known earnings management models in accrual calculation, distinguishing it into discretionary and non-discretionary. It brought to the earnings management literature the assumption that earnings management occurs in accrual part of the profit. [11] Dechow and Sloan developed an Industrial Model, which, like Jones model, mitigates the assumption that non-discretionary accruals are constant over time. In this model, it is assumed that differences in the determinants of non-discretionary accruals are common between companies in companies in the same industry. [12]

Many studies rely on the Jones model, but its reliability is questioned by authors Dechow, Sloan or Sweeney, who modified the original Jones model by supplementing the change in sales with a change in receivables. Kang and Sivaramakrishnan also points to the weak detection of earnings management practices at a time when economic conditions are changing. [13] Kasznik determined non-discretionary accruals as a function of the change in income, which is adjusted for the change in receivables, real estate, equipment and total cash flow of operations. [14] Beneish developed a model that is not for calculating discretionary accruals, but is used to detect gain control. He proves the existence of a relationship between the probability of profit management and certain figures in the financial statements. [15]

The option to adjust the accrual in order to achieve the required level of profit is also described as *accrual-based earnings management*. In particular, older studies paid more attention to this type of earnings management. The ability to manage profits through appropriate operational decisions that have an impact on cash flow from operating activities is referred to as *real earnings management*. [16] Authors pay more attention to this especially in recent years.

It can be stated that earnings management is a current topic. It is studied by several experts. Among domestic authors dealing with the issue of EM, Kliestik, Kovacova Valaskova, Michalkova, Cug, Cugova, Siekelova, Podhorska, etc. can be included. [17-22]

2 Methodology

Although earnings management issue has been investigated under various hypotheses, there is no agreement on a uniform detection or measurement of earnings management practices.

To understand the following methodology of models, it is necessary to define the following terms. *Accruals* are short-term liabilities (eg interest, wages, taxes) arising during the accounting period, but are not supported by any invoice. When the financial statements for a particular accounting period are prepared, accruals are estimated using experience (eg, based on previous payments). Accrual represents increasing and such growing assets of the company are not taken into account in order to comply with the accrual rule. *Discretionary accruals* are optional costs that have yet to be realized but are already recorded in the accounting books. Examples are the aforementioned bonuses or bonuses for managers. *Non-discretionary accruals* are mandatory costs that must be incurred and are already recorded in the accounting books. Examples are wages for the next month, resp. energy bill.

It can be stated that earnings management analysis often consists of focusing on what discretionary measures a manager uses. However, such an analysis requires a methodology that estimates the discretionary portion of reported income. There are simple models and more sophisticated models. Within simple models, discretionary accruals are perceived as total, as opposed to more sophisticated models, which are able to categorize total accruals into discretionary and non-discretionary.

The aim of the paper is to clarify the historical development of earnings management models. Using statistical methods to analyze articles, publications, or books is known as bibliometrics. Scientometrics, also defined as the sub-field of bibliometrics, deals with the analysis of scientific publications. Bibliometrics analysis has a wide application in the different areas of science. Most often, bibliometrics or scientometrics is associated with the evaluation of science at various levels. Historical development in selected science fields, as well as hidden relationships between issues, authors, or disciplines, can be defined based on the results of bibliometrics analysis. Bibliometric methods are also used to identify the most current topics of scientific research, or the level of their obsolescence.

3 Results and Discussion

There are some group of earnings management model based on the ways to its measurement. Table 1 shows basic methods of earnings management.

Table 1. Basic methods of earnings management measurement.

Method
Graphical Methods Based on Time Series Data
Mathematical Modeling of Specific Accruals
Mathematical Modeling of Total Discretionary Accruals Using Time Series Data
Mathematical Modeling of Total Discretionary Accruals Using Cross-Sectional Abnormal Accruals

Especially after 2000, the group of authors has dealt with the issue of so-called real earnings management. Cho, Choi and Kwon dealt with the role of employee on financial reporting. They investigated the relationship between real earnings management and employee length of employment. Authors Hamza and Kortas dealt with the impact of weaker regulatory environment on earnings management. Jeong and Choi showed the existence of the negative association that real earnings management prevents the market from assessing companies' future earnings reflected in the current stock prices. The results of work by Kim, Udawatte and Yin shows that the higher the CSR level is, the lower the EM initiatives level are in the company. In connection with the development of information and communication technologies, also modeling using neural networks penetrates into the issue of earnings management. Table 2 shows the most frequently used calculation methods of EM chronologically arranged.

Table 2. The most frequently used calculation methods of EM chronologically arranged.

Method	Authors	Year
Graphical Methods Based on Time Series Data	Gordon	1964
	Dopuch and Drake	1966
	Archibald	1967
Mathematical Modeling of Specific Accruals	Gordon et al.	1966
	Copeland,	1968
	White	1970
	Dascher and Malcom	1970
	Barefield and Comiskey	1972
	Beidleman	1973
Mathematical Modeling of Total Discretionary Accruals Using Time Series Data	Healy	1985
	Kaplan	1985
	DeAngelo	1986
	McNichols and Wilson	1988
	Jones	1995
	Dechow et al.	1996
	Kothari and Watts	1966
	Beneish	1997
	Young	1999
Mathematical Modeling of Total Discretionary Accruals Using Cross-Sectional Abnormal Accruals	DeFond and Jiambalvo	1994
	Subramanyam	1996
	Pope and Young	2000

Many authors state that there is currently a wide range of alternative models for measuring earnings management, but the most popular are the Jones model (1991), the modified Jones model (proposed by Dechow, Sloan and Sweeney, 1995), the Theoh, Welch and Wong model (1998), Kasznikov's model (1999) and Kothari's model (2005). These models belong to the group of profit models. The authors of Hendström and Tounkara divided profit models into three categories:

1. *models of total accruals,*
2. *models of non-discretionary accruals,*
3. *models of discretionary accruals.* [23]

As was mentioned above, these are the best-known and the most used models for earnings management measurement. Table 3 shows them chronologically arranged.

Table 3. Earnings management models chronologically arranged.

Year	Authors
1981	Ronen and Sadan Model
1985	Healy Model
1986	DeAngelo Model
1988	McNichols and Wilson Model
1991	Bartov Model
1991	Jones Model
1991	Industry Model (Dechow, Sloan and Sweeney)
1994	Defond and Jiambal Model
1995	Modified Jones Model
1995	Kang and Sivaramakrishnana Model
1996	Shivakumar Model

1997	Key Model
1998	Theo et al. Model
1999	Beneish Model
1999	Kasznikov Model
2003	Dechov, Richardson and Tuma Model
2004	Larcker and Richardson Model
2005	Kothari et al. Model
2006	Yoon at el. Model
2006	Roychowdhury Model
2011	Islama et al. Model
2012	Dechov et al. Model
2013	Dunmor Model

4 Conclusion

Several models have been developed in order to measure degree of earnings management. The first ways to capture earnings management are based on graphical methods based on time series data. Another group of authors dealt with the detection of EM by mathematical modeling of specific accruals. The third group of authors detects earnings management through mathematical modeling of total discretionary accruals using time series data. Another group was authors who decided to use cross-sectional abnormal accruals instead of time series data, namely DeFond, Jiambalvo, Subramanyam, Pope or Young. Beneish constructed a model detecting earnings manipulation similar to Altman's bankruptcy model. The aim of the paper is to clarify the historical development of earnings management models. In the article author also pay attention to the historical overview of profit models.

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