THE EFFECTIVENESS OF THE MATCHING PRINCIPLE IN DIFFERENT FINANCIAL REPORTING SYSTEMS AND ITS IMPACT ON THE QUALITY OF EARNINGS

Pietro Fera *

* *Corresponding author*, Department of Economics, University of Campania "Luigi Vanvitelli", Italy
Contact details: Department of Economics, University of Campania "Luigi Vanvitelli", C.so Gran Priorato di Malta, 81043, Capua, Caserta, Italy

OPEN ACCESS

How to cite this paper: Fera, P. (2019). The effectiveness of the matching principle in different financial reporting systems and its impact on the quality of earnings. *Corporate Ownership & Control, 16(3),* 129-142. http://doi.org/10.22495/cocv16i3art11

ISSN Online: 1810-3057
ISSN Print: 1727-9232

Received: 30.03.2019
Accepted: 28.05.2019

JEL Classification: M40, M41, M1
DOI: 10.22495/cocv16i3art11

Abstract

In the last decade, there has been a renewed interest in the fundamentals of accounting, highlighting a considerable downward trend in the effectiveness of the matching process. Therefore, this study analyses how changes to the financial reporting system (revenue/expense vs. asset/liability) affect the degree of matching and assesses the relationship between the latter and the quality of accounting numbers. Focusing on private firms in the Italian institutional settings, this paper highlights how the switch from a revenue/expense model (as proxied by the Italian GAAP) to an asset/liability approach (as proxied by the IAS/IFRS) has clearly worsened the level of matching between current revenue and expenses. Moreover, this study analyses if quality of the accounting numbers is systematically influenced by the degree of matching effectiveness through a direct correlation and highlights that the degree of matching is positively related to the predictability and persistence of earnings, while having a negative correlation with earnings volatility. This stresses the positive impact of such basic reporting processes on the quality of accounting numbers. These findings are particularly relevant for regulators, standard setters and academics, since they provide further insights for the debate on the accounting harmonisation process and represent an additional call for further research into this topic.

Keywords: Matching Process, Financial Reporting System, Asset/Liability, Revenue/Expense, Earnings Quality, Private Firms

1. INTRODUCTION

Earnings are the primary product of accrual accounting and are used as a better measure of performance (Graham et al., 2005).

However, the usefulness of earnings depends on their quality, which in turn depends on the quality of their components. Given that the realised cash flows sub-component of earnings is the most reliable part of the financial reporting activity (Lee, 1985; Charitou & Ketz, 1991; Lawson, 1992; Bernstein, 1993; Lee, 1993; Dechow, 1994; Dechow et al., 1998), the usefulness and the quality of earnings depend on the quality of the accrual sub-component. In particular, the quality of accruals can be influenced by both the firm's economic fundamentals and the managerial discretion (Guay et al., 1996; Healy, 1996; Subramanyam, 1996; Dechow and Dichev, 2002; Francis et al., 2005).

Besides these exogenous factors, another primary issue concerns the endogenous features of financial reporting, namely the ground rules of the accrual accounting system: the revenue recognition and the matching process.

Regarding the endogenous factors, a niche strand of research shows that there has been a considerable downward trend in the effectiveness of the basic principles of accrual accounting: revenue

recognition, matching, and timing (Dichev & Tang, 2008; Donelson et al., 2011; Murdoch & Krause, 2012; Srivastava, 2014; Kagaya, 2014; Bushman et al., 2016; He & Shan, 2016). However, regarding the determinants and consequences of the detected declining trends within the fundamentals of accrual accounting, the heterogeneity in the results and ideas is profound, especially the effects of changes in the accounting system (Dichev & Tang, 2008; Jin et al., 2015; Bushman et al., 2016; He & Shan, 2016).

Since this topic is still an empirical matter far from being undisputed, this study develops an understanding of the consequences of a change to the financial reporting system on the effectiveness of the process of matching expenses with revenue. Further, it assesses the effect that possible differences in the degree of matching could have on the quality of accounting numbers, controlling for a set of variables that might affect both the matching process and earnings quality.

This study focuses on the Italian institutional settings to compare the effectiveness of matching and its impact on the quality of accounting numbers for a group of private firms adopting an asset/liability approach (as proxied by the IAS/IFRS) versus firms reporting under a revenue/expense model (as proxied by the Italian GAAP). In fact, the recent and almost worldwide adoption of the IAS/IFRS has contributed to the spread of the asset/liability reporting system (Camfferman & Zeff, 2007; Kagaya, 2014), creating an ideal (and still unexplored) setting that allows an analysis of how the switch from a revenue/expense to an asset/liability reporting system could have affected the fundamentals of accrual accounting. Since the Italian accounting system is traditionally oriented towards a revenue/expense model (Nobes, 2001; Corbella & Florio, 2010; Alexander et al., 2012) the analysis of the Italian context provides a better appreciation of the effect of the switch from a specific financial reporting system to one which has sharp differences in its basic rules.

After controlling for a set of variables that can affect the financial reporting process, this study highlights how the switch from a revenue/expense model (as proxied by the Italian GAAP) to an asset/liability approach (as proxied by the IAS/IFRS) has worsened the level of matching between contemporaneous revenues and expenses. Moreover, findings from this study reveal that there is a strong relationship between the degree of matching and the quality of accounting numbers, as proxied by predictability, persistence, and volatility of earnings. Specifically, empirical findings suggest that the degree of matching is positively related to the predictability and persistence of earnings, while having a negative correlation with earnings volatility.

This study contributes to the accounting literature in several ways. First, it collects new empirical evidence about a still partially unexplored topic, by extending the analysis concerning the relationship between the financial reporting models (revenue/expense versus asset/liability) and the effectiveness of the process of matching revenues and expenses. Second, although some previous studies have already analysed the impact of the IAS/IFRS on the matching process and other earnings attributes, none (except for a working paper from Moscariello et al., 2016) have explicitly considered the asset/liability nature of the international standards or examined their impact within an institutional setting traditionally characterised by a revenue/expense approach. Third, this is one of the first studies to investigate the effects of different financial reporting models on basic accounting rules (Dichev & Tang, 2008; Jin et al., 2015; Bushman et al., 2016; He & Shan, 2016). It is also the first study that directly links such ground rules to the earnings attributes of private firms, thereby contributing to the debate on the effects of the accounting harmonisation process for non-listed companies.

The remainder of the paper proceeds as follows. The next section outlines the background relative to the trends in the degree of matching effectiveness, with its determinants and consequences, and develops the research hypotheses. Section 3 presents the research setting, the methodological issues, and the sampling process. Sections 4 and 5 define the variables and modes, describe the research methodology, and discuss the empirical evidence. Finally, the conclusions are outlined in Section 6.

2. BACKGROUND AND DEVELOPMENT OF HYPOTHESES

Although it was a broadly analysed topic until the 1970s, there has been little research effort aimed at the study of matching in the last 20 years because of both the market efficiency paradigm and the evolution of accounting standards (Dichev & Tang, 2008). In fact, the renewed interest in fundamentals analysis is only quite recent and aims to determine whether and how the accounting knowledge yields superior insights into firm performance and security valuation (e.g., Fairfield et al., 1996; Sloan, 1996; Piotroski, 2000; Nissim & Penman, 2001).

In the spirit of fundamentals analyses, the study of matching, and its determinants and consequences, represents a further step towards enriching the knowledge about the determination and properties of earnings. This research strand consists of Su (2005) and the related studies of Lane and Willett (1999) and Gibbins and Willett (1997). The *fil rouge* of these studies is based on the idea that a proper matching of revenues and expenses has a smoothing effect on earnings that allows for better estimates 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 lead to better decision-making processes (Su, 2005). Recently, Zimmerman and Bloom (2016) confirmed that matching could be helpful in forecasting earning power and state that it should be retained as a long-standing fundamental accounting principle in standard setting and in practice.

2.1. Trends in the degree of matching effectiveness

Starting from studies that support the matching principle as a desirable practice that helps to obtain more useful and informative accounting numbers, and motivated by the aforementioned lack of recent research into study matching, some authors have tried to deepen the knowledge of this topic by

analysing trends, and any potential determinants and consequences.

Dichev and Tang (2008) suggest that poor matching acts as noise in the economic relation of advancing expenses to earn revenues and detect a decline in matching based on a sample of U.S. firms: an increasing amount of expenses have been recognised before and after the period at which it affects revenues.

Building on Dichev and Tang (2008), similar trends have been documented by Donelson et al. (2011), Murdoch and Krause (2012), Srivastava (2014), and Bushman et al. (2016). Specifically, still focusing on U.S. settings, they provide supporting evidence for a decline in the contemporaneous association of revenues and expenses, and an increase in the lag (lead) coefficient. In addition, Kagaya (2014), and He and Shan (2015) also confirm that the worsening in the correlation between contemporaneous revenues and expenses is a worldwide phenomenon, especially among the English speaking countries. The only dissenting voice belongs to Jin et al. (2015), who examined changes in matching within the Australian context and revealed that the revenue-expense relation declined in Australia during 2001-2005, but has improved in more recent years.

However, the mere detection of these trends is not that revealing without an analysis of both the possible determinants and consequences that relate to such a widespread declining trend in the effectiveness of the process of matching revenues and expenses.

2.2. Determinants of changes in the degree of matching effectiveness

According to Dichev and Tang (2008), the possible determinants of the combined evidence that suggest a worsening in accounting matching over time can be identified in both the accounting system evolution and innate economic factors. However, their paper suggests that changes in the real economy have played a secondary role in the evolution of the properties of earnings.

To date, Dichev and Tang (2008) remain the only researchers who ascribe the decline in matching to the accounting system's ground rules. In fact, Donelson et al. (2011) suggest that changes to the frequency of economic events associated with special items have played a more important role than the adoption of individual accounting standards. Murdoch and Krause (2012) also conclude that recurring earnings are preferred to an earnings number that includes the impact of special items. Srivastava (2014), instead, highlights that each new cohort of listed firms exhibits a lower degree of matching than its predecessors, mainly because of higher intangible intensity. Therefore, he concludes that the trend in the decline in matching is due more to changes in the sample of firms than to changes in the generally accepted accounting principles or in the quality of the matching process of previously listed firms. He and Shan (2015) also reject the idea that changes in reporting systems have a primary role in determining changes in the degree of matching, finding that the downward trend is due to other factors (i.e., more special items, low GDP growth rates, more R&D activities). Further, He and Shan (2015) also show that the contemporaneous revenue-expense relation is weaker in countries with legal origins in common law and stronger investor protection. Finally, relying on an increasing trend in matching in the Australian context after the mandatory adoption of mandatory IFRS, Jin et al. (2015) suggest that changes in accounting rules have positively affected the effectiveness of the matching process.

Overall, beside the changes in the financial reporting system, a wide range of determinants has been proposed to justify the declining trend in matching and there seems to be no prevailing ideas. For these reasons, the first hypothesis is stated in its alternate form:

H1: ceteris paribus, the switch from a revenue/expense model to an asset/liability approach does not systematically affect the effectiveness of the process of matching contemporaneous revenues and expenses.

2.3. Consequences of changes in the degree of matching effectiveness

Dichev and Tang (2008) documented an increased volatility in earnings, a declining persistence of earnings, and an increased negative autocorrelation in earnings changes. Therefore, they suggest that accounting matching has worsened over time and that this trend has affected the properties of the resultant earnings. Murdoch and Krause (2012) agree, and highlight how the documented decline in 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. Moreover, Kagaya (2014) shows that the degree of matching is positively related to the stability of earnings, improving the earnings smoothing and the signalling ability of future cash flows.

On the other hand, Bushman et al. (2016) show that the decline in matching is less drastic than the decline in the timing role of accrual accounting, highlighting that the effect of the mismatch on the attenuation of the timing role of accruals is subsumed by the effect of cash flow volatility.

Finally, Srivastava (2014) fails in neglecting the possibility that matching, as a ground rule of accrual accounting, can act as a moderator. Moreover, he fails to prove if the downward trend in matching has consequences for the quality of accounting numbers.

Overall, the previous literature does not come up with a prevailing view regarding a systematic relationship between the effectiveness of the matching process and the quality and informativeness of earnings. For these reasons, the heterogeneity of the prior findings regarding the correlation between accounting systems, the degree of matching, and earnings quality justifies the second non-directional hypothesis:

H2: ceteris paribus, changes in the matching effectiveness are not systematically related to the quality of earnings and its attributes.

3. RESEARCH SETTING AND SAMPLE SELECTION

The reasons for choosing to study private firms in Italy and the research context are analysed in this section. Moreover, this section also explains the

methodological issues and procedures for improving the robustness of the results. Finally, a detailed description of the sampling process is provided.

3.1. The Italian institutional setting

This study focuses on the Italian context as it represents a typical European country with civil laws (La Porta et al., 1997).

Relaying on the financial reporting rules and practices typically adopted by private firms, the Italian accounting system is traditionally oriented toward a revenue-expense model (Nobes, 2001; Corbella & Florio, 2010; Alexander et al., 2012). Indeed, driven by the need for proper matching, the Italian GAAPs allow for the capitalisation of specific deferred charges and credits on the balance sheet (e.g., start-up costs, research costs, advertising and promotional costs, and provisions for restructuring) and do not involve the fair value valuation method for the appraisal of assets and liabilities (Nobes, 2001).

However, because of the implementation of the IAS Regulation (1606/2002), since 2005 Italian private firms have been able to voluntarily opt to adopt the IAS/IFRS instead of the local GAAP. This is an important contingency since it allows for the simultaneous assessment of the effectiveness of the matching process in a context characterised by the coexistence of firms who have adopted the revenue/expense model (R/E) and those that follow the asset/liability approach (A/L).

In addition, according to the tax principle of neutrality, equal treatment is granted to companies who adopt the IAS/IFRS and to those who use the Italian GAAP (PricewaterhouseCoopers, 2006). Therefore, individual tax issues and the peculiarities of the national tax system should not influence the results of our analysis (Cameran et al., 2014).

Overall, the Italian context provides the ideal setting for an examination of the interaction between two different financial reporting systems (the IAS/IFRS based on an asset/liability approach vs. the Italian GAAP based on a revenue/expense approach) and reporting incentives for private firms. Moreover, the Italian context also represents an ideal institutional setting because it allows for the mitigation of research biases and the alleviation of the methodological issues that typically characterise studies into the impact of different financial reporting systems on the accounting attributes of private companies.

3.2. Private firms

This study primarily focuses on private companies to consider firms' incentives towards transparency and high quality financial reporting. In fact, when firms are forced to use the IAS/IFRS, the co-existence of different compliance incentives opens the door for 'label adoptions' or opportunistic manipulation of financial reporting. This is especially true in countries, such as Italy, with low investor protection, low enforcement of accounting standards, high ownership concentration, and smaller stock markets (Soderstrom & Sun, 2007; Dasket et al., 2013; Halabi & Zakaria, 2015). On the other hand, the voluntary adoption of the IAS/IFRS may be due to a real willingness to improve disclosure quality (Cuijpers & Buijink, 2005; Barth et al. 2008; Christensen et al. 2015). This can be the case if the voluntary IAS/IFRS adopters are not controlled by listed companies and have not adopted the IAS/IFRS to comply with the requirements of the parent company and/or to simplify their financial reporting procedures (Cameran et al., 2014).

An alternative research strategy (listed companies) would not clarify whether the implementation of the IAS/IFRS model is due to an incentive action or merely to comply with rules. Moreover, it would require an examination of two different periods (before and after the mandatory adoption), which would increase the influence of the exogenous and macroeconomic variables (such as the economic-financial crisis) on the quality of earnings. In addition, the choice of private companies stems from a desire to fit this study into a series of underestimated research. In fact, the impact of the adoption of the IAS/IFRS on accounting fundamentals and earnings quality for public companies is still open to question, and is even more so for private firms (Orens et al., 2012; Cameran et al., 2014).

An analysis of the impact of an asset/liability model over the accounting attributes of private firms appears to be more useful considering the Responsible Business package with its 'Think Small First' principle. In fact, the European Commission has replaced the IV and VII EU Directive for private companies with the new Accounting Directive 2013/34/EU, which adopts a financial reporting model that is closer to the asset/liability model. Therefore, a study evaluating the impact of the current financial reporting regulation should also be of interest to the EU.

3.3. Methodological issues

There are major concerns regarding the controversial findings from previous studies, as presented in Section 2. These include the view that the conflicting results relate to research design issues, such as sample heterogeneity, self-selection bias, and survivorship bias.

Sample heterogeneity relates to the adoption of cross-country scenarios that is likely to produce biased results because of the impact of the differences in the economic, political, and enforcement rules in various countries on the financial reporting quality of firms (Ball, 2006; Leuz, 2010). This study overcomes this possible distortion by focusing the analysis in the Italian context whish implies homogeneity among all the Italian private firms involved.

Self-selection bias typically affects studies of private firms, which have voluntarily adopted the IAS/IFRS. Specifically, it is connected to the existence of peculiar characteristics that distinguishes those who switch to the IAS/IFRS from other constituents. Indeed, the voluntary decision to adopt the new reporting system is not an exogenous event and might follow from a specific firm's characteristics (in terms of higher incentives for transparency), thereby biasing the sample-building process (Christensen et al., 2015; Jin et al., 2015; Ahmed et al., 2013; Daske et al., 2008). This study constrains such possible distortion by selecting the

R/E sample implying a matched case-control design, to obtain two samples (R/E and A/L) that consist of firms with the same profiles and, therefore, the same incentives towards financial reporting quality and transparency.

Survivorship bias occurs when only those firms who have persisted over time are included in the sample, so that only the best firms are analysed. In this study, such a risk is limited by examining firms over a relatively short period, from 2001 to 2015 (Bartov et al., 2000; Ecker et al., 2006). This research strategy mitigates the risk that a worsening in the fundamentals and the quality of accounting is not due to evolutions in the reporting system but rather to substantial changes within the organisations and in the macroeconomic environment (Singer & You, 2011; Srivastava, 2014).

3.4. Sample selection

The sample consists of two groups of active Italian private non-financial limited companies with data available from AIDA by Bureau Van Dijk for the period from 2001 to 2015.

The first group consists of non-listed Italian firms which have voluntarily adopted the IAS/IFRS system (A/L firms). This sub-sample consists of 118 A/L firms, with 1,749 firm-year observations.

A randomly drawn second sub-sample of Italian private companies, which have not implemented the IAS/IFRS and still rely on Italian GAAP (R/E firms, as a proxy of revenue/expense reporting system), is also used in this study.

Table 1. Sample selection process for A/L firms

Population of Italian private voluntary IAS/IFRS adopters	137
Firms with accounting and corporate governance data not available	-19
Basic A/L sample	118

However, since they could be characterised by a lower incentive towards transparency, a matched case-control design is adopted, where each firm is coupled with a control one, relying on variables that are presumed to be associated with the analysed outcome. Since A/L and R/E firms are similar with respect to variable coupling, the differences in the phenomenon analysed cannot be due to sampling factors (Schlesselman, 1982). Specifically, the R/E sample consists of firms with the same profiles as the L/A firms, in terms of geographical and institutional context, industry (as proxied by the NACE, Rev.2), size (as proxied by total annual revenues), profitability (as proxied by ROA), and leverage. Moreover, the sampling process works by using the comparable firms from AIDA who have approximately the same number of years and available accounting and governance variables. After excluding comparable firms that were in default, the R/E group consists of 118 firms, from which a final sample of 1,750 firm-year observations is obtained.

Table 2. Two-tiles t-tests for differences in Sales, ROA, and Leverage

Panel A: Sales t-test between A/L firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
A/L firms	118	8.87e+07	9959435	1.08e+08	6.90e+07	1.08e+08
R/E firms	118	8.21e+07	9092124	9.88e+07	6.41e+07	1.00e+08
Combined	236	8.54e+07	6731825	1.03e+08	7.21e+07	9.87e+07
Difference		6622790	1.35e+07		-1.99e+07	3.32e+07
H : Difference != 0						
Pr (|T| > |t|) = 0.6238						
Panel B: ROA t-test between A/L firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
A/L firms	118	0.0353023	0.0088697	0.0963494	0.0177363	0.0528682
R/E firms	118	0.0324217	0.0058303	0.0633336	0.0208750	0.0439684
Combined	236	0.0338620	0.0052967	0.0813694	0.0234269	0.0442971
Difference		0.0028806	0.0106143		-0.0180313	0.0237924
H : Difference != 0						
Pr (|T| > |t|) = 0.7863						
Panel C: Leverage t-test between A/L firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
A/L firms	118	0.5663066	0.0208554	0.2265480	0.5250035	0.6076097
R/E firms	118	0.5980692	0.0198938	0.2161023	0.5886705	0.6374679
Combined	236	0.5821879	0.0144176	0.2214878	0.5537836	0.6105922
Difference		-0.0317626	0.0288221		-0.0885465	0.0250214
H : Difference != 0						
Pr (|T| > |t|) = 0.2716						

In order to prove the effectiveness of the sampling process, the two-tailed *t*-tests on means were used to control for differences in firm size, ROA, and leverage[29], as illustrated in Table 2.

[29] A Chi-square test to control for differences in the industries distribution has also been performed. For the sake of brevity, the results are not reported here but are available from the author.

4. DEFINITION OF VARIABLES AND RESEARCH METHODS

This section defines the proxies for the degree of matching effectiveness, earnings quality attributes and other control variables, followed by the model specification for testing the hypotheses.

4.1. Proxies and models for the degree of matching effectiveness

The effectiveness of the matching process is represented by the degree of contemporaneous association between revenues and expenses *(Matching*). According to Dichev and Tang (2008), *Matching* is computed by assessing the coefficients of a model that regresses current operating revenues *(Rev)* on one-year-back, the present and one-year-forward operating expenses *(Exp)*[30]:

$$Rev_{it} = \beta_0 + \beta_1 Exp_{i(t-1)} + \beta_2 Exp_{it} + \beta_3 Exp_{i(t+1)} + \varepsilon_{it} \quad (1)$$

where i represents the firm and t represents the year.

Eq.1 is performed on a cross-sectional basis for each year of the reference period and separately for each of the two samples (A/L and R/E). In this model, the coefficient β_2 represents a proxy for the degree of matching, where the higher values of β_2 are associated with a higher degree of matching. Once the β coefficients are estimated for each year, a two-tailed t-test is used to test for differences in the means of the β coefficients and compare the A/L and the R/E samples.

However, this research model does not allow for control of other firms' specific factors (such as industry, R&D activities, and volatility of both sales and operating cash flow accruals) which, according to the previous microstructure literature, might affect the degree of matching effectiveness, irrespective of the implemented reporting system (Srivastava, 2014; He & Shan, 2016). For this reason, this study defines a second proxy for the degree of matching *(M°).* Specifically, $M°$ represents the standard deviation of the residuals from the following heteroskedastic-robust standard errors panel data regression with fixed effects, which is separately performed for each sub-sample (A/L and E/R):

$$Rev_{it} = \beta_0 + \beta_1 Exp_{i(t-1)} + \beta_2 Exp_{it} + \beta_3 Exp_{i(t+1)} + \sum(Year\ effects) + \sum(Fixed\ effects) + \varepsilon_{it} \quad (2)$$

where i represents the firm, and t stands for the year.

Bearing in mind that a higher standard deviation of such residuals reflects a lower degree of matching between revenues and expenses, $M°$ is used as a dependent variable of the following cross-sectional robust regression model that includes both sub-samples (A/L and R/E):

$$M° = \beta_0 + \beta_1 (R/E) + \beta_2 Size + \beta_3 \sigma Sales + \beta_4 \sigma OCF + \beta_5 \mu ROA + \beta_6 \mu Lev + \beta_7 Own + \sum(Industry\ effects) + \varepsilon \quad (3)$$

where R/E is a dummy variable which takes the value of 1 for all firms that do not adopt the IAS/IFRS reporting system and are still using the Italian GAAP. In particular, this variable allows an assessment of the relationship between the two different accounting models and the degree of matching effectiveness. Further, the regression model also includes several control variables that might affect $M°$. Specifically, in keeping with Francis et al. (2005), the model includes three innate determinants of the quality of accounting numbers: the log-function of the average total annual sales stands for a proxy for firm size *(Size)*, while the standard deviations of both sales *(σSales)* and operating cash flows *(σOCF)* represent a proxy for the operating environment volatility. In addition, a measure of the profitability *(μROA*), computed as the mean value of the annual ratios between operating income and total assets, is also included to control for economic incentives. Regarding such variables, it is expected that $M°$ is negatively related to both *Size* and μROA, but positively related to both $\sigma Sales$ and σOCF. Moreover, the model also includes two corporate governance variables. The first is represented by the average value of financial leverage *(μLev)*, computed as the mean of the annual ratios between net debt and total assets. The second (Own) captures the ownership concentration and is computed as a categorical variable that assumes the following values: 1 in case of direct control higher than 0.5; 2 in case of indirect control higher than 0.5; 3 in case of ownership concentration between 0.25 and 0.5; and 4 in case of ownership concentration lower than 0.25. Therefore, higher values of Own correspond to a lower ownership concentration in the observed firms.

The A/L group has also been divided into two sub-samples to enrich the analysis and enhance the robustness of the findings. Specifically, the A/L firms have been split into firms that are controlled by companies that have adopted the IAS/IFRS reporting system, and others that are not controlled at all or are controlled by entities that have not adopted the IAS/IFRS model. Assuming that companies in the first group could have switched to the IAS/IFRS mainly to comply with the parent company requirements, it is possible that the two sub-samples have different incentives in terms of transparency and quality of financial reporting. Therefore, this study also performs Eq.3 only including those A/L firms that, since they are not controlled by IAS/IFRS companies, should have higher incentives for a better financial reporting process, to further mitigate the risk of biased results.

Since Eq.1 and Eq.3 are only performed for the post IAS/IFRS adoption period, a major concern is due to the possible pre-existing differences between A/L firms and R/E ones. In particular, if the two groups already had differences in terms of matching effectiveness it could be misleading to conclude that one accounting model is better than the other, based exclusively on the analysis of the post-switch period. Therefore, this study also performs a difference-in-difference (D-I-D) analysis. In facts, this allows for an assessment of whether possible differences in the

[30] All variables are deflated by average total assets. Moreover, given that Donelson et al. (2011) find supporting evidence for the influence of special items on the degree of matching, rather than the financial reporting system per se, this study focuses on operating revenues and expenses in order to better appreciate the specific role of accounting models.

degree of matching effectiveness, between A/L and R/E firms, already existed when they all used Italian GAAP and how these differences changed after the A/L firm switched to the IAS/IFRS. For this reason, the following cross-sectional robust regression model is performed:

$$M° = \beta_0 + \beta_1(A/L) + \beta_2 Post + \beta_3[(A/L)*Post] + \\ + \beta_4 Size + \beta_5 \sigma Sales + \beta_6 \sigma OCF + \beta_7 \mu ROA \\ + \beta_8 \mu Lev \\ + \beta_9 Own + \beta_{10} Control + \sum(Industry\ effects) + \varepsilon \quad (4)$$

where A/L is a dummy variable which takes the value of 1 for firms that opt for the IAS/IFRS reporting system, $Post$ is a dummy variable which takes the value of 1 for the post-switch period, and finally $(A/L)*Post$ is the interaction variable that takes the value of 1 only for A/L firms after they actually switched to the IAS/IFRS. Specifically, the interaction variable captures the effect of a change in the reporting system on the degree of matching effectiveness in relation to possible pre-existing differences between A/L and R/E firms. In addition, besides the already defined variables, Control is a dummy variable that takes the value of one for all A/L firms controlled by other companies that adopt the IAS/IFRS model.

4.2. Proxies and models for the earnings quality attributes

The main attributes analysed in this study as proxies for the quality of accounting numbers are predictability, persistence, and volatility of operating income.

4.2.1. Predictability

The proxy for earnings predictability *(Pred)* is given by the square root of the error variance of the following fixed-effect regression model, performed for each of the two samples (Lipe, 1990)[31]:

$$EBIT_{it} = \beta_0 + \beta_1 EBIT_{i(t-1)} + \\ + \sum(Year\ effects)_{it} + \sum(Industry\ effects)_{it} + \varepsilon_{it} \quad (5)$$

where i represents the firm and t represents the year.

The variable $Pred$ is then used as the dependent variable in the following cross-sectional robust regression. The following model also includes the proxy $M°$, to directly assess the impact of changes in the degree of matching effectiveness on the predictability of earnings, after controlling for other features related to the impact of different financial reporting systems:

$$Pred = \beta_0 + \beta_1 M° + \beta_2(R/E) + \beta_3 Size + \beta_4 \sigma Sales + \\ + \beta_5 \sigma OCF + \beta_6 \mu ROA + \beta_7 \mu Lev + \beta_8 Own + \\ + \beta_8 Control + \sum(Industry\ effects) + \varepsilon \quad (6)$$

A higher value of $M°$ reflects a lower degree of matching between revenues and expenses, a positive (negative) relationship between $M°$ and $Pred$ highlights that a lower degree of matching effectiveness negatively (positively) affects the predictability of earnings.

4.2.2. Persistence

The impact of changes to the degree of matching effectiveness on the persistence of earnings is detected through the slope coefficients of the following autoregressive fixed-effect regression model, which relates to current operating earnings and lagged operating earnings (Lev, 1983)[32]:

$$EBIT_{it} = \beta_0 + \beta_1 EBIT_{i(t-1)} + \beta_2 PoorMatching_{it} + \\ + \beta_3[PoorMatching_{it} * EBIT_{i(t-1)}]_{it} + \beta_4(R/E) \\ + \beta_5 Size_{it} \\ + \beta_6 \Delta Sales_{it} + \beta_7 \Delta OCF_{it} + \beta_8 \Delta ROA_{it} + \beta_9 Lev_{it} \\ + \beta_{10} Own_{it} \\ + \sum(Year\ effects)_{it} + \sum(Industry\ effects)_{it} + \varepsilon_{it} \quad (7)$$

The variable $PoorMatching$ is a dummy variable that takes the value of one if the firm-year residuals from Eq.2 are above the median, and zero otherwise. Therefore, higher values of $PoorMatching$ are associated with a lower degree of matching. Moreover, $PoorMatching_{it} * EBIT_{i(t-1)}$ is an interaction variable that captures the level of earnings persistence of firms with a lower degree of matching between contemporaneous revenues and expenses. In addition, the variable (R/E) allows controlling for other features related to the impact of different financial reporting systems. Finally, $Size$ represents the log-function of annual sales; $\Delta Sales$, ΔOCF, and ΔROA are, respectively, the annual changes in sales, in operating cash flow, and in the firm's profitability; Lev is computed as the annual ratio between net debt and total assets; and Own is defined as described above for Eq.3[33].

4.2.3. Volatility

The proxy for earnings volatility *(Vol)* is represented by the ratio between the standard deviation of EBIT and the standard deviation of operating cash flow (Burgstahler et al., 2006): higher values of this ratio correspond to a higher volatility of operating income.

This measure of earnings volatility is then used as the dependent variable in the following cross-sectional robust regression model to directly assess the impact of changes in the degree of matching effectiveness on the volatility of earnings, after controlling for other features related to the impact of different financial reporting systems (as defined for Eq.6):

$$Vol = \beta_0 + \beta_1 M° + \beta_2(R/E) + \beta_3 Size + \beta_4 \sigma Sales \\ + \beta_6 \mu ROA + \beta_7 \mu Lev + \beta_8 Own + \\ + \beta_8 Control + \sum(Industry\ effects) + \varepsilon \quad (8)$$

Note that to avoid a multicollinearity problem, Eq.8 does not include the standard deviation of operating cash flows, since σOCF has been used to define the dependent variable. Therefore, the model still embodies the effect of the operating cash flow volatility.

[31] All variables are deflated by average total assets between the values at the beginning and at the end of the year.

[32] All variables are deflated by average total assets between the values at the beginning and end of the year.

[33] A positive relationship is expected between both Size and ΔROA, while a negative relationship is expected between $EBIT_{it}$ and both ΔSales, and ΔOCF.

Bearing in mind that a higher value of $M°$ reflects a lower degree of matching between revenues and expenses, a positive (negative) relationship between $M°$ and Vol highlights that a lower degree of matching effectiveness negatively (positively) affects the volatility of earnings.

5. EMPIRICAL FINDINGS

5.1. Descriptive statistics and preliminary tests

Table 3 shows the descriptive statistics for the continuous variables used in this study. As expected after the matched case-control design for the sampling process, descriptive statistics highlight no great differences between L/A and R/E firms in terms of economic fundamentals.

Despite the two groups of firms having similar profiles in terms of their economic fundamentals, it is noted that they have some differences relative to the proxies for the degree of matching effectiveness and the quality of earnings. Specifically, Table 3 highlights that while the two sub-samples have almost the same average earnings predictability, the R/E firms have a lower volatility of earnings than the A/L ones. Moreover, both proxies for the degree of matching effectiveness are better for firms adopting a revenue/expense reporting system.

Table 3. Descriptive statistics – 2006-2015

Panel A: Descriptive statistics for L/A firms					
Variable	***Min***	***Max***	***Mean***	***Median***	***ST-Dev***
Revenues	0.00716	2.35041	0.64577	0.56283	0.47637
Expenses	0.03485	2.68880	0.65696	0.57054	0.50297
EBIT	-0.45089	0.25940	0.02271	0.02655	0.09931
OCF	-0.65789	0.79473	0.05105	0.04967	0.10217
Size	14.4669	19.8828	17.5907	17.6553	1.27769
σSales	0.00172	0.84672	0.15057	0.09844	0.15830
σOCF	0.00482	0.22492	0.05266	0.03680	0.05273
μLev	0.03271	0.95992	0.57101	0.60997	0.21103
Matching	0.45470	1.13742	0.84782	0.87638	0.19010
M°	0.00171	0.36790	0.06434	0.04776	0.06645
Pred	0.00752	0.19974	0.04828	0.03423	0.04135
Vol	0.10118	11.7004	1.38916	1.20094	1.27640
Panel B: Descriptive statistics for R/E firms					
Variable	***Min***	***Max***	***Mean***	***Median***	***ST-Dev***
Revenues	0.00989	2.21307	0.75472	0.57419	0.70129
Expenses	0.05582	2.30190	0.73984	0.53304	0.60308
EBIT	-0.38158	0.26594	0.02846	0.03929	0.06712
OCF	-0.52060	0.69803	0.06761	0.05742	0.09622
Size	15.2564	20.3365	17.9686	18.0600	1.30031
σSales	0.00277	0.86732	0.18834	0.11646	0.17537
σOCF	0.00602	0.21026	0.04834	0.03002	0.03216
μLev	0.07513	0.91752	0.59046	0.61808	0.17962
Matching	0.89548	1.07733	0.99188	0.99289	0.06038
M°	0.01098	0.21157	0.05272	0.03482	0.04226
Pred	0.00850	0.13523	0.03530	0.02839	0.02528
Vol	0.12511	4.76784	1.24384	1.21726	0.68642

Note: All economic fundamental variables are scaled by total assets.

Given that the variable Matching (β_2 in Eq. 1) captures the degree of contemporaneous association between revenues and expenses, a two-tailed t-test for differences in means of β coefficients is performed to compare the A/L and R/E firms, as reported in Table 4. Panel B of Table 4 highlights that there is a statistically significant difference between the Matching coefficients of the two sub-samples, with R/E firms having a higher β_2 coefficient.

This result implies a higher degree of matching between contemporaneous revenues and expenses for R/E firms relative to L/A ones, during the period that follows the voluntary adoption of the IAS/IFRS (A two-tailed t-test for differences in Matching (β_2 in Eq.1) has also been performed for the pre-2006 period, when both R/E and L/A firms adopted the Italian GAAP.

Findings from this test (for the sake of brevity, the results are not reported here but are available from the author) reveal no statistically significant differences).

Table 4. Two-tiles t-tests for differences in *Matching* (β_2 in Eq.1) – 2006-2015 (Part 1)

Panel A: β_1 t-test between L/A firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
L/A firms	9	0.0201814	0.0437779	0.1313337	-0.0807707	0.1211334
R/E firms	9	0.0248467	0.0123703	0.0371109	-0.0036793	0.0533727
Combined	18	0.0225141	0.0220742	0.0936527	-0.0240583	0.0690864
Difference		-0.0046654	0.0454921		-0.1011043	0.0917735
H: Difference != 0						
Pr (|T| > |t|) = 0.9196						

Table 4. Two-tiles t-tests for differences in $Matching$ (β_2 in Eq.1) – 2006-2015 (Part 2)

Panel B: β_2 t-test between L/A firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
L/A firms	9	0.8478208	0.0633660	0.1900980	0.7016986	0.9939431
R/E firms	9	0.9918831	0.0201281	0.0603844	0.9454675	1.0382990
Combined	18	0.9198519	0.0366783	0.1556128	0.8424675	0.9972364
Difference		-0.1440622	0.0664860		-0.2850063	-0.0031182
H : Difference < 0						
Pr (T < t) = 0.0228						
Panel C: β_3 t-test between L/A firms and R/E firms						
	Obs	***Mean***	***StdErr***	***StdDev***	***[95% Conf. Interval]***	
L/A firms	9	0.0723054	0.0416929	0.1250787	-0.0238386	0.1684494
R/E firms	9	-0.0277187	0.0131304	0.0393911	-0.0579974	0.0025599
Combined	18	0.0222933	0.0244276	0.1036375	-0.0292444	0.0738310
Difference		0.1000241	0.0437116		0.0073597	0.1926885
H : Difference > 0						
Pr (T > t) = 0.0180						

5.2. Univariate correlations matrix

Table 5 shows the univariate correlations matrix.

Table 5. Pairwise correlation matrix

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
(1)	$M°$	1.0000											
(2)	$Pred$	0.7423*	1.0000										
(3)	Vol	- 0.0727	0.0565	1.0000									
(4)	(A/L)	0.1043*	0.1869*	0.2636*	1.000								
(5)	(R/E)	- 0.1043*	- 0.1869*	- 0.2636*	- 1.0000	1.0000							
(6)	$Size$	- 0.1293*	- 0.0922	- 0.0936	- 0.1241*	0.1241*	1.0000						
(7)	$\sigma Sales$	0.4585*	0.2082*	- 0.2677*	- 0.2914*	0.2914*	0.0737	1.0000					
(8)	σOCF	0.5262*	0.5924*	0.0412	0.1384*	- 0.1384*	- 0.1057	0.2427*	1.0000				
(9)	μROA	- 0.1020*	- 0.3163*	- 0.0857	- 0.1908*	0.1908*	0.1250*	- 0.0072	- 0.3417*	1.0000			
(10)	μLev	0.0771	0.0620	- 0.2099*	- 0.0443	0.0443	0.1605*	0.1715*	- 0.1197*	- 0.2168*	1.0000		
(11)	Own	- 0.0723	- 0.1356*	- 0.1224*	- 0.2800*	0.2800*	- 0.1435*	0.0294	- 0.0969	0.0371	- 0.0184	1.0000	
(12)	$Control$	0.0759	0.0979	0.0651	0.5708*	- 0.5708*	0.0614	- 0.1324*	0.0976	- 0.0623	0.0166	- 0.2683*	1.0000

*Note: * Significance at the 0.1*

The dummy variable (R/E) is negatively related to $M°$, Pred, and Vol, implying that firms adopting a revenue/expense reporting system (Italian GAAP) should have a lower volatility of earnings and a higher level of both matching process effectiveness and earnings predictability (while the dummy variable (A/L) has exactly the opposite relationships, as expected). Moreover, $M°$ is positively correlated with Pred, and has a negative, even if not significant, relationship with Vol. This means that, as preliminary evidence, a higher degree of matching effectiveness positively affects the quality of earnings in terms of predictability and volatility.

As for the control variables, $Size$ is negatively related with $M°$, implying that larger firms have a higher level of matching between contemporaneous revenues and expenses. Moreover, $\sigma Sales$ and σOCF, as proxies for the volatility of the operating environment, negatively affect the degree of matching and the quality of earnings in terms of predictability and volatility, as expected.

5.3. Different accounting systems and the degree of matching effectiveness

In order to test the first hypothesis, Eq.3 is performed to compare the R/E firms with the A/L firms during the post-switch period. Specifically, column 1 of Table 6 shows a negative and strongly significant correlation between (R/E) and $M°$ (P>|t|=0.009), highlighting that firms still using the Italian GAAP have a higher degree of matching effectiveness, relative to companies that opted for the implementation of the IAS/ IFRS. Moreover, $M°$ is positively influenced by $\sigma Sales$ and σOCF (both p-values are lower than 0.01), showing that a higher volatility in the operating environment lowers the contemporaneous association between revenues and expenses.

Note that, as shown in column 2 of Table 6, the same consideration can be proposed when the model considers only those A/L firms not controlled by IAS/IFRS companies and, therefore, should have higher incentives for a better financial reporting process. Indeed, while the correlations between M° and the other control variables remain unchanged, the negative relationship between (R/E) and the response variable holds, even if it is not as strong as previously discussed (P>|t|=0.082).

These results, combined with those reported in Table 4, could lead to a rejection of the first hypothesis. However, such a conclusion could be misleading because of possible pre-existing differences in terms of matching effectiveness between R/E and A/L firms. Therefore, this study also carries out a D-I-D analysis, performing Eq.4.

Table 7 shows that there were no statistically significant differences between R/E and A/L firms (P>|t|=0.442), when they both adopted a revenue/expense reporting system (Italian GAAP). However, the difference in terms of matching process effectiveness becomes statistically significant when A/L firms opt for the implementation of the IAS/IFRS accounting model (P>|t|=0.008).

Table 6. Accounting systems and degree of matching – 2006-2015

Dep. variable: $M°$	*A/L vs. R/E*			*A/L (free of control) vs. R/E*		
	Coefficient	*t-stat*	*P>|t|*	*Coefficient*	*t-stat*	*P>|t|*
Intercept	0.0918521	2.22	0.028	0.0957520	1.80	0.074
(R/E)	- 0.0165352	- 2.62	0.009	- 0.0163985	- 1.75	0.082
Size	- 0.0049072	- 1.99	0.047	- 0.0052112	- 1.63	0.105
σSales	0.1105311	3.86	0.000	0.1048092	3.12	0.002
σOCF	0.4999611	3.97	0.000	0.5632149	4.09	0.000
μROA	- 0.0001163	- 0.00	0.999	0.0671058	0.75	0.453
μLev	0.0227509	1.39	0.166	0.0287407	1.40	0.163
Own	- 0.0011161	- 0.38	0.754	- 0.0010891	- 036	0.719
Industry effects	Included			Included		
R^2	0.43360			0.41670		
Root MSE	0.04288			0.04269		
F-value	7.57			6.91		
Prob. >*F*	0.0000			0.0000		
No. of obs.	236			178		

Moreover, Table 7 also shows that the D-I-D coefficient (β_3 in Eq.4) shows a positive and significant correlation with $M°$ (P>|t|=0.086). This indicates that when starting from a situation in which there were no differences in the degree of matching effectiveness between R/E and A/L firms (when they both adopted a revenue/expense reporting system), the choice of A/L firms to shift to an asset/liability accounting model represents a determinant of the observed worsening in the degree of matching effectiveness for such a group of firms.

Overall, the combining discussion of results from Eq.3 and Eq.4, and the two-tiled t-tests on betas of Eq.1, lead to reject the first hypothesis. Indeed, these findings suggest that, everything being equal in terms of reporting incentives, the switch from a revenue/expense model to an asset/liability approach negatively affects the effectiveness of the matching process.

Table 7. Accounting systems and degree of matching – 2001-2015

No. of observations	*Pre-switch*	*Post-switch*	*TOT.*	
L/A firms	118	118	236	R^2=0.36
R/E firms	118	118	236	
TOT.	236	236	472	
Outcome	***M°***	***Std. Error***	***t-stat***	***P>|t|***
Pre-switch				
R/E firms	0.067			
L/A firms	0.073			
Diff. (L/A – R/E)	0.005	0.007	0.77	0.442
Post- switch				
R/E firms	0.066			
L/A firms	0.085			
Diff. (L/A – R/E)	0.019	0.007	2.65	0.008
D-I-D (Post – Pre)	**0.014**	**0.009**	**1.53**	**0.086**

5.4. Accounting systems, the degree of matching effectiveness, and earnings quality

Changes to accounting systems can influence both the quality of the accounting numbers and the degree of matching effectiveness without a direct empirical correlation between matching and earnings quality. Therefore, Eq.6, Eq.7, and Eq.8 are performed to directly assess the impact of changes in matching effectiveness on the predictability, persistence and volatility of earnings.

Table 8 shows a positive and significant relationship between $M°$ and Pred (P>|t|=0.000) which implies a direct correlation between the degree of matching and the predictability of earnings.

Table 8. Matching and earnings predictability – (2006-2015)

Dep. variable: Pred	*Coefficient*	*t-stat*	*P>|t|*
Intercept	- 0.0047471	- 0.25	0.802
$M°$	0.4061767	6.80	0.000
(R/E)	- 0.0005837	- 0.22	0.826
Size	0.0005293	0.48	0.633
σSales	- 0.0274248	- 3.15	0.002
σOCF	0.2086306	3.31	0.001
μROA	- 0.0538007	- 1.81	0.072
μLev	0.0050961	0.58	0.563
Own	- 0.0022560	- 2.08	0.038
Control	- 0.0038197	- 0.83	0.407
Industry effects	Included		
R^2	0.64610		
Root MSE	0.02112		
F-value	31.49		
Prob. >*F*	0.0000		
No. of obs.	236		

Table 9 shows a negative and significant relationship between $EBIT_t$ and $PoorMatch*EBIT_{(t-1)}$ (P>|t|=0.068) which implies a direct correlation between the degree of matching effectiveness and the persistence of earnings.

Table 9. Matching and earnings persistence – (2006-2015)

Dep. variable: $EBIT_t$	***Coefficient***	***t-stat***	***P>|t|***
Intercept	- 0.3939993	- 4.39	0.000
$EBIT_{(t-1)}$	0.2767630	5.89	0.000
$PoorMatch$	- 0.0013718	0.03	0.976
$PoorMatch * EBIT_{(t-1)}$	- 0.0216739	- 0.43	0.068
(R/E)	0.0014834	0.24	0.811
$Size$	0.0273698	5.04	0.000
$\Delta Sales$	0.0009030	0.19	0.853
ΔOCF	0.0027221	3.96	0.000
ΔROA	0.0049292	6.17	0.000
Lev	- 0.1116466	- 4.29	0.000
Own	0.0001922	0.15	0.880
$Control$	- 0.0049514	- 1.05	0.293
Year effects	Included		
Industry effects	Included		
R^2 *within*	0.28440		
R^2 *between*	0.34960		
R^2 *overall*	0.3146		
F-value	12.84		
Prob. >F	0.0000		
No. of obs.	1.716		
No. of groups	236		

Table 10 shows a positive and significant relationship between $M°$ and Vol (P>|t|=0.000) which implies an inverse correlation between the degree of matching and the volatility of earnings.

Table 10. Matching and earnings volatility – (2006-2015)

Dep. variable: Vol	***Coefficient***	***t-stat***	***P>|t|***
Intercept	0.7591754	0.77	0.440
$M°$	5.5018350	2.29	0.023
(R/E)	- 0.0304769	- 0.19	0.849
$Size$	0.0039913	0.10	0.922
$\sigma Sales$	- 1.1159560	- 2.51	0.013
μROA	0.7166496	0.74	0.459
μLev	1.2076510	2.84	0.005
Own	- 0.0393769	- 0.81	0.417
$Control$	- 0.0922260	- 0.57	0.568
Industry effects	Included		
R^2	0.12290		
Root MSE	0.97688		
F-value	2.72		
Prob.>F	0.0000		
No. of Observations	236		

Moreover, it has to be noted that the correlations between the proxy for the reporting system (R/E) and each earnings quality attribute (predictability, persistence, and volatility) are not statistically significant. This means that changes in the quality of earnings, that follow a change in the accounting system, are primarily due to a worsening in the degree of matching that, in turn, is directly affected by the switch from a revenue/expense reporting system to an asset/liability approach, rather than other features that arise from such a switch.

Overall, the empirical findings suggest that the degree of matching effectiveness is positively related to the predictability and persistence of earnings, while having a negative correlation with earnings volatility. Therefore, these findings led to a rejection of the second non-directional hypothesis, since the empirical evidence highlights that the quality of the accounting numbers is systematically related to the degree of matching effectiveness through a direct correlation.

6. CONCLUSIONS AND REMARKS

Since the primary product of accrual accounting is net income, one of the main goals of the accrual financial reporting system is to provide useful information about earnings and its components. However, the usefulness of earnings depends on their quality that, in turn, depends on the quality of its components. Given that the realised cash flow component of earnings is the most reliable part of the financial reporting, it follows that the usefulness and quality of earnings depends on the quality of the accrual components that, in turn, can be influenced by both exogenous factors (firms' economic fundamentals and managerial discretion) and endogenous ones (the reporting system's ground rules).

Relative to 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, the heterogeneity in the results and ideas is profound, especially regarding the determinants and consequences of the detected declining trends. In particular, changes to accounting systems can be considered a most compelling and controversial topic when analysed in connection with the quality of accounting numbers and its fundamentals.

In analyzing the consequences of changes to the financial reporting systems on the effectiveness of the process of matching expenses with revenues for private firms, this study highlights that the switch from a revenue/expense accounting model to an asset/liability approach represents a determinant of the observed worsening in the degree of matching.

Moreover, assuming that the matching process is one of the milestones of accrual accounting, it is formally considered a determinant of the quality of accounting numbers, and not just one of the many earnings quality attributes. Therefore, this study also assesses the effects that different degrees of matching could have on the quality of accounting numbers, controlling for a set of variables that might affect both the matching process and earnings quality. Specifically, the empirical findings suggest that the degree of matching is positively related to the predictability and persistence of earnings, while having a negative correlation with earnings volatility. This means that the degree of matching is directly related to the quality of accounting numbers.

Besides the contribution of this study and despite the adopted arrangements for improving the robustness of results, some limitations exist which must be recognised. First, the analysis is based on a single country and, therefore the estimated effects of a switch in financial reporting systems towards an asset/liability approach (as proxied by the voluntary adoption of the IAS/IFRS) might be significant only for those countries where reporting incentives and enforcement strength are classified as low. Second, the empirical evidence highlights a positive impact of the revenue/expense approach on the degree of matching and, in turn, on earnings attributes for manufacturing and service firms, but they cannot be extended to firms adopting a different business model, such as financial firms. Finally, by focusing attention on one country and relying on a matched case-control design for the sampling process, the methodological concerns that probably influence the investigations (self-selection bias, sample heterogeneity, and identification problem relative to reporting incentive research bias) are mitigated, but are probably not completely eliminated.

These and other issues should be considered in any future studies to further deepen the relationship between different accounting systems and other earnings attributes through other fundamentals of accounting, without neglecting the role that could be played by the discretionary component of financial reporting. In fact, this field of study is still in its infancy, especially for private firms, and should be of major concern to regulators, standard setters, and academics.

REFERENCES

1. Ahmed, A. S., Neel, M., & Wang, D. (2013). Does mandatory adoption of IFRS improve accounting quality? Preliminary evidence. *Contemporary Accounting Research, 30(4),* 1344-1372. https://doi.org/10.1111/j.1911-3846.2012.01193.x
2. Alexander, D., Bonaci, C. G., & Mustata, R. V. (2012). Fair value measurement in financial reporting. *Procedia Economics and Finance, 3,* 84-90. https://doi.org/10.1016/S2212-5671(12)00124-4
3. Ball, R. (2006). International Financial Reporting Standards (IFRS): Pros and cons for investors. *Accounting and Business Research, 36(1),* 5-27. https://doi.org/10.1080/00014788.2006.9730040
4. Barth, M. E., Landsman, W. R., & Lang, M. (2008). International accounting standards and accounting quality. *Journal of Accounting Research, 46(3),* 467-498. https://doi.org/10.1111/j.1475-679X.2008.00287.x
5. Bartov, E., Gul, F. A., & Tsui, J. S. L. (2000). Discretionary-accruals models and audit qualifications. *Journal of Accounting and Economics, 30(3),* 421-452. https://doi.org/10.1016/S0165-4101(01)00015-5
6. Bernstein, L. A. (1993). *Financial statement analysis: Theory, application, and interpretation*. Richard D. Irwin, Inc., Homewood, Illinois, U.S.A.
7. Burgstahler, D. C., Hail, L., & Leuz, C. (2006). The importance of reporting incentives: Earnings management in European private and public firms. *The Accounting Review, 81(5),* 983-1016. https://doi.org/10.2308/accr.2006.81.5.983
8. Bushman, R. M., Lerman, A., & Zhang, X. F. (2016). The changing landscape of accrual accounting. *Journal of Accounting Research, 54(1),* 41-78. https://doi.org/10.1111/1475-679X.12100
9. Cameran, M., Campa, D., & Pettinicchio, A. (2014). IFRS adoption among private companies: Impact on earnings quality. *Journal of Accounting, Auditing & Finance, 29(3),* 278-305. https://doi.org/10.1177/0148558X14534260
10. Camfferman, K., & Zeff, S. A. (2007). Financial reporting and global capital markets: A history of the International Accounting Standards Committee, 1973-2000. Oxford University Press on Demand. https://doi.org/10.1093/acprof:oso/9780199296293.003.0002
11. Charitou, A., & Ketz, J. E. (1991). An empirical examination of cash flow measures. *Abacus, 27(1),* 51-64. https://doi.org/10.1111/j.1467-6281.1991.tb00256.x
12. Christensen, H. B., Lee, E., Walker, M., & Zeng, C. (2015). Incentives or standards: What determines accounting quality changes around IFRS adoption? *European Accounting Review, 24(1),* 31-61. https://doi.org/10.1080/09638180.2015.1009144
13. Corbella, S., & Florio, C. (2010). Issues arising for accounting harmonization: The case of stock options in Italy. *Accounting Forum, 34(3),* 184-195. https://doi.org/10.1016/j.accfor.2010.08.001
14. Cuijpers, R., & Buijink, W. (2005). Voluntary adoption of non-local GAAP in the European Union: A study of determinants and consequences. *European Accounting Review, 14(3),* 487-524. https://doi.org/10.1080/0963818042000337132

15. Daske, H., Hail, L., Leuz, C., & Verdi, R. (2008). Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research, 46(5),* 1085-1142. https://doi.org/10.1111/j.1475-679X.2008.00306.x
16. Daske, H., Hail, L., Leuz, C., & Verdi, R. (2013). Adopting a label: Heterogeneity in the economic consequences around IAS/IFRS adoptions. *Journal of Accounting Research, 51(3),* 495-547. https://doi.org/10.1111/1475-679X.12005
17. Dechow, P. M. (1994). Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of Accounting and Economics, 18(1),* 3-42. https://doi.org/10.1016/0165-4101(94)90016-7
18. Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review, 77(s-1),* 35-59. https://doi.org/10.2308/accr.2002.77.s-1.35
19. Dechow, P. M., Kothari, S. P., & Watts, R. L. (1998). The relation between earnings and cash flows. *Journal of Accounting and Economics, 25(2),* 133-168. https://doi.org/10.1016/S0165-4101(98)00020-2
20. Dichev, I. D., & Tang, V. W. (2008). Matching and the changing properties of accounting earnings over the last 40 years. *The Accounting Review, 83(6),* 1425-1460. https://doi.org/10.2308/accr.2008.83.6.1425
21. Donelson, D. C., Jennings, R., & McInnis, J. (2011). Changes over time in the revenue-expense relation: Accounting or economics? *The Accounting Review, 86(3),* 945-974. https://doi.org/10.2308/accr.00000046
22. Ecker, F., Francis, J., Kim, I., Olsson, P. M., & Schipper, K. (2006). A returns-based representation of earnings quality. *The Accounting Review, 81(4),* 749-780. https://doi.org/10.2308/accr.2006.81.4.749
23. Fairfield, P. M., Sweeney, R. J., & Yohn, T. L. (1996). Accounting classification and the predictive content of earnings. *The Accounting Review, 71(3),* 337-355.
24. Francis, J., LaFond, R., Olsson, P., & Schipper, K. (2005). The market pricing of accruals quality. *Journal of Accounting and Economics, 39(2),* 295-327. https://doi.org/10.1016/j.jacceco.2004.06.003
25. Gibbins, M., & Willett, R. (1997). New light on accrual, aggregation, and allocation, using axiomatic analysis of accounting numbers' fundamental and statistical character. *Abacus, 33(2),* 137-167. https://doi.org/10.1111/1467-6281.00009
26. Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics, 40(1),* 3-73. https://doi.org/10.1016/j.jacceco.2005.01.002
27. Guay, W., Kothari, S. P., & Watts, R. (1996). A market-based evaluation of discretionary accrual models. *Journal of Accounting Research, 34,* 83-105. https://doi.org/10.2307/2491427
28. Halabi, H., & Zakaria, I. (2015). Mandatory IFRS adoption and earnings quality: The impact of country-specific factors. *European Financial Management Association, Annual Meetings.* Retrieved from https://repository.hkbu.edu.hk/hkbu_staff_publication/4844
29. He, W., & Shan, Y. (2016). International evidence on the matching between revenues and expenses. *Contemporary Accounting Research, 33(3),* 1267-1297. https://doi.org/10.1111/1911-3846.12183
30. Healy, P. M. (1996). Discussion of a market-based evaluation of discretionary accrual models. *Journal of Accounting Research, 34,* 107-115. https://doi.org/10.2307/2491428
31. Jin, K., Shan, Y., & Taylor, S. (2015). Matching between revenues and expenses and the adoption of international financial reporting standards. *Pacific-Basin Finance Journal, 35,* 90-107. https://doi.org/10.1016/j.pacfin.2014.10.008
32. Kagaya, T. (2014). Matching expenses with revenues around the world. *International perspectives on accounting and corporate behavior,* 81-106. https://doi.org/10.1007/978-4-431-54792-1_4
33. La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *The Journal of Finance, 52(3),* 1131-1150. https://doi.org/10.1111/j.1540-6261.1997.tb02727.x
34. Lane, J., & Willett, R. (1999). Optimal smoothing of accounting earnings. *IMA Journal of Management Mathematics, 10,* 1-14. https://doi.org/10.1093/imaman/10.1.1
35. Lawson, G. H. (1992). *Studies in cash flow accounting and analysis.* Garland Publishing, Inc., New York and London.
36. Lee, T. A. (1985). *Towards a theory and practice of cash flow accounting, accounting thought and practice through the years.* Garland Publishing, New York.
37. Lee, T. A. (1993). C*ash flow reporting: A recent history of an accounting practice*. New works in Accounting History, Garland Pub, New York.
38. Leuz, C. (2010). Different approaches to corporate reporting regulation: How jurisdictions differ and why. *Accounting and Business Research, 40(3),* 229-256. https://doi.org/10.1080/00014788.2010.9663398
39. Lev, B. (1983). Some economic determinants of the time-series properties of earnings. *Journal of Accounting and Economics, 5(1),* 31-38. https://doi.org/10.1016/0165-4101(83)90004-6
40. Lipe, R. (1990). The relation between stock returns and accounting earnings given alternative information. *The Accounting Review, 65(1),* 49-71.
41. Moscariello, N., La Rosa, F., & Bernini, F. (2016). *From the income statement model to the balance sheet model: An empirical analysis on the impact on SMEs' earnings quality.* Retrieved from https://arpi.unipi.it/retrieve/handle/11568/846156/268991/Bernini_846156_1.pdf
42. Murdoch, B., & Krause, P. (2012). The decline in matching and earnings' ability to forecast operating cash flows. *Journal of Applied Business Research, 28(4),* 701-708. https://doi.org/10.19030/jabr.v28i4.7053
43. Nissim, D., & Penman, S. H. (2001). Ratio analysis and equity valuation: From research to practice. *Review of Accounting Studies, 6(1),* 109-154. https://doi.org/10.1023/A:1011338221623
44. Nobes, C. (2001). *GAAP 2001: A survey of national accounting rules benchmarked against international accounting standards.* PricewaterhouseCoopers.
45. Orens, R., Renders, A., & Crabbé, K. (2010). Voluntary adoption of international financial reporting standards in private firms: The German case. In *Proceedings of Eufin 2010: Workshop on European financial reporting* (pp. 1-21). University of Stirling.
46. Piotroski, J. D. (2000). Value investing: the use of historical financial statement information to separate winners from losers. *Journal of Accounting Research, 38,* 1-41. https://doi.org/10.2307/2672906
47. PricewaterhouseCoopers. (2006). *IFRS: Tax implications for the EU financial industry - Are you ready?* Retrieved from www.pwc.com.

48. Schlesselman, J. J. (1982). *Case-control studies: Design, conduct, analysis.* Oxford University Press, New York (NY).
49. Singer, Z., & You, H. (2011). The effect of Section 404 of the Sarbanes-Oxley Act on earnings quality. *Journal of Accounting, Auditing & Finance, 26(3),* 556-589. https://doi.org/10.1177/0148558X11401554
50. Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review, 71(3),* 289-315.
51. Soderstrom, N. S., & Sun, K. J. (2007). IFRS adoption and accounting quality: A review. *European Accounting Review, 16(4),* 675-702. https://doi.org/10.1080/09638180701706732
52. Srivastava, A. (2014). Why have measures of earnings quality changed over time? *Journal of Accounting and Economics, 57(2),* 196-217. https://doi.org/10.1016/j.jacceco.2014.04.001
53. Su, S. Y. (2005). To match or not to match. *The British Accounting Review, 37,* 1-21. https://doi.org/10.1016/j.bar.2004.08.001
54. Subramanyam, K. R. (1996). The pricing of discretionary accruals. *Journal of Accounting and Economics, 22(1),* 249-281. https://doi.org/10.1016/S0165-4101(96)00434-X
55. Zimmerman, A. B., & Bloom, R. (2016). The matching principle revisited. *Accounting Historians Journal, 43(1),* 79-119. https://doi.org/10.2308/0148-4184.43.1.79