

The value relevance of the fair value hierarchy. Empirical evidence from the European Union

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Abstract

This paper investigates the value relevance of the fair value hierarchy disclosed for financial instruments through a sample of 97 financial entities listed over the period 2011-2016 in the stock markets of 23 European countries. Its main objectives are threefold. First, by analysing the European setting, the paper means to study the value relevance of the fair value hierarchy to judge the choice of the International Accounting Standard Board (IASB) to extend the disclosure of the hierarchy to all the assets and liabilities. Second, the paper aims to evaluate the choice of abandoning management intent as a criterion for the classification and measurement of financial instruments investigating the effect that such an intent has on the value relevance of the fair value hierarchy. Finally, by studying the effect that exposure to risks has on the value relevance of the fair value hierarchical levels, the paper plans to investigate the implications that the disclosure of the hierarchy could have on the rules of Basel 3 capital adequacy. Formulating three different research hypotheses, the findings validate them providing evidence that the value relevance of fair value measurement depends on the source of inputs used to estimate fair value and that both management intent and the risk intensity of the asset book only affect the value relevance of the less reliable fair value estimates. These results are useful for standard setters and regulators. Actually, for the investors decisions, they suggest the importance of disclosing the fair value hierarchy for all the assets and liabilities as required by IFRS 13, as well as the advantage of replacing in IFRS 9 the management intent criterion

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with the business model test and the characteristics of the instruments for the classification and measurement of financial instruments. For the future, the findings suggest the opportunity to introduce filters within the common equity tier 1 for the less reliable fair value estimates. This paper's current and future implications for standard setters and regulators are to avoid earnings management and capital management behaviour possibly affecting the quality of financial reporting.

Keywords: value relevance, fair value hierarchy, IFRS 13, financial entities.

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Introduction

During the last decades, the attention of academics, practitioners and standard setters paid to the use of fair value accounting in financial reporting has increased. This is especially true after the recent financial crisis that has cast doubts on the use of fair value in financial statements and has refreshed a theoretical debate concerning the pros and cons of this method (Quagli, 2009, p. 94). Its proponents argue that fair value is more value relevant, better reflects the real volatility of assets/liabilities values, is more timeliness and so enhances the possibility of effective corrective actions, improves the transparency of financial statements and does not accelerate a financial crisis, being only the innocent messenger of bad news. On the other hand, its opponents claim that the valuations at fair value are less verifiable, particularly when they lack an active market, are more subject to the errors (intentional or unintentional) of managers, exacerbate the financial crisis and, more generally, contribute to pro-cyclicality. In this context, both the Financial Accounting Standards Board (FASB) in SFAS 157 and the IASB (in IFRS 7 before and IFRS 13 as of 1st January 2013) issued accounting standards on fair value measurement. Before the issuance and adoption of IFRS 13, despite the many common projects between the two standard setters, there were significant differences between accounting regulations on fair value measurement. With the adoption of IFRS 13 "Fair value measurement", these differences almost entirely disappeared. Among the disclosure requirements, IFRS 13 and SFAS 157 oblige entities to disclose fair value in the so-called fair value hierarchy according to the inputs used to estimate it. This hierarchy is composed of three levels. Level 1 refers to the prices of identical assets/liabilities traded in active markets, level 2 refers to the observable inputs of

similar instruments (e.g., the prices of similar assets/liabilities traded in active markets or the prices of identical assets/liabilities traded in inactive markets) and level 3 refers to unobservable inputs (e.g., the present value of expected cash flows). The goal of the accounting standards mentioned above is to make investors able to distinguish the level of reliability of fair value estimates, which should decrease moving from level 1 to level 3. Their issuance has increased the attention of academics who, over time, have investigated different topics. For instance, they have studied the value relevance of the fair value hierarchy as required by the SFAS 157 since the financial crisis in 2008 (Goh et al., 2015) and the ability of the quality of corporate governance (Song et al., 2010; Siekkinen, 2016a) or investor protection (Siekkinen, 2016b) to affect the value relevance of the less reliable fair value estimates. This research has been motivated by the growing interest of academics in the value relevance of the fair value hierarchy. Its objectives are threefold.

First, this paper aims to assess and compare the value relevance of the fair value hierarchy disclosed for financial instruments by European financial entities in order to judge the choice of the IASB to extend the disclosure of the hierarchy to all the assets and liabilities. Prior studies showed that the disclosure of the hierarchy has increased transparency and has reduced information asymmetry between managers and investors (Song et al., 2010). However, fair value estimates lack reliability due to the application of subjective criteria allowed by level 3 fair value (Sannino, 2014). Thus, our first hypothesis is that the value relevance of fair value decreases moving from level 1 to level 3.

The second purpose of this paper is to verify whether the discretion behind the classification and measurement of financial instruments according to the requirement of IAS 39 affects the value relevance of the single levels of the fair value hierarchy. This is to evaluate the choice of the IASB of abandoning in IFRS 9 management intent as a criterion for the classification and measurement of financial instruments. Our second hypothesis is that management intent does not affect the value relevance of fair value estimated by using observable inputs but only the less reliable level 3. This is because the classification of financial instruments in a specific category leads managers to carry out earnings management behaviour. Possible forms of misrepresentation of financial information due to accounting discretion (Leuz et al., 2003) impair the value relevance of the less reliable fair value estimates given the high level of information asymmetry between managers and investors, especially relating to the reliability of Level 3 inputs (Song et al., 2010, p. 1390).

Third, the paper aims at verifying if exposure to risks affects the value relevance of the different hierarchical levels to investigate the implications

that the disclosure of the hierarchy could have with the rules of Basel 3 capital adequacy. Moving from those studies that criticised the capital adequacy rules (Jones, 2000; Blundell- Wignall et al., 2013), according to our third hypothesis the risk intensity of the asset book only affects the value relevance of financial instruments measured at fair value level 3. This is because fair value level three could be easily manipulated to provide better capital ratios given the absence of prudential filters within the common equity tier 1 that avoid possible capital management behaviour. This increases the reliability concerns about the less reliable fair value estimates.

To test our hypotheses, we focused on a sample of 97 financial entities (582 firm-year observations) listed over the period 2011-2016 on the stock exchanges of 23 European countries.

Our findings provide evidence that the value relevance of fair value measurement depends on the source of inputs used to estimate fair value. Both for financial assets and liabilities, they show that level 1 is more value relevant than level 2, which is in turn more value relevant than level 3. The disclosure of the hierarchy is an instrument that allows investors to distinguish the reliability of fair value estimates by inducing them to place different weights according to their reliability concerns towards such estimates.

These results contribute to the literature because few papers published in academic journals have focused on the value relevance of the fair value hierarchy centring on the European context. To the best of our knowledge, only Siekkinen (2016a) investigated this context with the purpose of studying the relationship between the value relevance of fair value estimates and some corporate governance characteristics of the financial entities analysed. The majority of scholars have investigated the US setting (e.g., Kolev, 2009; Song et al., 2010; Goh et al., 2015).

The findings also show that management intent only affects the value relevance of the less reliable fair value estimates. The results show that while the value relevance of fair value estimated by using observable inputs does not change between the different categories of financial instruments measured at fair value, the value relevance of level 3 is different if one compares the weight placed by investors on fair value of the different categories of financial instruments measured with unobservable inputs. This result could be explained by the higher probability of carrying out earnings management behaviour due to the discretion behind the classification of financial instruments and the facility to manipulate fair value estimated by using firm-generated inputs. For this result, the paper completes and goes beyond the findings of Koonce et al. (2011), who investigate the effect of management intent

on value relevance without controlling, for financial instruments measured at fair value, which are the kind of inputs used to estimate fair value.

Finally, the results show that other than management intent, the risk intensity of the asset book also affects the value relevance of the less reliable fair value estimates. In particular, the paper shows that in banks that have a comparatively higher exposure to risks, investors are concerned about the less reliable level 3 with respect to banks with lower risk exposure. This is because of the higher probability of capital management behaviour in fair value estimates. To the best of our knowledge, this result is new in the accounting literature and provides novel research opportunities in the misrepresentation field of research.

Other than contributing to the accounting literature, the findings have implications for standard setters and authorities that have to exercise surveillance, pursuing a prudent management of intermediaries, stability and the overall efficiency of the financial system. Standard setters have enough evidence to be aware of the usefulness of extending the disclosure of the fair value hierarchy to all the assets and liabilities measured at fair value with the introduction of IFRS 13 “Fair value measurement”. Different motivations that could lead managers to carry out earnings management (e.g., to achieve earnings targets) and capital management behaviour (e.g., to comply with the capital adequacy rules) can lead them to manipulate the less reliable fair value estimates. Also regulators and all the authorities that have to survey the banking system can consider the fair value hierarchy as a useful instrument to detect the items of annual reports for which an abuse of accounting policies can be used to artificially manipulate the regulatory capital. Consequently, they can evaluate the opportunity of introducing additional rules to filter from the computation of the regulatory capital the change of earnings or the increase of accumulated other comprehensive income (OCI) due to the changes of level 3 fair value assets and liabilities or to re-introduce a filter for fair value measurement in the Basel III capital rules.

The paper is composed of six sections. After the introduction, the second section references the literature and formulates our research hypotheses. In the third, the research design useful to test these hypotheses is described. The fourth section is dedicated to the presentation of the sample selection and descriptive statistics, while in section five one can find the research results. In the last section, the paper discusses the results, shows their limitations and their further future development.

1. Literature review

Value relevance is one of the most important areas of accounting studies on the capital market (Azzali, 2012) that in the last twenty years has been investigated with theoretical and empirical research (Fornaciari, 2013, p. 54). The expression refers to the ability of accounting amounts to reflect the underlying economic value of the firm (Hung and Subramanyam, 2007, p. 639), measured by stock market prices as a synthesis of the market participants' beliefs about future cash flows and discount rates. Therefore, accounting amounts are value relevant if they are associated with stock prices, and value relevance research assesses how well accounting amounts reflect the information used by investors (Barth et al., 2001, p. 77). The topic has been investigated at the beginning in an international setting (e.g., Easton and Harris, 1991; Ohlson, 1995; Easton, 1999; Barth et al., 2001; Mitra and Hossain, 2009) and then by Italian scholars. In Italy, academics investigated the effect of the IFRS mandatory adoption on accounting quality (Paglietti, 2009; De Valle et al., 2010) and the value relevance of accounting amounts (Azzali et al., 2012), showing a particular interest, after its introduction, in the value relevance of comprehensive income and its components (Veltri and Ferraro, 2012; Mechelli and Cimini, 2013, 2014). Still in Italy, there is a strand of literature that focuses on the value relevance of non-financial indicators such as the "change in mono-brand stores" (Dainelli and Giunta, 2011) and the effect of the financial crisis on value relevance (Veltri and Silvestri, 2011).

For the value relevance of fair value, previous authors generally found the value relevance of fair value of financial instruments when they are traded in an active market (Ahmed and Takeda, 1995; Barth et al., 1996; Eccher et al., 1996; Nelson, 1996). Conflicting results arise when they analyse the value relevance of fair value of financial instruments in the case of an inexistence of prices from active markets (Barth et al., 1996; Nelson, 1996; Eccher et al., 1996). These results seem to suggest that fair value estimates are value relevant but that they are affected by the source of information. Actually, when the reliability of the input is high – fair value is estimated based upon the prices of identical assets/liabilities in active markets (e.g., mark-to-market) – fair value estimates are always value relevant, while when we move towards a situation in which fair value is estimated by using firm-generated inputs (the so called mark-to-model), empirical findings are not univocal. These results are coherent with the theoretical assumptions that investors are less confident in fair value estimates when managers exercise their discretion. The literature highlights that the perceived reliability of investors decreases when both the incentives and the possibilities managers

have of manipulating financial reporting estimates increase (Barth et al., 1996; Danbolt and Rees, 2008). In this regard, empirical evidence shows that managers manipulate financial statements, carrying out earnings management behaviour to accomplish their own interests (Aboody et al., 2006; Bartov et al., 2007; Nissim, 2003) or capital management behaviour (Ahmed et al., 1999) to comply with the capital adequacy rules. The possibility of these behaviour is obviously higher when they estimate fair values using models instead of observable prices. Moreover, we should also consider that managers could both make unintentional mistakes when they have to choose the models or select inputs and have an unintentional upwards optimism (Martin et al., 2006). The literature highlights that value relevance research operationalises relevance and reliability criteria. An amount is value relevant only if includes information relevant for investors and reliable enough to affect investor decisions (Barth et al., 2001, p. 80), and has trouble exactly distinguishing relevance and reliability before the issuance of standards that allows researchers, and users, to know the source of input for value estimates.

The mandatory disclosure of the fair value hierarchy helps investors to discern the reliability of fair value estimates, increases transparency and reduces information asymmetries (Song et al., 2010), having a positive effect on companies' valuation and cost of capital (Broberg et al., 2010).

By investigating the US setting, Song et al. (2010) analysed the value relevance of level 1, level 2 and level 3 estimates through using the first three quarterly reports of banks in 2008. They found level 1 and 2 significantly more value relevant than level 3. Other authors in the USA have conducted similar research. Goh et al. (2015) analysed a sample of U.S. banks for the period 2008-2011. They found that each of the three levels is value relevant and that the differences between the pricing of the estimates are reduced over time, suggesting that as market conditions stabilised in the aftermath of the 2008 financial crisis, reliability concerns about level 3 estimates dissipated to some extent. Also, Kolev (2009) analysed the first two quarters of 2008 focusing on financial entities that operate in the US. He found that each of the three levels is value relevant, having level 2 and level 3 coefficients consistently lower than that of level 1, even though only the difference between the coefficients of level 3 is significantly different from that of level 1. Hence, the value relevance of fair value decreases with a drop in the fair value hierarchy from level 1 to level 3.

The studies carried out by Kolev (2009), Song et al. (2010) and Goh et al. (2015) can only tell us how value relevant fair values are in the USA and nothing about how investors rely on fair values in a European context. To the best of our knowledge, only Siekkinen (2016a) focuses on the fair value

hierarchy disclosed by European entities. This scholar examines if the adoption of IFRS 13 affected the value relevance of fair values, also controlling for corporate governance mechanisms. Prior to IFRS 13, level 1 and level 2 assets were more value relevant than level 3 assets, while in a post IFRS 13 era these differences have diminished. These findings indicate that the IASB has achieved its goal of reducing the information asymmetry related to fair value estimates. Hence, this study strengthens the assumption made by Barth et al. (2008) that standard setters could increase accounting quality if accounting standards limited managers' opportunistic behaviour. Siekkinen (2016b) conducted another value relevance study by analysing financial firms from 34 countries (2012-2014). This research concludes that fair values estimates are more value relevant than those which are non-fair value. Investors seem to pay more attention to fair value assets than to historical values (non-fair values) as they believe that managers are conservative when estimating fair value. Compared with Siekkinen (2016a), not all the countries analysed in Siekkinen (2016b) belong to the EU.

After this overview of studies that assessed the value relevance of the fair value hierarchy, even though they had some differences we can conclude that all the research seems to highlight that level 1 of fair value is more value relevant than level 3. More conflicting results arise when level 2 has been detected because it is an intermediate case whose value relevance has been found to be similar to that of level 1 and to that of level 3, depending on the paper analysed. In this regard, all the fair value levels should be value relevant because disclosing the inputs of fair value estimates ought to increase transparency and reduce information asymmetries (Song et al., 2010), having positive effects on companies' valuation and cost of capital (Broberg et al., 2010). Comparing the value relevance of the different levels, our expectation is that the different quality of inputs used to estimate fair value should make a difference in the weight investors place on fair value estimates. In detail, level 1 is more value relevant than level 2. This in some cases (e.g., the choice of similar assets/liabilities) both gives managers the possibility of opportunistic behaviour and generates risks of unintentional mistakes. Nonetheless, level 2 should be more value relevant than level 3, where the discretion of managers is very high, having the consequent possibility which has just been remarked of both opportunistic behaviour and unintentional mistakes. The decrease of the value relevance moving from level 1 to level 3 could be justified by the drop of reliability of fair value estimates. In fact, IFRS 13 examines reliability with reference to the prices observed in active markets, which are considered the most reliable measures of fair value. In

some circumstances, this reliability is lacking due to the application of subjective criteria allowed by level 3 fair value (Sannino, 2014).

This leads us to formulate our first hypothesis:

H₁: The value relevance of fair value decreases moving from level 1 to level 3.

Once hypothesised that the value relevance of fair value decreases moving from level 1 to level 3, we investigate if the weight placed by investors on the same level of the hierarchy disclosed for the different categories of financial instruments measured at fair value is the same. If so, management intent that determines the classification and measurement of financial instruments according to the requirement of IAS 39 does not affect the value relevance of the fair value hierarchy. To the best of our knowledge, no papers have compared the value relevance of the fair value hierarchy between the different categories of financial instruments.

To formulate a hypothesis, we can start from Koonce et al. (2011), according to whom the management's intent influences the investors' judgments about the value relevance of fair value. These scholars focused on the value relevance of the different categories of financial instruments but they did not control for the level of the hierarchy in which fair value has been classified. The problem of management intent is the discretion that it produces in the classification and measurement of financial instruments. Prior studies have shown how accounting discretion is a source of earnings management behaviour (Leuz et al., 2003). Earnings management occurs when managers use judgments in financial reporting and in structuring transactions to alter financial reports either to mislead some stakeholders about the company's underlying economic performance or to influence contractual outcomes that depend on reported accounting numbers (Healy and Wahlen, 1999, p. 365). Managers can abuse this discretion to accomplish their own interests. The disclosure of the fair value hierarchy might obstruct the impairment of the financial reporting quality due to accounting discretion and should relegate concerns about fair value estimates due to earnings management to fair value estimated by using firm-generated inputs. Prior studies support our arguments and show that IFRS 13 has successfully reduced the information asymmetry related to fair value estimates (Siekkinen, 2016a) with the disclosure of the fair value hierarchy. The ability of investors to distinguish the inputs used to estimate fair value leads us to hypothesise that accounting discretion due to management intent should affect only in part the value relevance of the hierarchical levels of fair value. In particular, the mandatory disclosure of the hierarchy should not affect the value relevance

of financial instruments measured at fair value using observable inputs that ought to be the same irrespective of the category in which the financial instrument has been classified. Indeed, the value relevance of financial instruments measured by using quoted prices of the same instrument (or of similar instruments) should be the same regardless of the managers classifying them. On the contrary, given the high level of information asymmetry between managers and investors, especially relating to the reliability of level 3 inputs (Song et al., 2010, p. 1390), the value relevance of level 3 fair value ought to be different between the categories of financial instruments because of the probability that the classification in a category might hide earnings management behaviour.

Thus, our hypothesis is the following:

H₂: Management intent only affects the value relevance of the less reliable level 3.

Other than studying the effect of management intent on the value relevance of fair value estimates, this paper investigates the effect that the exposure to risks measured in terms of the risk intensity of the asset book has on the value relevance of fair value estimates.

To formulate a preliminary hypothesis, one should take into account that the attitude of inflating earnings arising from the valuation of fair value level 3 held-for-trading financial instruments and inflated OCI due to fair value level 3 available-for-sale securities are capital management (Ahmed et al., 1999) behaviour. In fact, they produce an increase of regulatory capital that does not find a prudential filter within the common equity tier 1 capital. Those scholars that manifested certain scepticism towards both regulatory capital and the Basel rules support the hypothesis of capital management behaviour. According to their studies, not only could regulatory capital be affected by some arbitrage phenomena but the risk weighting system might also be easily manipulated to provide better capital ratios. This does little to enhance underlying safety and soundness (Jones, 2000, p. 36). In addition, Blundell-Wignall et al. (2013) argued that Basel 2 introduced an enormous moral hazard into the pillar 1 capital rules for large complex banks by letting them use their own internal risk models to determine the asset riskiness to which risk weighting would apply (Blundell-Wignall et al., 2013, p. 3). Therefore, the literature provides enough arguments to support the hypothesis that managers of banks that are more exposed to risks can manipulate fair value estimates to carry out capital management behaviour. The absence of

prudential filters within the common equity tier 1 makes more probable manipulations of held-for-trading and available-for-sale financial instruments measured by using unobservable inputs than for financial instruments measured at fair value for the use of a fair value option. Conversely, in banks with lower exposure to risks, such opportunistic behaviour are less likely because the capital adequacy rules are less of a burden than in the other category of financial entities.

Thus, our hypothesis is the following:

H₃: Asset riskiness affects the value relevance of financial instruments measured at fair value level 3.

2. Research design

To test our hypotheses, we used a modified version of the Ohlson (1995) model that is useful to assess the value relevance of financial assets and liabilities measured at fair value and disclosed in each of the levels of the fair value hierarchy according to the requirements of IFRS 7 and IFRS 13. Despite scholars involved in the value relevance of the fair value hierarchy using a share-deflated model to answer their research questions, our price models have unde-flated variables. The previous literature (e.g., Brown et al., 1999) raised doubts concerning the use of the number of shares as a deflator to mitigate the scale effect, however, Barth and Clinch (2009) argued that the unde-flated specification and the share-deflated specification perform the best regardless of the type of scale effect. Another common characteristic of the price models used in this research is the dependent variable (e.g., the market value of equity). Unlike Song et al. (2010), who used the monthly price-per-share as the dependent variable of the price model, we consider the fiscal-year end price-per-shares to calculate the market value of equity like in the fundamental Ohlson model, instead of the price-per-share four months after the fiscal year end (Siekkinen, 2016a, b) or the closing share price on the date immediately after the filing of the financial reports (Goh et al., 2015).

Following the accounting literature, we use the regression coefficients (Van Cauwenberge and De Beelde, 2007) and the t-statistics (Kousenidis et al., 2009) as measures of value relevance. As far as we are concerned, t-statistics are more useful than regression coefficients to measure value relevance as assessed scaling coefficients with their standard errors. In other

words, the t-statistics control for both the magnitude of the regression coefficients and their variability. The higher the regression coefficients and the t-statistics, the higher the value relevance of the accounting amounts.

To test our first research hypothesis that the value relevance of fair value decreases moving from level 1 to level 3 we use the following equation:

$$MV_{it} = \varphi_0 + \varphi_1 FVAL_{1it} + \varphi_2 FVAL_{2it} + \varphi_3 FVAL_{3it} + \varphi_4 FVLL_{1it} + \varphi_5 FVLL_{2it} + \varphi_6 FVLL_{3it} + \varphi_7 \widetilde{BV}_{it} + \varphi_8 NI_{it} + \varphi_9 L_{it} + \varphi_{10} L_{it} \times NI_{it} + \text{fixed effects} + \varepsilon_{it} \quad (1)$$

where¹:

MV_{it}	is the market value of equity;
$FVAL_{1it}$	are the financial assets measured at fair value by using observable inputs, whose fair value has been disclosed in level 1;
$FVAL_{2it}$	are the financial assets measured at fair value by using observable inputs, whose fair value has been disclosed in level 2;
$FVAL_{3it}$	are the financial assets measured at fair value by using unobservable inputs, whose fair value has been disclosed in level 3;
$FVLL_{1it}$	are the financial liabilities measured at fair value by using observable inputs, whose fair value has been disclosed in level 1;
$FVLL_{2it}$	are the financial liabilities measured at fair value by using observable inputs, whose fair value has been disclosed in level 2;
$FVLL_{3it}$	are the financial liabilities measured at fair value by using unobservable inputs, whose fair value has been disclosed in level 3;
$\widetilde{BV}_{it}$	is the book value purged by those financial assets and liabilities measured at fair value disclosed in one of the levels of the fair value hierarchy;
NI_{it}	is the net income;
L_{it}	is a dummy variable that is equal to 1 in the case of earnings being negative and 0 otherwise;
Fixed effects	are dummy variables that control for time and country effects.

The model allows for studying the value relevance of the single financial assets and liabilities measured by using fair value levels 1, 2 or 3. We expect to find a decrease of the value relevance of fair value measurement due to the loss of reliability moving from level 1 to level 3.

¹ The variables of equation [1] refer to the entity i at the end of fiscal year t .

To test our second research hypothesis that management intent affects the value relevance of the less reliable level 3, we use the following specification that is useful to assess and compare the value relevance of the different levels of the hierarchy disclosed for the categories of IAS 39 measured at fair value:

$$\begin{aligned} MV_{it} = & \varphi_0 + \varphi_1 FVAL_{12TRADit} + \varphi_2 FVAL_{3TRADit} + \varphi_3 FVAL_{12AFS_{it}} + \\ & \varphi_4 FVAL_{3AFS_{it}} + \varphi_5 FVAL_{12FVO_{it}} + \varphi_6 FVAL_{3FVO_{it}} + \varphi_7 FVL_{it} + \varphi_8 \bar{BV}_{it} + \\ & \varphi_9 NI_{it} + \varphi_{10} L_{it} + \varphi_{11} L_{it} \times N_{it} + \text{fixed effects} + \varepsilon_{it} \end{aligned} \quad (2)$$

where TRAD, AFS and FVO represent the Held-for-trading, the Available-for-sale and the fair value option categories.

To avoid multicollinearity biasing the research results, we test the hypothesis only for financial assets, distinguishing between the different categories in which they can be classified according to management intent. In fact, to avoid biases due to multicollinearity, with respect to equation (1), we differentiated between the different categories of financial instruments, aggregating those measured using observable inputs. For the same reason, financial liabilities have been aggregated into a single variable. While the coefficient of financial liabilities is expected to be negative and statistically significant for financial assets, according to our arguments the discretion of management intent should only affect the value relevance of fair value measured by using unobservable inputs. Using the regression coefficients as a measure of value relevance, we expect to find no statistically significant differences between the coefficients φ_1 , φ_3 and φ_5 . This is because the value relevance of fair value measured by using observable inputs ought not to be influenced by management intent that drives the classification and measurement of financial instruments. Conversely, we expect to find a statistically significant difference between the regression coefficients φ_2 , φ_4 and φ_6 of financial assets classified into the different categories of IAS 39 and measured by using unobservable inputs because of possible earnings management behaviour behind the opaquest fair value estimates due to the discretion causing their classification.

To test our last hypothesis, that the asset riskiness affects the value relevance of financial instruments measured at fair value level 3, we downloaded the risk weighted asset intensity ($RWAI_{it}$). This is the ratio between the risk weighted assets and the total assets that we assume to be a measure of the exposure of the firm to risks. Splitting this variable at the median, we run equation (2) over and under the median in order to distinguish results accord-

ing to the level of risk exposure. According to our expectations, the regression coefficients φ_2 , φ_4 and φ_6 should not be statistically significant in banks that are more exposed to risks, because of the higher probability of intentional mistakes of fair value estimates to carry out capital management behaviour.

3. Sample selection and descriptive statistics

To test our research hypotheses, we analysed a sample of 97 financial entities listed on the stock exchanges of the 23 EU countries over the period 2011-2016. Using the Orbis Bank Focus database, the initial sample has 228 financial entities. Exclusions concern financial entities whose accounting amounts were not available for the entire period analysed (110) and those (21) that do not calculate the risk weighted assets because of the nature of their business models (e.g., real estate and central banks). The focus on the 2011-2016 time-window is due to the availability of data required to test our hypotheses in the Orbis Bank Focus database. The interest in the European setting is a result of the limited number of studies that have focused on this context.

Table 1 summarises the EU countries analysed with the number of financial entities that belong to the initial sample, the number of entities analysed due to the absence of available accounting data and without the information of risk weighted assets.

The table shows that Italy is the country with the majority of financial entities included in the sample. This is due to the high standardisation of the tables that financial entities have to tabulate in their notes according to the requirements of the Circular 262 of 22 December 2005, “Banks’ financial statements: layout and preparation” issued and updated by the Bank of Italy.

Table 2 provides the main descriptive statistics of data that concern the entities which belong to our sample and in particular the means and the percentiles.

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Table 1 – Sample selection strategy

Countries	Initial sample	Accounting series not available	RWA not available	Entities	Firm-year observations
Austria	10	4	0	6	36
Belgium	4	1	1	2	12
Bulgaria	4	3	0	1	6
Cyprus	2	1	0	1	6
Czech Republic	2	1	0	1	6
Denmark	11	3	0	8	48
Estonia	1	1	0	0	0
Finland	5	4	0	1	6
France	33	17	10	6	36
Germany	17	9	2	6	36
Greece	6	1	1	4	24
Hungary	2	0	0	2	12
Ireland	3	1	0	2	12
Italy	27	10	2	15	90
Lithuania	1	1	0	0	0
Luxembourg	2	2	0	0	0
Malta	5	1	1	3	18
Netherlands	6	2	0	4	24
Poland	13	3	2	8	48
Portugal	4	2	0	2	12
Republic of Croatia	3	1	0	2	12
Romania	3	1	0	2	12
Slovakia	2	0	0	2	12
Spain	11	4	1	6	36
Sweden	7	2	0	5	30
United Kingdom	44	35	1	8	48
Total:	228	110	21	97	582

The table reports the number of entities listed in the EU over the period 2011-2016 according to the Orbis Bank Focus database, the number of exclusions due to missing data and the number of country-banks at the end of the sample selection process. In the last column, the number of firm-year observations is reported.

Table 2 – Descriptive statistics (mil/€) – years 2011-2016

	Percentiles					Mean
	10%	25%	50%	75%	90%	
MV_{it}	+1.13e ⁺⁰⁸	+4.80e ⁺⁰⁸	+1.73e ⁺⁰⁹	+1.03e ⁺¹⁰	+3.23e ⁺¹⁰	+1.03e ⁺¹⁰
$FVAL_{1it}$	+5.56e ⁺⁰⁷	+4.66e ⁺⁰⁸	+2.75e ⁺⁰⁹	+2.00e ⁺¹⁰	+1.06e ⁺¹¹	+3.20e ⁺¹⁰
$FVAL_{2it}$	+9.79e ⁺⁰⁶	+1.07e ⁺⁰⁸	+1.40e ⁺⁰⁹	+1.76e ⁺¹⁰	+1.63e ⁺¹¹	+5.52e ⁺¹⁰
$FVAL_{3it}$	+0.00	+6.55e ⁺⁰⁶	+1.21e ⁺⁰⁸	+1.60e ⁺⁰⁹	+1.05e ⁺¹⁰	+6.22e ⁺⁰⁹
$FVAL_{12TRADit}$	+0.00	+0.00	+9.13e ⁺⁰⁷	+3.48e ⁺⁰⁹	+1.09e ⁺¹¹	+2.81e ⁺¹⁰
$FVAL_{3TRADit}$	+0.00	+0.00	+0.00	+5.28e ⁺⁰⁷	+2.48e ⁺⁰⁹	+7.96e ⁺⁰⁸
$FVAL_{12AFSIt}$	+0.00	+5.75e ⁺⁰⁷	+1.52e ⁺⁰⁹	+9.89e ⁺⁰⁹	+6.23e ⁺¹⁰	+2.11e ⁺¹⁰
$FVAL_{3AFSIt}$	+0.00	+0.00	+1.24e ⁺⁰⁷	+2.31e ⁺⁰⁸	+2.24e ⁺⁰⁹	+6.27e ⁺⁰⁸
$FVAL_{12FVOit}$	+0.00	+6.93e ⁺⁰⁴	+4.70e ⁺⁰⁸	+8.87e ⁺⁰⁹	+8.55e ⁺¹⁰	+3.76e ⁺¹⁰
$FVAL_{3FVOit}$	+0.00	+0.00	+2.41e ⁺⁰⁶	+2.48e ⁺⁰⁸	+3.56e ⁺⁰⁹	+4.79e ⁺⁰⁹
$FVLL_{1it}$	+0.00	+0.00	+4.14e ⁺⁰⁶	+1.41e ⁺⁰⁹	+2.53e ⁺¹⁰	+1.17e ⁺¹¹
$FVLL_{2it}$	+0.00	+2.86e ⁺⁰⁷	+9.40e ⁺⁰⁸	+1.59e ⁺¹⁰	+1.38e ⁺¹¹	+4.91e ⁺¹⁰
$FVLL_{3it}$	+0.00	+0.00	+0.00	+1.25e ⁺⁰⁸	5.49e ⁺⁰⁹	+4.74e ⁺⁰⁹
FVL_{it}	+0.00	+4.87e ⁺⁰⁷	+1.31e ⁺⁰⁹	+2.68e ⁺¹⁰	+2.02e ⁺¹¹	+1.71e ⁺¹¹
$\widetilde{BV}_{it}$	-1.61e ⁺¹¹	-2.31e ⁺¹⁰	-3.36e ⁺⁰⁹	-3.10e ⁺⁰⁸	+6.17e ⁺⁰⁸	+1.69e ⁺¹¹
BV_{it}	+1.65e ⁺⁰⁸	+5.52e ⁺⁰⁸	+2.14e ⁺⁰⁹	+1.25e ⁺¹⁰	+5.16e ⁺¹⁰	+1.37e ⁺¹⁰
NI_{it}	-3.30e ⁺⁰⁸	+6.22e ⁺⁰⁶	+1.04e ⁺⁰⁸	+5.31e ⁺⁰⁸	+2.27e ⁺⁰⁹	+3.40e ⁺⁰⁸
L_{it}	+0.00	+0.00	+0.00	+0.00	+1.00	+0.19
$RWAI_{it}$	+22.66	+36.05	+50.08	+64.42	+75.84	+51.58

The table reports the percentiles and the mean of the variables used in this paper to test our hypotheses.

The table suggests that fair value assets level 1 and 2 are more common than fair value asset level 3, both distinguishing the different categories of financial assets and aggregating them. For financial liabilities, level 2 is more common than levels 1 and 3. Comparing financial assets and liabilities measured at fair value, the former are more common and higher than the latter. This is what explains why the book value purged by financial assets and liabilities measured at fair value ($\widetilde{BV}_{it}$) has a negative sign in at least 75% of the entities analysed. For the earnings coefficients, the table shows that the sample analysed has loss firms. The mean of the variable L_{it} indicates that 19% of financial entities included in the sample disclose a loss in the income statement. This is the reason why we add between the regressors of our price models the variable L_{it} and its interactions with the earnings coefficients. This is a methodological choice adopted in the literature by Chambers et al., 2007 to avoid biases due to the presence of loss firms in the sample analysed.

Table 3 concludes this section dedicated to descriptive statistics and presents the Pearson linear correlation coefficients between the dependent variable and the explicative variables included in our regression model. The coefficients tabulated in the table show that in some cases the correlation between the variables is not so high. In other cases, high correlation coefficients between regressors could bias the research results because of multicollinearity. The mean variance inflation factor (VIF) is 5.2 for equation (1) and 2.8 for equation (2). Considering a rule of thumb that the VIF should not exceed 10, our VIF values exclude biases in the research results due to multicollinearity.

Table 3 – Linear correlation coefficients

	MV _{it}	FVAL _{1it}	FVAL _{2it}	FVAL _{3it}	FVLL _{1it}	FVLL _{2it}	FVLL _{3it}	BV _{it}	NI _{it}	L _{it}	L _{it} x NI _{it}
MV _{it}	+1.00										
FVAL _{1it}	+0.74***	+1.00									
FVAL _{2it}	+0.56***	+0.68***	+1.00								
FVAL _{3it}	+0.14***	+0.18***	+0.19***	+1.00							
FVLL _{1it}	+0.29***	+0.19***	+0.10*	+0.01	+1.00						
FVLL _{2it}	+0.55***	+0.68***	+0.99***	+0.22***	+0.09**	+1.00					
FVLL _{3it}	+0.09**	+0.15***	+0.08**	+0.95***	+0.01	+0.10**	+1.00				
BV _{it}	+0.27***	+0.16***	+0.08*	+0.01	+0.99***	+0.07*	+0.01	+1.00			
NI _{it}	+0.55***	+0.41***	+0.22***	+0.05	+0.21***	+0.21***	+0.05	+0.20***	+1.00		
L _{it}	-0.07*	-0.03	+0.04	-0.01	-0.02	+0.06	-0.02	-0.02	-0.45***	+1.00	
L _{it} x NI _{it}	-0.03	-0.09**	-0.13***	-0.01	+0.01	-0.15***	+0.02	+0.01	+0.73***	-0.47***	+1.00

	MV _{it}	FVAL _{12TRADit}	FVAL _{12TRADit}	FVAL _{12AFSit}	FVAL _{3AFSit}	FVAL _{12FVOit}	FVAL _{3FVOit}	FVLIAB _{it}	BV _{it}	NI _{it}	L _{it}	L _{it} x NI _{it}
MV _{it}	+1.00											
FVAL _{12TRADit}	+0.56***	+1.00										
FVAL _{3TRADit}	+0.42***	+0.78***	+1.00									
FVAL _{12AFSit}	+0.71***	+0.76***	+0.51***	+1.00								
FVAL _{3AFSit}	+0.45***	+0.57***	+0.55***	+0.63***	+1.00							
FVAL _{12FVOit}	+0.43***	+0.34***	+0.53***	+0.34***	+0.37***	+1.00						
FVAL _{3FVOit}	+0.07*	+0.01	+0.07	+0.08**	+0.12***	+0.10**	+1.00					
FVLIAB _{it}	+0.31***	+0.14***	+0.09**	+0.24***	+0.15***	+0.11***	+0.01	+1.00				
BV _{it}	+0.27***	+0.08	+0.04	+0.18***	+0.10**	+0.05	-0.01	+0.99***	+1.00			
NI _{it}	+0.55***	+0.35***	+0.20***	+0.39***	+0.15***	+0.12***	+0.03	+0.22***	+0.20***	+1.00		
L _{it}	-0.07*	-0.04	-0.01	-0.01	+0.11**	+0.06	-0.01	-0.02	-0.02	-0.45***	+1.00	
L _{it} x NI _{it}	-0.03	-0.05	-0.05	-0.11***	-0.24***	-0.14***	+0.02	+0.01	+0.01	+0.73***	-0.47***	+1.00

The tables disclose the correlation coefficients between the variables of equations (1) and (2) and the level of significance (***) stands for 1% level of significance; ** for 5% level of significance; * for 10% level of significance) of the test whose null hypothesis is that such coefficients are equal to zero.

4. Results

To verify our first research hypothesis, we investigated the value relevance of each level of the fair value hierarchy running regression including all the 582 firm-year observations. Table 4 shows the findings achieved running equation (1).

Table 4 – The value relevance of the fair value hierarchy in the EU

	Predicted sign	Coefficients	T-statistics		
φ_0	+/-	$+1.07e^{09}$	+0.45	No of obs.:	582
φ_1	+	+0.67	+27.69***	F-statistic:	184.87***
φ_2	+	+0.69	+22.95***	Adj. R-sqr:	92%
φ_3	+	+0.76	+16.87***		
φ_4	-	-0.66	-24.21***		
φ_5	-	-0.73	-22.66***		
φ_6	-	-0.77	-17.11***		
φ_7	+	+0.66	+24.21***		
φ_8	+	+2.44	+8.73***		
φ_9		$-1.21e^{07}$	-0.02		
φ_{10}		-2.14	-5.96***		
Test statistics			Chi2(1)		
$\varphi_1 = \varphi_2$ (FVAL _{1it} = FVAL _{2it})			+0.32		
$\varphi_1 = \varphi_3$ (FVAL _{1it} = FVAL _{3it})			+2.18		
$\varphi_2 = \varphi_3$ (FVAL _{2it} = FVAL _{3it})			+3.14*		
$\varphi_4 = \varphi_5$ (FVLL _{1it} = FVLL _{2it})			+6.60**		
$\varphi_4 = \varphi_6$ (FVAL _{1it} = FVAL _{3it})			+4.63**		
$\varphi_5 = \varphi_6$ (FVAL _{2it} = FVAL _{3it})			+1.58		

(***) 1% level of significance; (**) 5% level of significance; (*) 10% level of significance

The table provides our findings of the OLS regression of equation (1): $MV_{it} = \varphi_0 + \varphi_1 FVAL_{1it} + \varphi_2 FVAL_{2it} + \varphi_3 FVAL_{3it} + \varphi_4 FVLL_{1it} + \varphi_5 FVLL_{2it} + \varphi_6 FVLL_{3it} + \varphi_7 \overline{BV}_{it} + \varphi_8 NI_{it} + \varphi_9 L_{it} + \varphi_{10} L_{it} \times N_{it} + \text{fixed effects} + \varepsilon_{it}$. The data are those collected for the 97 European financial entities belonging to our sample. For each regression coefficient, we disclosed the predicted sign, the t-statistics and its level of significance (1%, 5%, 10%). The table also shows the Chi-square statistics of the tests used to compare regression coefficients with each other.

A first interesting result shown in the table is that all the regression coefficients are value relevant at 1% level of significance, suggesting that investors consider accounting amounts disclosed in the annual reports of the entities analysed useful for their investment's decisions. For the fair value hierarchy, Ta-

ble 4 validates the first hypothesis that the value relevance of fair value decreases moving from level 1 to level 3, providing evidence that the weight investors place on accounting amounts changes in relation to the inputs used by the management for fair value estimates. The t-statistics provide stronger evidence than the regression coefficients that the value relevance of fair value estimates decrease moving from level 1 to level 3. For financial assets, the t-statistic of the regression coefficient of level 1 (e.g., 27.69) is higher than that of level 2 (e.g., 22.95), which is in turn higher than that of level 3 (16.87). This is true also for financial liabilities. When comparing the absolute value of t-statistics we find that those of level 1 (e.g., 24.21) are higher than those of level 2 (e.g., 22.66) and those of level 3 (e.g., 17.11). These results provide evidence that the most opaque fair value estimates are those that investors consider less useful for their economic decisions. This is coherent with the other studies mentioned in this research that investigated the value relevance of fair value estimates. This is probably due to the loss of reliability of fair value estimated by using unobservable inputs that also exacerbate the information asymmetries (Song et al., 2010) between the company and the market with respect to fair value estimated by using observable inputs.

Regarding assessing value relevance through the comparison of the regression coefficients, similar to studies which investigated the value relevance of the fair value hierarchy (Song et al., 2010; Siekkinen, 2016a; Siekkinen 2016b), they do not decrease moving from level 1 to level 3. A plausible explanation that justifies the high coefficient of level 3 can be found in Song et al. (2010) according to whom the magnitude of regression coefficients is affected by the effects of the recent financial turmoil. To understand the reasons, we can add that according to several scholars (e.g., Ohlson, 1995; Collins et al., 1999), the higher the persistence of the book value of equity and its components, the higher are both its capability to predict the expected future normal earnings and its value relevance. The recent financial turmoil has increased the variability of market prices used to estimate level 1 and 2 fair value and, as a consequence, has reduced their value relevance with respect to level 3. Therefore, despite the low level of the reliability of fair value estimated by using firm-generated inputs, the major persistence of level 3 fair value regarding that estimated by using observable inputs guarantees a higher value relevance measured by the regression coefficients. This explanation justifies not only some inconsistencies in the magnitude of our regression coefficients but also those achieved by previous studies that investigated listed firms during periods of financial turmoil. Yet, as far we are concerned, these findings do not contradict our hypothesis that the value relevance decreases moving from level 1

to level 3 because a test statistic fails to reject the null hypothesis that such coefficients are equivalent in magnitude.

The results shown in Table 5 also validate our second hypothesis that management intent affects the value relevance of fair value measured using unobservable inputs.

Table 5 – The effect of management intent on the value relevance of fair value estimates

	Predicted sign	Coefficients	T-statistics		
φ_0	+/-	-4.14e ⁰⁸	-0.16	No of obs.:	582
φ_1	+	+1.17	+21.01***	F-statistic:	147.55***
φ_2	+	+1.51	+7.02***	Adj. R-sqr:	91%
φ_3	+	+1.20	+22.70***		
φ_4	+	+0.52	+2.03**		
φ_5	+	+1.17	+21.30***		
φ_6	+	+1.20	+20.65***		
φ_7	-	-1.18	-21.16***		
φ_8	+	+0.59	+21.17***		
φ_9	+	+3.30	+10.70***		
φ_{10}	-	-2.28e ⁰⁶	-0.00		
φ_{11}	-	-3.18	-7.95***		
Test statistics					Chi2(1)
$\varphi_1 = \varphi_3 = \varphi_5$ (FVAL _{12TRADit} = FVAL _{12AFSIt} = FVAL _{12FVOIt})					+1.24
$\varphi_2 = \varphi_4 = \varphi_6$ (FVAL _{3TRADit} = FVAL _{3AFSIt} = FVAL _{3FVOIt})					+8.41**

(***) 1% level of significance; (**) 5% level of significance; (*) 10% level of significance

The table provides our findings of the OLS regression of equation (2): $MV_{it} = \varphi_0 + \varphi_1 FVAL_{12TRADit} + \varphi_2 FVAL_{3TRADit} + \varphi_3 FVAL_{12AFSIt} + \varphi_4 FVAL_{3AFSIt} + \varphi_5 FVAL_{12FVOIt} + \varphi_6 FVAL_{3FVOIt} + \varphi_7 FVL_{it} + \varphi_8 \bar{BV}_{it} + \varphi_9 NI_{it} + \varphi_{10} L_{it} + \varphi_{11} L_{it} \times NN_{it} + \text{fixed effects} + \varepsilon_{it}$. The data are those collected for the 97 European financial entities belonging to our sample. For each regression coefficient, we disclosed the predicted sign, the t-statistics and its level of significance (1%, 5%, 10%). The table also shows the Chi-square statistics of the tests used to compare regression coefficients with each other.

Running equation (2) and comparing the regression coefficients φ_1 , φ_3 and φ_5 of fair value measured using observable inputs of the different categories of IAS 39, we cannot reject the null hypothesis that these coefficients are statistically equivalent in magnitude. Conversely, we reject the hypothesis that the regression coefficients φ_2 , φ_4 and φ_6 of fair value measured by using unobservable inputs are statistically equivalent in magnitude.

Our findings suggest that level 3 fair value assets of the trading instruments are more value relevant (regression coefficient +1.51) than the those of the available-for-sale instruments (regression coefficient +0.52) and those

measured at fair value for the exercise of the fair value option (regression coefficient +1.20). Comparing the t-statistics, that of the trading assets (t-statistic equal to +7.02) is higher than that of the available-for-sale securities (t-statistic equal to +2.03), but lower than that of the categories of financial instruments measured at fair value for the exercise of the fair value option (t-statistic equal to +20.65). It is interesting to observe that within the single categories of financial instruments measured at fair value, the t-statistics of fair value measured using observable inputs are higher than those of the same categories measured using unobservable inputs. This provides further support for our first hypothesis.

Finally, the results tabulated in Table 6 validate our last research hypothesis that the risk intensity of the asset book affects the value relevance of the less reliable fair value estimates.

Table 6 – The risk intensity of the asset book and the relevance of fair value estimates

	Predicted sign	LOW RISK INTENSITY		HIGH RISK INTENSITY	
		Coefficients	T-statistics	Coefficients	T-statistics
φ_0	+/-	-6.76e ⁰⁹	-0.87	+1.92e ⁰⁹	+0.67
φ_1	+	+1.07	+13.89***	+1.27	+8.53***
φ_2	+	+1.48	+5.50***	+1.94	+0.72
φ_3	+	+1.10	+14.95***	+1.40	+11.82***
φ_4	+	+0.78	+2.35**	+0.84	+1.07
φ_5	+	+1.06	+13.86***	+1.49	+10.06***
φ_6	+	+1.09	+13.52***	+1.65	+9.73***
φ_7	-	-1.08	-13.88***	-1.53	-10.53***
φ_8	+	+0.54	+13.88***	+0.64	+11.31***
φ_9	+	+3.37	+8.25***	+0.86	+1.35
φ_{10}	-	-1.44e ⁰⁹	-0.68	+4.28e ⁰⁷	+0.08
φ_{11}	-	-3.15	-5.93***	-1.21	-1.70*
No of obs.:		291		291	
F-statistic:		89.51		61.55	
Adj. R-sqr:		91%		88%	
Test statistics		Chi2(1)		Chi2(1)	
$\varphi_1 = \varphi_2$ (FVAL ₁₂ TRAD _{it} = FVAL ₃ TRAD _{it})		+0.24		+0.06	
$\varphi_3 = \varphi_4$ (FVAL ₁₂ AFS _{it} = FVAL ₃ AFS _{it})		+1.54		+0.52	
$\varphi_5 = \varphi_6$ (FVAL ₁₂ FVO _{it} = FVAL ₃ FVO _{it})		+0.44		+8.83***	

(***) 1% level of significance; (**) 5% level of significance; (*) 10% level of significance

The table provides our findings of the OLS regression of equation (2) from the clusters of entities with high and low risk intensity of the asset book: $MV_{it} = \varphi_0 + \varphi_1 FVAL_{12}TRAD_{it} + \varphi_2 FVAL_{3}TRAD_{it} + \varphi_3 FVAL_{12}AFS_{it} + \varphi_4 FVAL_{3}AFS_{it} + \varphi_5 FVAL_{12}FVO_{it} + \varphi_6 FVAL_{3}FVO_{it} + \varphi_7 FVL_{it} + \varphi_8 \widehat{BV}_{it} + \varphi_9 NI_{it} + \varphi_{10} L_{it} + \varphi_{11} L_{it} \times N_{it} + \text{fixed effects} + \varepsilon_{it}$. The data are those collected for the 97 European financial entities belonging to our sample. For each regression coefficient, we disclosed the predicted sign, the t-statistics and its level of significance (1%, 5%, 10%). The table also shows the t-statistics of the tests used to compare the statistically significant coefficients of financial assets (and liabilities) with each other.

Running equation (2) over the cluster of financial entities with low exposure to risks, we find that all the categories of financial instruments measured at fair value are statistically significant at the 1% level ($p\text{-value} < 1\%$). Running the price model over the cluster of financial entities with a high exposure to risk, all the regression coefficients continue to be statistically significant except those of the held-for-trading and available-for-sale financial assets measured by using unobservable inputs. This validates our hypothesis that an increase of the risk intensity of the asset book leads investors to manifest reliability concerns towards the less reliable fair value estimates. It is interesting to observe that the increase of the risks exposure does not affect the level 3 value relevance of financial instruments measured at fair value for the exercise of the fair value option. In fact, they are value relevant in both the clusters. A possible explanation of this result is the presence of prudential filters within the common equity tier 1 that avoid regulatory capital changing in specific cases of adoption of the fair value option.

To test the robustness of our findings we did several sensitivity analyses.

In the first, we re-ran our models before and after the adoption of IFRS 13 in order to test whether the change of requirements of the fair value hierarchy affects the results. The research hypotheses continue to be validated. Running equation (1) before (after) the adoption of IFRS 13, the results not tabulated show that the value relevance of fair value decreases moving from level 1 to level 3. T-statistics are equal to 24.90 (10.86), 21.33 (9.37) and 16.76 (2.00) for fair value assets and 22.08 (9.46), 20.74 (9.40) and 16.91 (1.96) for fair value liabilities. The regression coefficients continue to be not statistically different from each other and do not diverge over time, providing evidence that there is not a structural break between them. The results also validate the hypothesis that management intent does not affect the weight investors place on fair value of financial assets estimated by using the prices of the same or similar instruments but only that of the less reliable level 3. Testing that the regression coefficients are statistically equivalent, we fail to reject the null hypothesis of equivalence both before ($p\text{-value}$ equal to 0.38) and after ($p\text{-value}$ equal to 0.28) the introduction of IFRS 13. Divergences exist only between the coefficients of level 3 fair value ($p\text{-value} < 5\%$). Finally, running equation (2) over the clusters of entities with high and low risk intensity, we confirm the finding of the main analysis that in firms with a high risk intensity of the asset book, fair value level 3 of the held-for-trading and available-for-sale categories is not statistically significant either before or after the introduction of IFRS 13. A possible explanation of all these results is the fact that IFRS 13 has extended the disclosure of the fair value hierarchy to non-financial assets measured at fair value without introducing

significant changes for the fair value hierarchy of financial instruments. Therefore, our first test validates the finding of Siekkinen (2016a) that IFRS 13 has had only minor effects on the value relevance of fair values.

In the second test, we use the market capitalisation four months after the fiscal year end as the dependent variable of our price models, as in Siekkinen (2016a, b). The findings achieved in this test validate those of the main analysis. For our first hypothesis, the t-statistics estimated for the coefficients of equation (1) decrease moving from level 1 to level 3. For fair value assets, they are equal to 15.02, 12.40 and 8.99; for fair value liabilities, they are equal to 12.95, 12.25 and 9.07. The regression coefficients of equation (2) continue to be not statistically different from each other. For the second hypothesis, the findings validate that management intent affects the value relevance of fair value assets measured by using unobservable inputs. Comparing the regression coefficients of the different categories of financial instruments measured by using such inputs, the test rejects the hypothesis that the regression coefficients are statistically equivalent to each other. For the last hypothesis, the findings confirm that in financial entities with the highest risk intensity of the asset book, fair value measured by using unobservable inputs is not value relevant.

In the third test, we re-ran our regression model using comprehensive income instead of net income. This is coherent with the clean surplus relation behind the framework of the price model. Despite evidence that net income and comprehensive income are significantly different in the banking sector (Mechelli and Cimini, 2013), the results validate our first hypothesis. The value relevance of fair value decreases moving from level 1 to level 3. The results also validate the hypothesis that management intent does not affect the weight investors place on fair value estimated by using the prices of the same or similar instruments, but only the value relevance of fair value measured by using unobservable inputs. Finally, running equation (2) over the clusters of entities with high and low risk intensity we confirm the finding of the main analysis that in firms with a high risk intensity of the asset book, fair value level 3 of the held-for-trading and available-for-sale categories is not statistically significant.

As a fourth test, we check the effect of size on the research results. To do so, assuming total assets to be a proxy for the size of the entities and splitting this at the median, we re-ran equations (1) and (2) over and under the median in order to verify whether the results are replicated in both the clusters analysed. In this case, we tested only the first and the second hypotheses because splitting the subsamples of firms with a high and low risk intensity of the

asset book to distinguish the smallest and the biggest entities reduces the sample size and increases the risk of biasing the research results.

The results show that in financial entities with total assets over (under) the median, fair value level 1 is more value relevant than fair value level 2, which is more value relevant than fair value level 3. For fair value assets, t-statistics are equal to 18.18 (8.09), 14.89 (6.49) and 11.08 (6.06). For fair value liabilities, those of banks over the median are 15.74 (-2.32), 14.83 (-6.49) and 11.37 (-6.43). The t-statistics of the coefficients of the fair value liabilities of banks whose total assets are under the median do not decrease moving from level 1 to level 3. A reasonable explanation of these contradictory findings could be that in the smallest banks most of the financial liabilities are measured at an amortised cost and the fact that fair value estimates are not common enough to be able to bias our research results. The second hypothesis that management intent biases fair value estimated using unobservable inputs is validated, only the regression coefficients of fair value assets being measured by using observable inputs statistically equivalent to each other.

In the last test, we use a price model with variables deflated by the number of shares outstanding. The research hypotheses continue to be validated. Fair value level 1 is more value relevant than fair value level 2, which is more value relevant than fair value level 3, with t-statistics equal to 30.35, 29.95 and 22.89 for fair value assets, and 33.44, 31.36 and 23.26 for fair value liabilities. The results also validate the hypothesis that management intent affects the weight investors place on fair value estimated by using firm-generated inputs. Finally, running equation (2) over the clusters of entities with high and low risk intensities we confirm the finding of the main analysis that in firms with a high risk intensity of the asset book fair value level 3 of the held-for-trading and available-for-sale categories is not statistically significant.

5. Conclusions

This paper has investigated the value relevance of fair value estimates disclosed by European entities in the fair value hierarchy testing three hypotheses.

For the first, according to our arguments, fair value estimated by using observable and unobservable inputs should be value relevant with investors who place less weight on fair value estimated by using firm-generated inputs. The findings only provide weak empirical support for our first hypothesis. In fact, while the decrease of t-statistics provides evidence that the weight investors place on fair value disclosed in the hierarchy decreases moving from

level 1 to level 3, the comparison of regression coefficients does not. This is similar to studies that investigate the value relevance of the fair value hierarchy (Song et al., 2010; Siekkinen, 2016a; Siekkinen 2016b). Nevertheless, the findings allow support of the IASB's decision to extend, with the issuance of IFRS 13, the disclosure of the hierarchy to all the assets and liabilities measured at fair value.

According to our second hypothesis, management intent does not affect the value relevance of fair value measured by using observable inputs, or fair value estimated by using firm-generated inputs. Actually, if management intent does not affect the weight investors place on fair value estimated by using the prices of the same or similar instruments, it does affect the value relevance of fair value measured by using unobservable inputs because of reliability concerns due to possible earnings management behaviour. The introduction of IFRS 9 should overcome the risk of the misrepresentation of financial information because in the new accounting standard on financial instruments, the entity business model and the characteristics of the instruments determine the classification and measurement of financial instruments instead of management intent. The findings regarding management intent complete those of Koonce et al. (2011) according to whom the management's intent influences the investors' judgments concerning fair value relevance.

Our findings also validate our third hypothesis, suggesting that in banks with the highest risk intensity of the asset book investors have reliability concerns about the less reliable fair value estimates due to possible capital management behaviour. This last result is new in the literature and suggests the opportunity of adding prudential filters within the common equity tier 1 in order to reduce the probability of capital management behaviour due to manipulation of the less reliable fair value estimates.

The findings achieved that assess and compare the value relevance of fair value estimates suffer from several limitations that could be an opportunity for future research, but also have several implications for standard setters and regulators.

Concerning the limitations, one is the sample size and the relatively high number of entities excluded because of missing data. Future studies, with the availability of new databases could address the same research questions investigating the value relevance of fair value estimates by extending the sample to non-financial entities, also investigating the value relevance of non-financial assets and liabilities measured at fair value according to the requirement of IFRS 13. Future research could answer new research questions, such as how different degrees of liquidity of the EU capital market affect the value relevance of fair value estimates.

For implications for standard setters, the results suggest that despite the IAS/IFRS being high quality accounting standards, whose adoption has provided a high degree of accounting quality (Barth et al., 2008) and harmonisation (Ramanna, 2013) in the EU, there are several areas of the annual report affected by so much discretion that the relevance and reliability of accounting amounts risk being seriously impaired. This problem is particularly exacerbated in financial entities where fair value measurement is more common than in non-financial entities in relation to their core business and regarding those financial assets and liabilities measured at fair value that have not an active market.

For regulators, and in particular for those aiming at achieving the stability of the banking system, the paper theorises that the less reliable fair value estimates might be manipulated to achieve some capital adequacy targets. The European standard setter and regulators can learn from this the importance of the disclosure of the fair value hierarchy for investors' decisions and the opportunity to go beyond the harmonisation of accounting systems and of capital rules, standardising the information that entities have to provide in relation to the fair value hierarchy.

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