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A Renewed Interest on the Fundamentals of Accounting: The Impact of the Matching 'Principle' on Earning Attributes

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Additional information is available at the end of the chapter

Abstract

By adopting a 'revenue/expense' model, the matching principle has traditionally played a fundamental role in determining earnings. However, since the 1970s, standard setters have chosen to move to an 'asset/liability' approach to determine income. Some authors argue that these changes in accounting standards have caused a decline in the matching process, exercising a negative impact on the quality of earnings. A contrasting view, however, is that changes in the economic activity have caused the decline in matching. Moreover, according to Barth, there is no 'matching principle'. Indeed, the matching process often leads to the recognition of assets/liabilities of questionable substance and, therefore, cannot be considered an end in itself. The purpose of this chapter is to perform an extensive and systematic literature review on the determinants and consequences of the matching process, examining a topic of major concern for standard setters.

Keywords: accrual accounting, matching principle, revenue/expense model, asset/liability model, earnings attributes

1. Introduction

Information obtained from the financial reporting activity represent the most relevant data that a firm can disclose to the benefit of a wide group of stakeholders. In fact, the well-known information issue related to the information asymmetry between insiders and capital providers creates a demand for internally generated measures of performance to be reported over finite time intervals [1–5].

Since in the accounting field, sometimes it holds that profit is a point of view, while cash is a reality [6], and the interest of many accounting information users is addressed towards cash. As stated by Lee [7], the cash flow reporting system is based on the periodic recognition of cash inflows and outflows, which are not affected by credit transactions and arbitrary accounting allocations. Therefore, under the cash accounting method, revenues are recognized in the accounting period in which the payment is received, and expenses in the period in which the payment is made. In this case, income is computed as the difference between cash receipts from revenues and cash payments for expenses.

However, over a finite time interval, the mere recognition of realized cash flows could not be necessarily useful because of the net cash flows' fluctuations, with cash inflows and outflows that follow the firm's investment and financing activities as well as the firm's operating activities. For this reason, it can be assumed that realized cash flows undergo timing and matching problems which cause them to be a 'noisy' measure of firm performance [2].

Dechow [2] starts investigating whether cash flows have time-series properties which could be consistent with the idea that cash flows suffer from matching problems. Specifically, her results highlight that changes in net cash flows and in operating cash flows have an average negative autocorrelation (**Figure 1**), with the latter being smaller than the former.

This suggests that a cash-based performance measure suffers from temporary mismatching between cash inflows and outflows. In other terms, given that cash receipts and disbursements— which are strictly related to a specific activity—could be recognized in different measurement periods, a periodic reporting system based on cash flows does not coincide with the net economic benefits of shareholders in a given accounting period [8].

These issues were analysed and modelled by Dechow [2][1]. In particular, she sets up a simplified example based on a firm which has only sales. The starting point of the model is the definition of the cash collected during an accounting period:

$$Cash_t = [(1 - \alpha)*Rev_t] + (\alpha*Rev_{t-1}) \tag{1}$$

where $Cash_t$ represents cash collected in the accounting period t, Rev stands for the revenues generated from sales made during accounting periods t and $(t-1)$, and α is the proportion of sales for which cash is not collected until the next accounting period. It must be noted that in this model, α is assumed as a constant for each accounting period, so cash collected in the accounting period t is composed of both the proportion (α) of sales made in the period $(t-1)$ that have not been collected yet, and the proportion $(1 - \alpha)$ of sales made and cashed in the period t. Therefore, realized cash flows will differ from the economic net benefits realized in each period to the extent to which credit sales are not included in realized cash flows and the latter embody the inflows of credit sales from the previous period.

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[1]Dechow [2] is not the first to investigate the problems related to the cash-basis reporting (e.g., [9, 10], among many others to be added.) However, the author marks an attempt to contrast the empirical properties of earnings to cash flows based on the role of accruals.
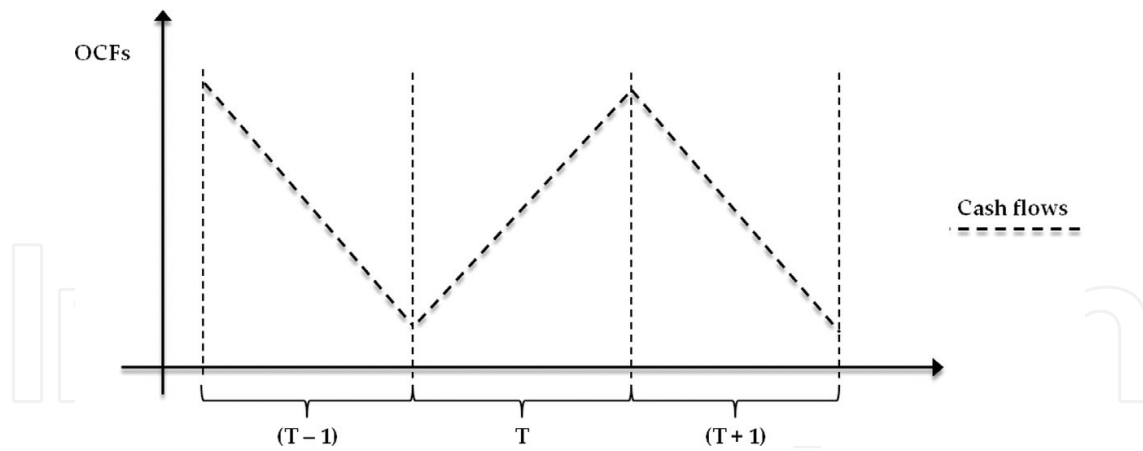
Figure 1. Negative autocorrelation of OCFs and changes in OCFs. Source: authors.

In such settings, if a steady-state firm is defined as one that is neither growing nor declining, it follows that $Rev_t = Rev_{t-1}$. Substituting Rev_t for Rev_{t-1} in Eq. (1) implies that $Cash_t = Rev_t{}^2$. This means that in a steady-state firm, there will be no difference between the accounting numbers reported under the cash-basis system and the realized economic benefit. However, the steady-state assumption is an oversimplification because it is quite rare that a firm does not have an increase (or a decrease) in sales over each period. In this case, $Rev_t \neq Rev_{t-1}$ and it follows that:[3]

$$Rev_t - Cash_t = \alpha * \Delta Rev_t \qquad (2)$$

where $\Delta Rev_t = Rev_t - Rev_{t-1}$.

As reported in Dechow [2], Eq. (2) highlights that the magnitude of the difference between revenues and cash flows for each period is directly and positively related to the proportion of sales on credit for which cash will be not collected until the next accounting period (α), and the larger is the change in revenues (ΔRev_t).

Even if the model is only focused on revenues from sales, it is readily generalizable to all other accounting features, and suggests that, when firms are not in a steady state, realized cash flows are expected to be a relatively poor measure of firm performance because they suffer from the abovementioned timing and matching problems, and are less able to reflect firm performance. In other terms, cash flows are characterized by a lack of information content about the future as they cannot show inter-period relationships. Given that the interest in a business organization depends on its ability to generate favourable future cash flows, a performance measure exclusively based on realized cash flows (especially during a short period) cannot adequately provide useful information to assess if a firm's performance is successful.

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[2]The process is as follows: $Cash_t = [(1 - \alpha)*Rev_t] + (\alpha*Rev_{t-1}) \equiv Cash_t = [(1 - \alpha)*Rev_t] + (\alpha*Rev_t) \equiv Cash_t = [(1 - \alpha + \alpha)*Rev_t] \equiv Cash_t = 1*Rev_t \equiv Cash_t = Rev_t$.

[3]The process is as follows: $Cash_t = [(1 - \alpha)*Rev_t] + (\alpha*Rev_{t-1}) \equiv Cash_t = Rev_t + [\alpha*(Rev_{t-1} - Rev_t)] \equiv Cash_t - Rev_t = [\alpha*(Rev_{t-1} - Rev_t)] \equiv Rev_t - Cash_t = [\alpha*(Rev_t - Rev_{t-1})] \equiv Rev_t - Cash_t = \alpha*\Delta Rev_t$.
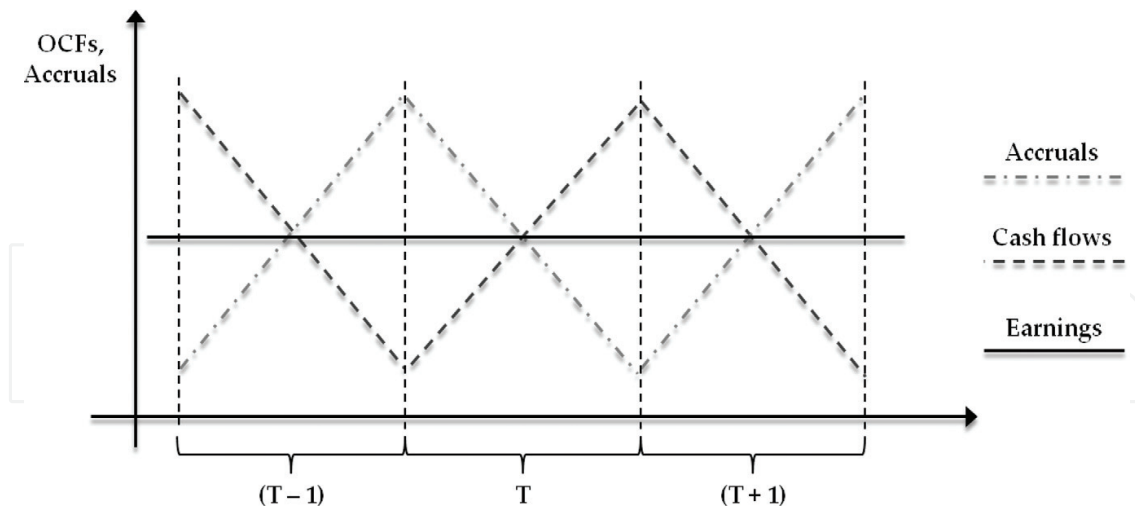
Figure 2. Earnings incorporating the negative autocorrelation of OCFs and accruals. Source: Authors.

An alternative to a reporting system based on realized cash flows is the accrual-basis financial reporting system whose primary product is net income, or earnings, as a measure of performance.

Accruals are adjustments for earned revenues and incurred expenses that are not recognized in the accounts yet. Income is therefore 'adjusted net cash flows' [11]: net cash inflows are still the principal driver of income, but they are temporarily adjusted by the accruals (changes in all non-cash assets and liabilities) because the effective receipts and disbursements of cash may not be the best representation of firms' performance as it does not show the causal relation between advancing cash to earn more cash. Therefore:

$$Earnings = Cash\ flows + Accruals \qquad (3)$$

This means that the primary role of accruals is to overcome the abovementioned problems—related to the cash-basis accounting system—in measuring firm's performance when economic entities are in continuous operation [2]. Therefore, if accruals are used to 'adjust' cash flows in order to match positive and negative outcomes associated with the same economic event, changes in accruals will exhibit a negative autocorrelations and accruals will be negatively correlated with changes in cash flows (**Figure 2**).

Dechow et al. [12] formally modelled the accrual accounting process, relying on operating cash flows and the process by which operating cash flows' forecasts are embedded into earnings. In particular, their model not only confirms changes in operating cash flows that have a negative serial correlation, as shown by Dechow [2], but also highlights how earnings incorporate the negative serial correlation of cash flows and accruals to smooth out such correlations and become a better forecast of future operating cash flows than current operating cash flows (**Figure 2**).

2. The process of matching revenues and expenses

Accruals allow business organizations to recognize, in a certain reporting period, revenues and expenses for which they expect to obtain or spend cash, respectively, in a future reporting

period. By recognizing economic events, regardless of when cash transactions occur, the accrual accounting method offers a fair review of business transactions.

Specifically, this method requires the recognition of revenues when they are earned—for supplied goods and rendered services—and expenses when they are incurred, regardless of the time of their collection (cash inflows and outflows). The underlying assumption is based on the proper recognition of business operations that should occur by matching revenues and expenses (revenue/expense matching process) when the economic event is completed rather than when payments are made or received. This method allows the correlation between current cash flows and future expected cash receipts and disbursements in order to obtain fairer representation of a firm's economic and financial conditions.

However, the usefulness of earnings depends on its quality that, in turn, depends on the quality of its components. Given that the realized cash flows subcomponent of earning is the most reliable element of the financial reporting activity, it goes that the usefulness and the quality of earnings depend on the quality of the accrual subcomponent.

The quality of accruals can be influenced by both firm's economic fundamentals (the so called 'innate factors') and the managerial discretion embedded in their recognition [13]. Nevertheless, besides these exogenous factors, another primary issue concerns the ground rules of the accrual accounting system. Specifically, the endogenous factors that affect the quality of accruals and, in turn, the quality of earnings are represented by the two main processes which guide the production of accounting numbers under the accrual reporting system: the revenue recognition and the matching process.

Since the correlation between expenses and revenues is one of the ground rules underpinning accrual accounting, the matching process has been defined as the central purpose of accounting, becoming the basic concept in the determination of periodic income [14].

Starting from 1940, Paton and Littleton support the determination of a periodic income based on the of stewardship perspective and, therefore, they advocate the historical cost accounting relying on the assumption according to which the historical cost is a more verifiable and objective evidence. As stated by Paton and Littleton [10] '*the primary purpose of accounting, […], is the measurement of periodic income by means of a systematic process of matching costs and revenues*'. According to the authors, the usefulness of matching principle can be viewed as a necessity for periodic profit and loss calculation in order to obtain a benchmark to assess the efficiency of management. In this sense, the difference between business effort (expenses) and accomplishments (revenue) reflects management efficiency, and this information is critical for investors to assess manager's stewardship.

In their matching process, revenues are recognized under the realization principle according to which products and services need to be converted into cash, its surrogates, or other valid assets. On the other hand, the recognition of expenses requires three phases: (i) ascertaining and recoding costs as incurred; (ii) tracing and reclassifying costs in terms of operating activity; (iii) assigning costs to revenues. Therefore, the expired expenses are recorded in accounts in order to match them with the relative 'realized' revenues. However, it has to be pointed out that '*matching costs and revenues requires more than careful procedures*, [… because …] t*he revenues*

of a particular period should be charged with the costs which are reasonably associated with the product represented by such revenues' ([10], 69).

2.1. The evolution of matching process in the standard setting

The revenue/expense (or income statement) approach views the identification of revenues, expenses and earnings as the primary goal of financial reporting. In particular, the main goal is represented by the proper determination of the timing and the amounts of revenues and expenses, while the balance sheet books and values are subordinate and derivative. In such settings, the two major guiding principles are the revenue recognition and the process of matching expenses with revenues. Specifically, the main goal of the traditional matching process is the determination of the proper periodic income, while assets are not determined looking at the existence of future economic benefits, but are considered as suspended revenues that are not properly aligned to the process of matching revenues and expenses. Therefore, the aim of the financial reporting process is to book accruals, which allow to correctly represent the timing of economic benefits (revenues recognition) linking the relative expenses (matching process). Consequently, the balance sheet elements are generally the residual of such a process, with assets and liabilities that are essentially the cumulative effect of periodic accruals. As a result, in order to ensure proper matching and avoid an earnings misrepresentation, the balance sheet not only reports assets and liabilities, but also accrued costs and revenues, and deferred charges and credits [15].

In contrast, the essence of the asset/liability (or balance sheet-based) approach is based on the proper assessment of assets and liabilities as the main goal of financial reporting, with the identification and the evaluation of other accounting numbers that are considered as subsequent and derivative. The main implication of such an approach is that the recognition of income statement values and the determination of earnings are affected by the balance sheet considerations. In fact, the asset/liability approach relies on the assumption according to which the proper determination of assets and liabilities leads the determination of earnings, which are simply viewed as the change in net assets over a certain period (adjusted for distributions and contributions from equity holders)[4].

Although there is an inherent conceptual tension between these two approaches, in practice, financial accounting has always been a pragmatic compromise between them [17]. However, it has to be noted that while the revenue/expense model historically dominated theory, practice, and pedagogy until the mid-1970s, a new era for the accounting process evolution started in 1973, when the FASB became the official standard setter in USA.

In particular, the Board recognized that the revenue/expense model and the asset/liability approach are the two major alternatives for the financial reporting activity. However, in order to ensure conceptual transparency and internal uniformity, the FASB also stated that the two approaches have to be considered as alternative, avoiding a muddled compromise between

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[4]This view of earnings has strong underpinnings in economics, where it is known as 'Hicksian income'. See Brief [16] for a review of Hicks' views on accounting.

them. Relaying on such assumptions, in the late 1970s, the FASB stated that the balance sheet approach has to be considered as the only logical and conceptually sound basis of accounting and, therefore, the asset/liability approach should become the cornerstone of standard setting and financial reporting[5].

According to Dichev [17], the FASB's assumptions derive from the idea, according to which earnings should be considered as a 'change in value' and, therefore, it is not possible to determine a 'change in value' without defining the concept of value first. Therefore, the identification of assets and liabilities should represent the logical fundamental concepts that overcome the determination of earnings and, consequently, the balance sheet financial reporting approach represents the only consistent accounting system. Moreover, the revenue/expense model is conceptually doubtful, because it is based on ambiguous processes (like matching) and its application generates deferred and accrued items, which should be considered as unreliable assets and liabilities.

Building on the aforementioned assumptions, the FASB have been developing the asset/liability approach starting from a gradual process of compliance in order to align the older accounting standards to the new Conceptual Framework. Moreover, on the top of that the FASB is even pushing in support of more extreme forms of the balance sheet approach, namely with the idea that should lead to the 'fair value' accounting.

In addition to the FASB's efforts, there has also been a world-wide diffusion of the balance sheet approach that entered the heart of international standard setters too, becoming the dominant financial reporting system. Indeed, when the International Accounting Standards Committee (IASC) was founded (in 1973), it adopted a conceptual framework deeply based on the FASB's one. Then, in 2001, the IASC was replaced by the International Accounting Standards Board (IASB) that joined the FASB in coordinating their ideas and actions, adopting, in 2002, a formal memorandum known as 'The Norwalk Agreement', which details their joint commitment to convergence of US and international accounting standards. Since such process can be implemented only with shared conceptual basis, the two standard setters converge towards the asset/liability approach.

However, it has to be pointed out that the aforementioned choices of the international standard setters are also coming in for severe criticism. In particular, the critique to the standard setters is effectively summarized by Dichev [17] and is built around the four main themes:

- *the balance sheet approach is awkward, since it does not reflect how most firms operate, create value, and are managed.*

In fact, if an economic entity advances expenses to obtain resources and earns revenues, while assets have a subordinate and subsidiary role, a proper accounting system has to reflect this reality, which implies a natural and logical supremacy of the income statement approach. In such settings, the main issue related to the balance sheet approach is that it does not consider the concept of business model that plays fundamental role in determining the value-creation

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[5]Storey and Storey [18], Bullen and Crook [19] and other accounts of this decision clearly indicate that the main reason for this conclusion was the perceived conceptual supremacy of the balance sheet approach.

process and the success of a business organization. Indeed, since the firm should be considered as a process and not a pool of 'things', the value of the economic resources originates from their value-in use and not from their value-in-exchange, implying that the revenue/expense model is the natural basis for financial reporting[6].

- *The assumed conceptual supremacy of the balance sheet approach is unclear. If anything, one can argue that the concept of income provides a clearer and stronger foundation for financial reporting.*

The accounting standard setters consider the concept of 'asset' as the most important and fundamental in accounting, and other concepts as derivative and secondary to it[7]. Specifically, the FASB and the IASB maintain that asset-oriented accounting is superior to income-oriented accounting because of the need to define earnings after the definition of assets. However, they then continue to define assets in terms of expected earnings[8]. Therefore, although the standard setters seem to suggest that the two concepts can be divorced and one can be superior to the other, the point is that the concept of asset and income are inextricably connected.

- *The balance sheet approach is probably one of the main sources of the decline in the forward-looking usefulness of earnings.*

The basic idea is that outsiders use earnings as the primary source of information to evaluate existing and future investments. However, the usefulness of earnings for investors is not embedded in the definition of 'changes in assets', but is related to the concept of 'recurring earnings', which represents the best predictor of the future earnings and cash flows. Therefore, while investors perceive good earnings as a highly persistent value able to predict of future earnings, the balance sheet approach considers assets as a store of values and earnings as 'changes in net assets', implying low persistence and predictability of earnings. This means that the balance sheet approach creates earnings which are not aligned to what investors consider 'good earnings'.

- *There are considerable issues related to the implementation of the balance sheet reporting system in practice.*

Such weaknesses derive from the great managerial discretion for the inputs and, consequently, the probability of large estimation errors and/or manipulation of accounting numbers[9]. In addition, the asset/liability model (and most of all the most extreme forms of mark-to-market and fair-value accounting) creates a feedback loop between financial markets and the real economy, and may possibly lead to or exacerbate market turmoil.

In response to the criticisms to the choices of the IASB and the FASB, and therefore to the balance sheet view, some scholars highlights that the significance of the matching process is

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[6]Note that a large minority of business activities and whole businesses do follow a process of value creation which has a balance sheet orientation, and where balance sheet-based accounting is sensible (an example is a firm whose only assets are marketable securities).
[7]Cfr. Storey and Storey [18], and Bullen and Crook [19].
[8]The FASB/IASB define assets as 'probable future economic benefits obtained or controlled by a particular entity as a result of past transactions or events'.
[9]See [20].

still recognized under the asset/liability approach as well. In fact, according to Kvifte [21], the asset/liability approach has been, and to some extent still is, misunderstood, because even if there are substantial differences between the balance sheet model and the revenue/expense view, there is a trend in attempting to find differences that do not exist [19, 22]. In fact, it has been said that the purpose of the asset/liability view is to downgrade the importance of income and of the income statement by making the balance sheet more important than the income statement [23]. Others have claimed that the intent of the asset/liability model is to supplant accounting based on completed transactions and matching of expenses and revenues with an accounting based on the valuation of assets and liabilities at current or fair values, labelling it as a 'valuation approach' [18]. However, according to Healy and Wahlen [24], the leading standard-setters do not ignore the emphasis on performance measures of the primary users of financial reports, and the conflict is rather how to achieve the best performance measures. In fact, given that the FASB states that the issue is how income is manifested (FASB, 2004a), Kvifte [21] concludes that the importance of net income is therefore not a matter of disagreement between the two groups.

Moreover, it has to be noted that although the matching process is considered as the basic concept of the income statement approach in the revenues and expenses' recognition method, according to the IASB and the FASB conceptual frameworks, it may also play a role in the asset/liability approach. However, matching is modified by the definition of asset and liability, given that costs has to be expensed in the same period as the revenues that result from the expenditures, but only to the extent that the relative balance-sheet items meet the asset/liability definitions (IASB, 1989).

Overall, whether the spread of the asset/liability approach has sidelined the concept of matching, or it has simply modified its application, the impact of such changes on the quality of accounting numbers is still an empirical matter.

3. Trends in the degree of matching

Although it was a broadly analysed topic until the 1970s, there has been little research effort aimed at matching in the last 20 years [3].

According to Dichev and Tang [3], one of the reasons related to this lack of research is that in earlier years the dominant paradigm of market efficiency implied that the market fully relays on accounting conventions and practices aimed to measure firms' performance. In fact, it is only quite recently that there has been a renewed interest into fundamental analysis, that is a research stream related to the study of whether and how the knowledge on accounting yields superior insights into firm performance and security valuation (e.g. [25–28]; and others)[10].

Another reason for the relative lack of research about the matching process is the aforementioned evolution of accounting standards. Indeed, while early standards recognized the

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[10]Dechow and Schrand [29] provide a useful overview of this research stream.

importance of matching on both conceptual and practical level, during the last two to three decades the FASB and the IASB have adopted a perspective where the determination of income is viewed more as resulting from revisions of asset and liability values rather than as the residual from revenues and matched expenses [18].

In the spirit of fundamental analysis, it seems that the study of matching, and its determinants and consequences, can be viewed as a further step into enriching the knowledge about the determination and the properties of earnings. In particular, there are three studies that are close to the spirit of this kind of research. Such strand comprises Su [30] and the related studies of Lane and Willet [31] and Gibbins and Willet [32].

The *fil rouge* of these studies is based on the idea according to which a proper matching of revenues and expenses has a smoothing effect on earnings that is beneficial because it allows for better estimation of long-run economic profitability. Therefore, they conclude that matching, as well as conservatism and other accounting practices, are not merely ad hoc or traditional rules which accountants arbitrarily apply, but have rational bases in the sense that they can allow a better decision-making process [30].

Recently, through an historical retrospective on matching, which includes a review of more contemporary research and thought, Zimmerman and Bloom [33] also confirm that matching, as an approach to income measurement, can be helpful in forecasting earning power. Consequently, they conclude that matching should be retained as a long-standing fundamental accounting principle in standard-setting and in practice.

Moving from the studies that support matching principle as a desirable practice that allows to obtain more useful and informative accounting numbers, and motivated by the aforementioned relative lack of recent research aimed at matching, some authors have tried to deepen the knowledge about this topic analysing trends, and potential determinants and consequences.

The reference study in this 'new' field is the analysis of Dichev and Tang [3], who present a theory of matching and its effects on accounting variables. The principal insight of the theory is that poor matching acts as noise in the economic relation of advancing expenses to earn revenues. Empirically, they concentrate on time-series specifications using a sample composed by the 1000 largest US firms (for 34,785 observations) from 1967 to 2003, and measure matching as the coefficient (γ_2) on current expenses in a regression of revenues on past, current, and future expenses.

$$Rev_{i,t} = \gamma_0 + \gamma_1\, Exp_{\,i,(t-1)} + \gamma_2\, Exp_{\,i,t} + \gamma_3\, Exp_{\,i,(t+1)} + \varepsilon_{i,t} \qquad (4)$$

Findings reveal a clear and economically substantial declining trend in the contemporaneous correlation between revenues and expenses, and an increase in the non-contemporaneous correlation between revenues and expenses. Therefore Dichev and Tang [3] highlight a decline in matching, such that an increasing amount of expenses is being recognized before and after the period in which it affects revenues (**Table 1**).

Year	Coefficient on past expenses	Coefficient on current expenses	Coefficient on future expenses
1967	−0.010	1.029	−0.013
1968	−0.014	1.044	−0.015
1969	−0.004	1.030	−0.012
1970	0.002	1.042	−0.033
1971	0.026	1.003	−0.016
1972	0.010	1.089	−0.077
1973	0.063	0.939	0.020
1974	−0.053	1.106	−0.038
1975	0.023	1.061	−0.066
1976	0.028	0.991	0.005
1977	−0.001	1.015	0.007
1978	−0.007	1.053	−0.022
1979	−0.007	1.027	0.006
1980	−0.021	1.070	−0.028
1981	0.063	0.965	−0.010
1982	−0.017	1.054	−0.024
1983	−0.016	1.087	−0.056
1984	0.051	0.972	0.003
1985	0.016	1.013	−0.013
1986	0.039	0.937	0.038
1987	0.145	0.762	0.111
1988	−0.013	1.032	0.007
1989	0.066	1.003	−0.053
1990	0.101	0.932	−0.018
1991	0.176	0.802	0.028
1992	0.117	0.871	0.029
1993	0.168	0.691	0.152
1994	0.033	0.986	0.006
1995	0.029	0.979	0.018
1996	0.020	1.000	0.006
1997	0.093	0.894	0.038
1998	0.032	0.977	0.016
1999	0.081	0.952	−0.005
2000	0.042	1.015	−0.037
2001	0.464	0.533	−0.012

Year	Coefficient on past expenses	Coefficient on current expenses	Coefficient on future expenses
2002	0.092	0.715	0.204
2003	0.132	0.797	0.091
Mean 1967 to 1985	0.007	1.031	−0.020
Mean 1986 to 2003	0.101	0.882	0.034
Difference	0.094	−0.149	0.055
P-Value on Difference	<0.001	<0.001	0.002

Revenues, is net revenues deflated by average assets for the current period.
Expenses, is the difference between *Revenues* and *Earnings* for the current period.
Expenses$_{t-1}$ is the difference between *Revenues* and *Earnings* for the previous period.
Expenses$_{t+1}$ is the difference between *Revenues* and *Earnings* for the next period.
The regression is run on a cross-sectional basis each year.
P-value on the differences is obtained forma two-tailed t-test.
Source: Dichev and Tang [3].

Table 1. Regression of revenues on previous, current, and future expenses.

Period	Exp_{t-1}	Exp_t	Exp_{t+1}
1967–1985	0.002	1.032	−0.030
1986–2005	0.089	0.895	0.025
Difference	0.087	−0.137	0.055
P-Value on difference	<0.001	<0.001	<0.001

This table presents properties of earnings-related variables between two time periods, 1967–1985 and 1986–2005. Annual coefficients are obtained estimating the Dichev and Tang [3] model each in both time periods.
Source: Donelson et al. [4].

Table 2. Relation of revenues to lagged, current, and future expenses.

Similar trends in the evolution of matching have been documented by other subsequent studies. Specifically, Donelson et al. [4] selected a sample which consists of 32,645 US firm-year observations between 1967 and 2005, and that is generally consistent with the sample in Dichev and Tang [3]. Next, they estimate a cross-sectional regression which is identical to the regression model reported in Dichev and Tang [3]. As described in such study, Donelson et al. [4] documented a decline in the contemporaneous association of revenue and expense, and an increase in the lag (lead) coefficient (**Table 2**).

Murdoch and Krause [34] also analysed the US market but they began their investigation with 1987 data and, to allow for comparisons with earlier research, extend the analysis period through 2005, including all firms for which pertinent data are available rather than limiting the sample to large firms. In order to assess the degree of matching, Murdoch and Krause [34] observe the correlation between revenues and two expenses measures from the 1987 to 1996 period and compare it to the correlation for the 1997–2005 period, adopting the same methodology of Dichev and Tang [3]. As a result, their findings also highlight a worsening in the degree of matching between revenues and expenses recognized in the same period.

Still focusing on US settings, Bushman et al. [35] built a sample that consists of 228,847 firm-year observations from 1964 to 2012 and, still employing the same technique used in Dichev and Tang [3], confirm the declining trend in matching between revenues and expenses as documented in previous studies.

Further, using a sample composed by 189,608 US firm-year observations with valid data from the years 1970 through 2009, Srivastava [5] replicates the model proposed by Dichev and Tang [3] and obtain similar results in terms of declining matching between current revenues and expenses. Moreover, splitting the sample in two groups of firm he shows that for the new-firm segment, the average matching declines from 1.05 to just 0.59, while the average revenue-expense matching of the seasoned-firm segment declines by much less, from 1.05 to 0.94. As a result, he confirms a declining trend in matching current revenues and expenses, but also highlights that, relative to the seasoned-firm segment, the average matching for the new-firm segment's is 37% lower.

In the same year, Kagaya [36] examine changes in the relation between revenues and expenses over the last 16 years around the world. In particular, the final sample consists of 282,873 firm-year observations for the fiscal years 1991–2008, relative to 30,537 non-financial firms across nine countries (Canada, China, Germany, France, India, Japan, Korea, the UK, and the USA) which, in turn, are clustered in different cultural areas according to the definition of cultural area from Djankov et al. [37]. Referring to the matching measures proposed by Dichev and Tang [3], Kagaya [36] confirms that the correlation between revenue and expense has declined around the world (**Figure 3**), and shows that such a trend is stronger among the English speaking countries (**Figure 4**).

Along the lines of these studies, He and Shan [38] measure matching by the contemporaneous correlation between revenues and expenses. Relying on a sample that includes 42 countries, they estimate the annual matching coefficient from 1991 to 2010, and find that the decline in
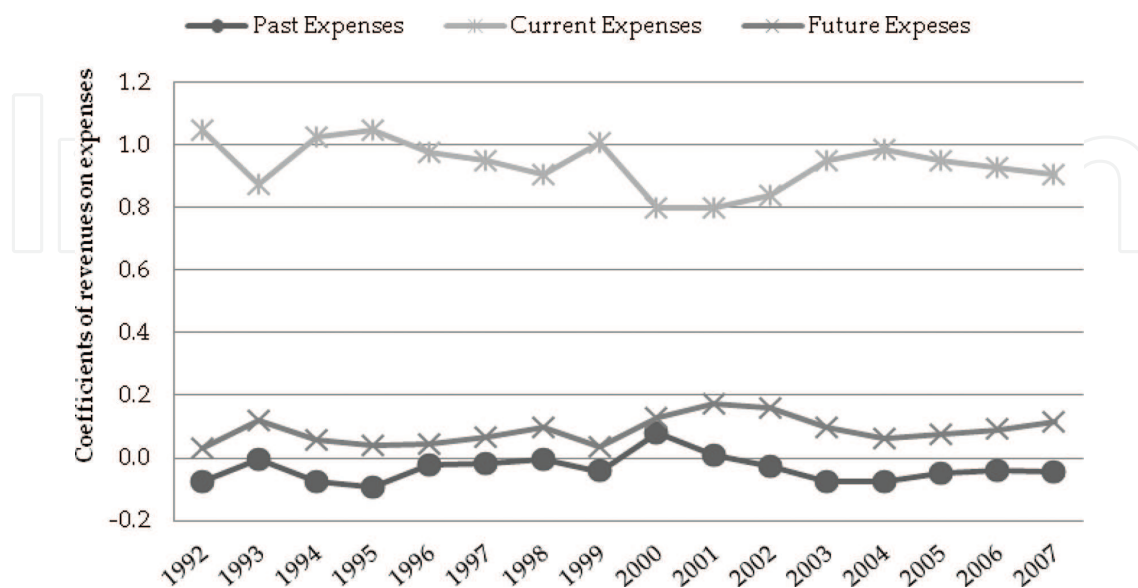
Figure 3. Coefficients in regression of revenues on past, current, and future expenses. Source: Kagaya [36].
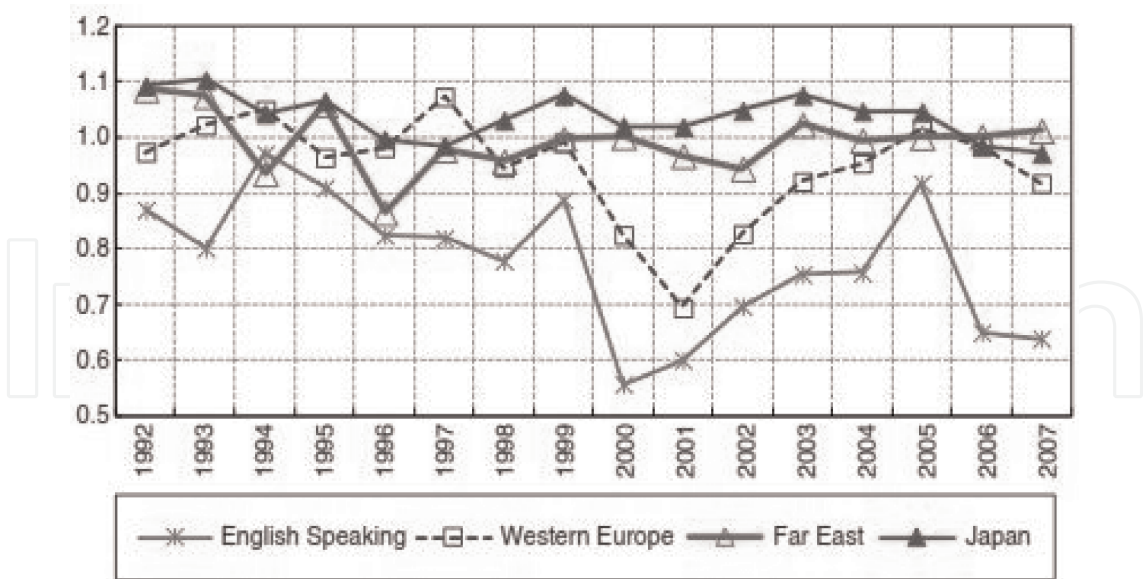
Figure 4. International comparison of the correlation between revenues and current expenses. Source: Kagaya [36].

matching is not unique to the United States, but a worldwide phenomenon during this period (**Figure 5**).

The only dissenting voice in this strand of research belongs to Jin et al. [39], who examine changes in the matching between contemporaneous revenues and expenses in Australian financial reporting. Specifically, relying on Dichev and Tang [3] their results indicate that the revenue-expense relation has declined in Australia during 2001–2005, but improved in more recent years (**Figure 6**).

Overall, looking at these studies focused on the identification of trends in the degree of matching, it seems clear that the major issue is related to a worsening of the relation between
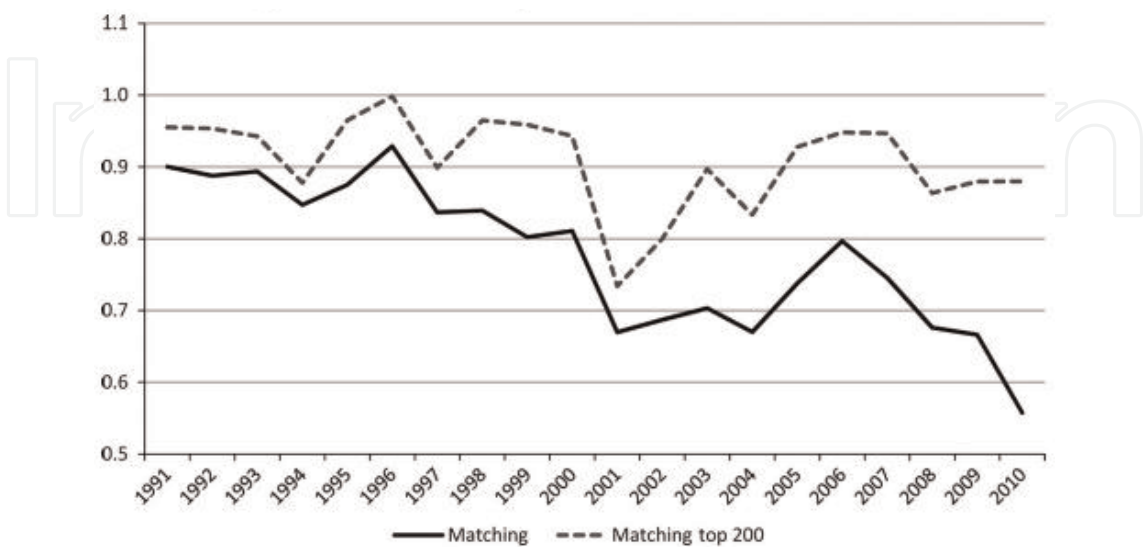

Figure 5. Matching between current revenues and expenses over time. Source: He and Shan [38].
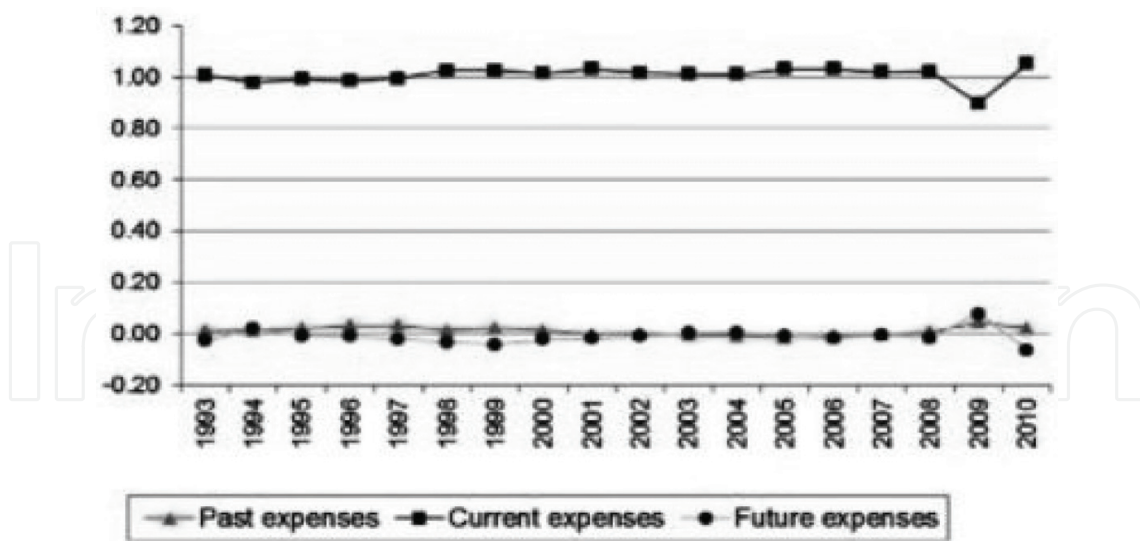
Figure 6. Correlation between current revenues and expenses in Australia. Source: Jin et al. [39].

current revenues and expenses, which has been documented in different settings with the only exception of the Australian one, examined by Jin et al. [39]. However, the mere detection of these changes could be not fully revealing without a careful analysis of both possible determinants and consequences related to such declining trend in one of the milestones of accrual accounting, such as the process of matching revenues and expenses.

### 3.1. Determinants of changes in the degree matching

According to Dichev and Tang [3], the possible determinants of the combined evidence that suggests a worsening of accounting matching over time can be identified in both the accounting system evolution and innate economic factors.

The reason underpinning this idea is due to the behaviour of accounting standard setters that, since the late 1970s, have taken a deliberate and far-reaching turn away from matching as the fundamental concept in the determination of earnings and towards a more balance sheet-based model of the determination of income[11]. On the other hand, the authors are also aware that changes in the real economy, towards more fixed costs and R&D activities, can also imply a temporal decline in matching success, and that there is little that financial reporting can do about the nature of these changes *per se*. However, Dichev and Tang [3] suggest that changes in the real economy have played a secondary role in the evolution of the properties of earnings. In addition, the authors state that if the point is 'what can be done to counter the effect of these changes on the informativeness of earnings', then the answer and the discretion lie again in the design of the financial reporting system and its relevant bodies.

Anyway, besides such theoretical aspects, the conclusions of Dichev and Tang [3] are not merely conjectures, inasmuch they rely on the empirical evidence of their analysis. However,

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[11]See Dichev [17] for a better understanding of this topic.
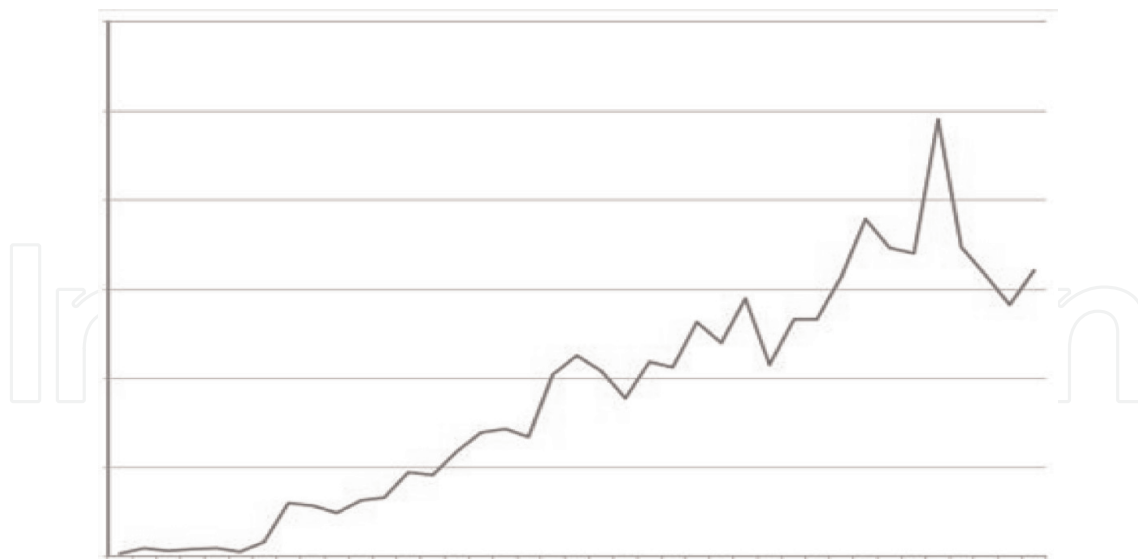
Figure 7. Correlation between current revenues and expenses in Australia. Source: Donelson et al. [4].

to date, Dichev and Tang [3] remain the only ones who ascribe the declining in matching to the accounting system's ground rules.

In fact, Donelson et al. [4], using a simple decomposition framework, show that the decline in the relation between current revenues and expenses is attributable primarily to a single income state-ment line item, namely special items, and not to systematic issues across multiple line items in the income statement. Moreover, since the 'weight' of special items as a component of total expenses has increased with the incidence of special items over time, decreasing the relation between current revenues and total current expenses, empirical evidence suggests that changes in the frequency of economic events associated with special items have played a more important and sustained role relative to the role played by the adoption of individual accounting standards (**Figure 7**).

Results from Donelson et al. [4] are then indirectly confirmed by Murdoch and Krause [34], who conclude that recurring earnings (that does not include the effect of special items) are preferred to an earnings number that includes the impact of special items.

An alternative explanation, to the declining in the relation between revenues and expenses, is offered by Srivastava [5]. In particular, he highlights that, in his sample, each new cohort of listed firms exhibits a lower degree of matching than its predecessors, mainly because of higher intangible intensity. Therefore, Srivastava [5] concludes that the trend of decline in matching is due more to changes in the sample of firms than to changes in generally accepted accounting principles or in the quality of matching process of previously listed firms (**Table 3**).

A totally different position from Dichev and Tang [3] is also assumed by He and Shan [38], who analyse the impact of IFRS adoption on matching and do not find any significant result, excluding that changes in reporting system have a primary role in determining changes in the degree of matching between current revenues and expenses. In addition, they analyse several economic factors as potential determinants of matching, such as the proportion of firms reporting large special items, the national economic growth, the weight of the service industry

Year	Total firms	Seasoned firms	Seasoned firms (%)	Year	Total firms	Seasoned firms	Seasoned firms (%)
1970	2470	2304	93.28	1990	4684	944	20.15
1971	2786	2263	81.23	1991	4868	935	19.21
1972	2975	2219	74.59	1992	5098	921	18.07
1973	3121	2169	69.50	1993	5319	905	17.01
1974	3206	2108	65.75	1994	5713	873	15.28
1975	3213	2051	63.83	1995	6166	847	13.74
1976	3214	1977	61.51	1996	6593	813	12.33
1977	3105	1886	60.74	1997	6578	757	11.51
1978	3051	1806	59.19	1998	6635	705	10.63
1979	3247	1731	53.31	1999	6500	651	10.02
1980	3510	1657	47.21	2000	6347	605	9.53
1981	3656	1587	43.41	2001	6399	586	9.16
1982	4109	1533	37.31	2002	6183	561	9.07
1983	4273	1428	33.42	2003	6076	546	8.99
1984	4396	1348	30.66	2004	5852	524	8.95
1985	4526	1257	27.77	2005	5755	510	8.86
1986	4544	1186	26.10	2006	5597	472	8.43
1987	4661	1098	23.56	2007	5482	455	8.30
1988	4629	1024	22.12	2008	5344	443	8.29
1989	4636	970	20.92	2009	5091	431	8.47

All of the firms with a listing year before 1970 are classified as 'seasoned firms'.
Source: Srivastava [5].

Table 3. Number of seasoned firms.

in a country's gross domestic product (GDP), and the intensity of R&D activities. Specifically, findings highlight that the degree of matching between contemporaneous revenues and expenses is weaker in countries where many firms report significant special items, GDP growth rates are low, more R&D activities are present, and the service sector accounts for a larger portion of the economy. Therefore, these results support the view that real economic factors are important determinants of matching. Finally, He and Shan [38] also consider whether country-level governance quality affects matching between revenues and expenses, and show that the contemporaneous revenue-expense relation is weaker in countries with common law legal origins and stronger investor protections. However, in these countries, there is a stronger association between past expenses and current revenues, implying that expenses are more likely to be recognized before the associated revenues[12].

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[12]This finding is consistent with Ball et al. [40], and Bushman and Piotroski [41], who report that asymmetric loss recognition, a commonly used measure of accounting conservatism, is greater in countries with stronger investor protection.

Period	Earnings volatility	Revenues volatility	Expenses volatility	Correlation rev. – exp.
Mean 1967 to 1985	0.014	0.101	0.094	0.973
Mean 1986 to 2003	0.021	0.093	0.088	0.914
Difference	0.007	−0.008	−0.005	−0.059
P-Value on difference	<0.001	0.057	0.140	<0.001

Period	Earnings persistence		Autocorrelation in earnings changes	
Mean 1967 to 1985	0.855		0.019	
Mean 1986 to 2003	0.705		0.234	
Difference	−0.150		−0.215	
P-Value on Difference	<0.001		<0.001	

Source: Dichev and Tang [3].

Table 4. Volatility and persistence of earnings, and autocorrelation in earnings changes.

Even more diametrically opposite to Dichev and Tang [3], there is the study of Jin et al. [39]. In fact, as viewed in the previous paragraph, they detect an increasing trend of matching between contemporaneous revenues and expenses for the Australian context, but only after the mandatory adoption of IFRS. Therefore, they suggest that changes in accounting rules have positively affected the matching process effectiveness.

Overall, a wide range of determinants has been proposed in order to justify the detected trend of matching and there seems to be no prevailing ideas among them.

3.2. Consequences of changes in the degree of matching

In addition to the determinants of changes in matching effectiveness, another fundamental issue is the analysis of the consequences of the modified degree of correlation between revenues and expenses.

The essence of the milestone of this research stream [3], is that mismatched expenses act as noise in the economic relation of advancing expenses to earn revenues, and therefore poor matching decreases the contemporaneous correlation between revenues and expenses. However, Dichev and Tang [3] also documented an increased volatility of earnings, a declining persistence of earnings, and an increased negative autocorrelation in earnings changes (**Table 4**)[13].

Therefore, looking at the combined evidence of their study, Dichev and Tang [3] suggest that accounting matching has become worse over time and that this trend had a pronounced effect on the properties of resulting earnings. Therefore, since earnings are the most widely used

[13]Dichev and Tang [3] also highlight that there are none of these temporal patterns in cash-based measures of revenues, expenses, and earnings.

accounting number, these results also suggest that a consideration of degree of matching effectiveness can bring useful insights to financial reporting users.

The same view can be detected in Murdoch and Krause [34], who employ a cash flow prediction criterion to investigate whether the decrease in matching has compromised earnings' usefulness in forecasting future cash flows. In particular, their results indicate that earnings from earlier periods, in which matching was better, can be used to make more accurate predictions of operating cash flows, relative to earnings from later periods with poorer matching. Therefore, Murdoch and Krause [34] conclude that the documented decline of matching damages the ability of earnings to aid in the prediction of future cash flows, thus being at odds with the primary purpose of financial statements.

A different position is assumed by Bushman et al. [35], who examines the timing role of accrual accounting and show that the timing role of accruals has dramatically declined over the past 50 years and has largely disappeared in more recent years. However, in exploring several potential reasons for such observed attenuation, they find that the decline in matching between revenues and expenses is less drastic than the decline in the timing role of accrual accounting. Furthermore, they highlight that the effect of the mismatch on the attenuation of the timing role of accruals is subsumed by the effect of the changes in cash flow volatility[14]. This means that Bushman et al. [35] do not believe that a worsening in the degree of matching affects one of the basic functions of accrual accounting.

Srivastava [5], on his own, analysed some determinants of the deterioration of the quality of earnings, considering matching as one of the of earnings quality components. However, although he confirms that there has been a decline in matching between revenues and expenses, he fails in neglecting the possibility that matching, as a ground rule of accrual accounting, could act as a moderator between the determinant of the documented erosion of earnings quality and the earnings quality measures and attributes. Consequently, the analysis is not able to prove if the downward trend of matching could have had some consequences on the quality of accounting numbers.

Going on, Kagaya [36] investigates the relation between earnings smoothness and matching, and analyses the relation between current accruals, and current and next cash flows from operations. Evidence shows that the degree of matching is positive related to the stability of earnings. Therefore, Kagaya [36] states that matching contributes to the presentation of permanent incomes, controlling for the volatility of earnings. Moreover, his results suggest that the accrual process, supported by matching and accruals, improves earnings smoothing and the signalling ability of future cash flows.

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[14]Empirical results are consistent with the idea that the decline in the matching between revenues and expenses over time contributes to the loss of the timing role of accrual accounting. However, the coefficient on the matching trend variable remains negative and statistically significant (revealing that that only about 19% of the timing role decline is related to documented mismatch between revenues and expenses) and it becomes statistically insignificant, whereas the coefficient on cash flow volatility remain highly significant.

Overall, among these studies, that analyse the effects following the declining in matching revenues and expenses, the prevailing idea is that a higher degree of matching is a desirable quality to obtain more informative and useful earnings.

4. Conclusion and remarks

Despite the assumption according to which the accrual reporting system provides better performance measures and useful accounting information through earnings, previous literature on this topic has highlighted very mix findings due to the great heterogeneity of analysed settings. Moreover, it has to be noted that the usefulness of accounting numbers depends primary on their quality that in turn can be influenced by both exogenous factors (firms' economic fundamentals and managerial discretion) and endogenous factors (the reporting system's ground rules), to be considered as determinants of earnings quality.

In connection with the endogenous factors, a niche strand of research has shown a renewed interest into fundamental analysis and highlights that there has been a considerable downward trend in the effectiveness of the basic rules of accrual accounting: revenue recognition, matching and timing. However, even if there are not so many scholars that joined this topic, the heterogeneity in results and ideas is quite deep, especially with regard to the determinants and the consequences of the detected declining trends. In particular, changes in the accounting systems can be considered as the most compelling and controversial topic, when analysed in connection with the quality of accounting numbers and its fundamentals.

In connection with this, it has to be noted that financial accounting figures have always been the result of a pragmatic compromise between two basic approaches: the 'revenue/expense' and the 'asset/liability' ones [17]. However, during the last decades, the emphasis of financial reporting standards has been gradually shifting from the former approach to the latter [42].

In particular, the 'asset/liability' view is described as the only logical and conceptually sound basis of accounting [18, 19, 43]. In fact, since the late 1970s, a movement towards the 'asset/ liability' approach has been strongly supported by the Financial Accounting Standards Board and rapidly embraced by many other national standard setters, like Australia, Canada, New Zealand and UK [44]. In this view, the definition of assets and liabilities also represents the fundamental building block in the International Accounting Standards Board's Conceptual Framework [45]. Therefore, the presence of the 'revenue/expense' model has narrowed all over the world, together with the adoption of, or convergence towards, International Financial Reporting Standards [36].

In response to the clear position taken by regulators, national and international standard setters, several scholars have stressed theoretical and empirical drawbacks associated with the 'asset/liability' approach. In fact, it seems that the alleged conceptual superiority of the balance sheet is unclear, while it contrasts with how most businesses operate and create value: advancing expenses to generate revenue and earnings [17, 21]. At the same time, according to Dichev and Tang [3], by worsening the revenue-expense matching process, the constant shift towards an 'asset/liability' model seems to have lowered the earnings quality of US listed

companies over the past 40 years, causing a marked deterioration in the forward-looking informativeness of earnings.

However, few scholars have challenged the conclusions reached by the aforementioned authors, as they ascribe the prolonged decline in the 'matching' between contemporaneous revenues and expenses to changes in the economic environment, rather than to changes in the accounting standards [4, 5].

Therefore, given that this topic is still an empirical matter and far from being undisputed, there are many rooms for future studies in order to deepen the consequences of a change in the financial reporting system on the effectiveness of the process of matching expenses with revenues. Further, other important issues to be considered should aim to assess the effect that the possible different degree of matching could have on the quality of accounting numbers, controlling for a set of variables that might affect both matching process and earnings quality.

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