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An anatomy of the Level 3 fair-value hierarchy discount

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An anatomy of the Level 3 fair-value hierarchy discount

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Abstract

We use an integrated approach to analyze the reasons behind the discount on the balance-sheet fair value of illiquid financial instruments held by European banks and classified into the Level 3 Fair Value hierarchy under IFRS 7. We believe that the potential sources of misalignment are 1) the lack of disclosure, 2) earnings management, and 3) the lack of liquidity. We show that the discount implicit in market values is linked to the lack of mandatory additional disclosure required by IFRS 7 and that this result support the strong enforcement activity made by national authorities. We also show that financial markets penalize banks that transfer assets from other fair-value hierarchy levels and that the penalty is due both to the instruments' drop in liquidity and the opacity of the transfers.

Keywords: Fair value hierarchy, Level 3, liquidity discount, financial instruments,

JEL Classification: G120, G150, G180, G210, G280, G320, G380

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Introduction

This study tests, through an integrated approach, the extent to which European banks' market prices reflect the balance sheet value of financial instruments estimated at fair value. Previous research on US samples documents the value relevance of fair-value hierarchy information, showing that, in case of Level 3 financial instruments (i.e., less liquid assets), only a fraction of the balance sheet value is captured by market prices. Our research confirms that, for European banks, Level 3 net assets are priced at discount. Our model also allows for the incorporation of incremental information—such as the choice to disclose and the content of that disclosure—to uncover the reasons for the differences between balance sheet and market value. Potential sources of the difference are as follows.

i) Earnings management: Level 3 valuations make use of unobservable inputs, i.e., internally sourced estimates, characterized by a high level of subjectivity. The degree of variation in inputs could allow managers to manipulate these inputs to overvalue financial instruments classified within Level 3. Supporting this argument, the ratio of Level 3 net assets over tangible book value was very high at the end of 2008, about 48% of tangible book value, and Dexia bank, which was bailed out by the Belgian government during the financial crisis, had Level 3 assets of about 12 times tangible book value. It is clear that the market considered just a fraction of the fair value derived from management estimates, thus balancing out managers' choice of inputs.

ii) Lack of liquidity: managers might not include a liquidity discount in fair value estimates, while the market typically considers the lower liquidity of financial instruments (either at the single activity or portfolio level).

iii) Disclosure opacity: opacity in disclosure of methods for estimating fair value and annual changes might drive the market to incorporate only a fraction of the fair value estimate.

Lambert, Leuz and Verecchia (2007) demonstrate that the amount and quality of financial statement disclosure has a significant effect on companies' beta. Since beta is a determinant of market prices, we expect that the level of disclosure contributes to the market value of a company. Consistent with this theory, we expect that the discount attributed to Level 3 net assets is strictly linked to the level of disclosure.

In Europe, fair-value disclosure discipline under IFRS accounting has increased, with a two-year delay after the insights that US GAAP introduced in 2007. In March 2009, against the background of high volatility and lack of liquidity following the Lehman Brothers default, the International Accounting Standard Board (IASB) published an amended version of IFRS 7, requiring additional disclosure for financial instruments estimated at fair value. That was a response to the market's demand for greater transparency about the trading activities of financial institutions; investors wanted to know the amount of illiquid assets banks were holding in their portfolios, mainly as related to subprime lending. Thus, by amending "IFRS 7 Financial Instruments: Disclosures," the IASB required financial institutions to declare the amount of assets that had been estimated at fair value through a strict three-layer hierarchy, almost identical to the one already adopted by SFAS 157 in the US. Level 1 mark-to-market estimates are directly derived from market prices. Level 2 mark-to-matrix estimates are indirectly related to market prices. And Level 3 mark-to-model estimates are modeled by using unobservable inputs.

Additional disclosure, required by amended IFRS 7, followed users requests for better information on the nuances of Level 3 financial instruments. European market regulators through ESMA (European Securities and Markets Authority[1]) had strongly urged companies to completely fulfill additional disclosure requirements of IFRS 7. National authorities behaved similarly, following supra-national directions, by publishing documents designed to enforce adoption of IFRS 7 and focusing, in particular, on disclosure. As an example, in March 2010 in Italy, three major authorities—CONSOB (the market regulator), Banca d'Italia (the bank regulator), and ISVAP (the insurance regulator[2])— jointly published a document that standardized the format for disclosure of changes in Level 3 under IFRS 7, requiring immediate adoption.[3] From the outset, the relevance of additional disclosure seemed high. We believe that the actual IFRS 7 disclosure framework allows a full understanding of the reasons for the discount for Level 3 activities. In fact, information disclosed might produce a priori the following expectations.

1. The analysis of the level of net profit generated by Level 3 activities could lead to the detection of earnings management.

[1] ESMA is an independent EU authority that contributes to safeguarding the stability of the European Union's financial system by ensuring the integrity, transparency, efficiency, and orderly functioning of securities markets, as well as enhancing investor protection. In particular, ESMA fosters supervisory convergence both among securities regulators and across financial sectors by working closely with the other European supervisory authorities competent in the field of banking (EBA) and insurance and occupational pensions (EIOPA).

[2] In January 2013, Isvap (an institution for the security of private and of social interest insurances) was dissolved. All its powers were transferred to the newly established IVASS (an institution for the security of insurance companies).

[3] Fiscal years 2009 and 2010, "Disclosure in financial reports on asset impairment tests, financial debt contract clauses, debt restructuring and fair value hierarchy," Bank of Italy-Consob-Isvap Document no. 4 of 3, March 2010, Bank of Italy, Consob and Isvap coordination forum on applying IAS/IFRS, downloadable at http://www.bancaditalia.it/vigilanza/att-vigilanza/accordi-altre-autorita/accordi-aut-italiane/tavolo_coordinamento/fin_reports09_10.pdf

2. Detection of transfers from Levels 1 and 2 to Level 3 should allow the quantification of the drop in liquidity of transferred net assets (financial instruments that were quoted but are not anymore) or the identification of the possibility of hiding unrealized future losses by transferring activities to a more opaque category. The detection of a positive market reaction after a transfer from Level 3 to Levels 1 and 2 (i.e., greater liquidity) should support the liquidity hypothesis.
3. The amount of net investment can give users an idea about portfolio management policy. A strong portfolio turnover would raise questions about the estimated fair value of assets. (For example, why should a commercial bank buy illiquid assets?)

Equipped with this information, investors not only should be able to draw a picture of the amount of opaque, illiquid instruments on the balance sheet but also should be able to trace the dynamics of those assets, gaining insight to portfolio management policies and the potential opportunistic use of financial estimates on the balance sheet. The availability of this information should allow the market to derive its own fair value estimate for trading activities, thus adjusting balance sheet tangible book values—which implicitly incorporates a full fair value estimate—in the bank's valuation.

If the market gathered this information and used it in formulating prices, we would expect to find a significant incremental effect within the cross section of banks analyzed by using the same integrated framework adopted for testing the fair-value hierarchy in the European sample.

Our research focused on a sample of European banks during the period between 2008 and 2012. Following the Ohlson residual-income model, we tested fair value estimates of Level 1 to 3 financial instruments recorded in financial statements, capturing a discount on Level 3 net assets of about 11%. The discount on European banks is not aligned with the discount found in research focused on US financial institutions. Notably, European banks were required to apply the fair-value hierarchy two years later than US banks. Oddly enough, during 2009, European banks halved their Level 3 financial instruments, mainly through divestments and consequent losses. Within the sub-sample of banks that immediately (2009) disclosed the fair-value hierarchy and related changes, the ratio of Level 3 assets to tangible book value was about 21.7% in 2009. The same ratio was a lot higher in 2008, about 48.1%. It is likely that reductions in Level 3 assets have been a consequence of amended IFRS 7 requirements and related enforcement by market authorities, and this probably affected the size of the discount implicit in Level 3 financial instruments. Our analysis shows that the discount is due to information risk and potential earnings management.

a) Information risk: banks that do not provide required disclosure on changes in Level 3 assets show a discount on Level 3 financial instruments that is completely recovered for banks that do provide disclosure, all else equal. In other words, the market reflects information risk through a lower price for the bank. The presence of a Level 3 discount supports IASB's efforts to produce higher quality financial statement standards and regulators' attempts–in particular those by ESMA–to make a priority of enforcement of disclosures of Level 3 financial instruments. ESMA enforcement led to an increase in the percentage of banks disclosing the fair-value hierarchy and change in fair value Level 3 from 72.9% on 31.12.2009 to 94.1% on 31.12.2012.

b) Potential earnings management and the liquidity hypothesis:

a) Banks that transfer a significant amount of Level 1 and 2 assets into Level 3 receive, on equal terms, lower valuations by the market. The discount is directly linked to the amount of assets transferred, and it is, from a theoretical standpoint, perfectly in line both with a liquidity discount applied on financial instruments that are not traded (and not already captured in fair value estimates) and with a broader discount due to potential fair value manipulation. Banks' management might be induced to transfer financial instruments downward in the fair-value hierarchy to manage the valuation process (e.g., to avoid losses);

b) Banks that transfer significant amount of Level 3 assets upward receive, in general, a lower valuation by the market. Genuine transfer upward should be accompanied by an increase recover in the financial instrument's liquidity, which should in theory lead to a higher valuation. Empirical evidence strongly supports the presence of a discount on the entire transfer of a block of assets from and to Level 3. However, we find evidence that small transfers are positively correlated with market prices, while big transfers retain a large discount. Those results support the hypothesis that large transfers within the fair-value hierarchy are discounted from market prices because of the possibility that management managed earnings.

2. Accounting rules on the fair-value hierarchy under IFRS 7 amended

An amendment to IFRS 7 introduces the fair-value hierarchy (section 27A), a three-layer structure in which financial instruments must be classified. The levels of the valuation hierarchy are as follows.

- **Level 1**: *"*quoted prices (unadjusted) in active markets for identical assets or liabilities*"* (c.d. mark-to-market). The classification of a financial instrument within Level 1 is linked to the existence of two requirements. The first is the presence of an "active market," as previously defined in IAS 39-AG71[4] or, equivalently, in IFRS 13: "IFRS 13 defines an active market as a market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing." The concept of active market concerns the individual financial instrument being valued and not the market in which it is quoted. Therefore the fact that a financial instrument is quoted on a regulated market is not, in itself, a sufficient condition for the instrument to be defined as quoted in an active market. The second requirement is represented by the term "unadjusted," i.e., the quote must not be adjusted.

- **Level 2**: "inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (i.e., as prices) or indirectly (i.e., derived from prices)" (c.d. mark-to-matrix). The estimate of the fair value of Level 2 (as well as Level 3) requires the use of valuation techniques. If the valuation technique is based on observable inputs that do not require adjustment based on unobservable inputs, the financial instrument is classified in Level 2 (adjusted mark-to-market or mark-to-matrix). The definition embraces prices in markets that are not deemed active or prices quoted in active markets for financial instruments with similar characteristics (in terms of risk factors, liquidity, etc.) but that are not identical.
- **Level 3: "**inputs for the asset or liability that are not based on observable market data (unobservable inputs)" (c.d. mark-to-model). When fair-value measurement involves unobservable inputs that are significant to the assessment or, alternatively, observable inputs that require significant adjustment based on unobservable inputs, the instrument will be classified in Level 3. Level 3 valuation techniques include subjective inputs and assumptions (a judgmental approach) with respect to those inputs. These assumptions should, however, be based on the best information available at the balance sheet date.

Fair-value estimates should consider the market participant's perspective, which must reflect the best information available, taking into account such facts as risk, complexity, degree of liquidity, and degree of observability of the financial instrument.

Paragraph 27B of IFRS 7 requires an entity to provide adequate information on the measures used in fair value estimates. In particular, the entity must provide:

a) the category (Level 1, Level 2, or Level 3) in which the financial instrument is classified;

[4] A market in which "the quoted prices are readily and regularly available from an exchange, dealer, salesman, industry, agency determination the price, regulators and those prices represent actual market transactions that occur regularly in a normal market".

b) the amount and the reasons when significant transfers from Level 1 to Level 2 occur during the year;

c) a reconciliation of opening and closing balances for Level 3 financial instruments, highlighting the variations due to profits and losses, those arising from new investments or divestments, and those relating to transfers into and out of Level 3 that are due to a change in assumptions. The level of activity classified according to the Level 3 at the end of each year be reconciled with that at the beginning of period:

$$\text{Asset Level } 3_{i,t} = \text{Asset Level } 3_{i,t\text{-}1} + \text{Increases Asset Level } 3_{i,t} + \text{Decreases Asset Level } 3_{i,t}$$

where:

$\text{Increases}_{i,t}$ = $\text{Purchases}_{i,t}$ + Profit Recognized in Income $\text{Statement}_{i,t}$ + Profit Recognized in $\text{Equity}_{i,t}$ + Transfers from Other $\text{Level}_{i,t}$ + Other $\text{Increases}_{i,t}$

$\text{Decreases}_{i,t}$ = $\text{Sales}_{i,t}$ + $\text{Redemptions}_{i,t}$ + Losses Recognized in Income $\text{Statement}_{i,t}$ + Losses Recognized in $\text{Equity}_{i,t}$ + Transfers in Other $\text{Level}_{i,t}$ + Other $\text{Decreases}_{i,t}$

d) a sensitivity analysis of Level 3 fair-value estimates to changes in unobservable inputs, where such changes may result in a significant change in fair value.

IFRS 7 paragraph 28 also requires information on the so-called day-one profit, that is, profit from the difference between fair value at initial recognition (the fair value of the transaction) and the fair value determined by using a valuation technique not immediately recognized in income statement. When a difference arises, the bank must disclose a) the difference that will be recognized in the income statement to reflect the change in factors (including the time effect), which any market participant would use in determining fair value at that specific date, and b) the aggregate difference yet to be recognized in the income statement at the beginning and end of the period and a reconciliation of the change in the balance.

3. Literature review and research hypothesis

Previous research has explored the link between the fair-value hierarchy and financial markets in many ways. A first branch of research has focused on the value relevance of the fair-value hierarchy, showing that all levels are value relevant even though level 3 net assets are valued at a discount compared to their book value and that the discount on Level 3 is greater than the one on Level 1.[5] These studies focused only indirectly on the reasons beneath the discount, which can steam from i) lack of liquidity on level 3 net assets, ii) earnings management, iii) potential measurement error. On this latest argument, a second branch of research has started analyzing the

[5] There is no definitive evidence that Level 3 is statistically different from Level 2.

relationship between different measures of risk used in financial markets (beta, credit default swaps, liquidity risk, and bid-ask spread as a proxy for liquidity risk) and the fair-value hierarchy. The results of these studies show a higher level of risk, classified as information risk, in businesses that are characterized by high amounts of Level 3 financial instruments. This second branch of research would thus support the empirical evidence of a discount in the pricing of Level 3 net assets: however, no one to date has performed an analysis of the discount directly on stock prices. All studies were concerned with samples of banks and financial companies listed in the US during the financial crisis. Their main question was the following: "How value relevant are different measures of fair value at each level of the fair value hierarchy (formerly SFAS No. 157-Fair Value Measurement)?"

Kolev (2008), using a sample of 177 U.S. financial institutions in the first quarter of 2008 and 172 in the second quarter, tests the hypothesis that Level 2 and Level 3 are relevant. Kolev's model (a balance sheet approach) links the market price of each security with its net[6] financial assets, broken down to each level of the fair-value hierarchy. Other variables within the model are net assets not measured at fair value and a set of control variables. The coefficients of Levels 2 and 3 that result, however, are lower than that of Level 1, which is close to one; the maximum discount attributed to Level 3 net assets is around 35%. Kolev concludes that assumptions made by management, in measuring these financial instruments, are sufficiently reliable to be reflected in quoted market prices of financial institutions.

Following Kolev (2008), Goh et al. (2009) note that, within the US, financial instruments valued with mark-to-model techniques (Level 2 and Level 3) are priced at a discount probably due to their low liquidity and high information risk. Despite the positive relationship between stock prices and the three levels of financial instruments, coefficients are all below unity—that is, 0.85, 0.63, and 0.49, respectively. The Level 1 coefficient is statistically different from the coefficients of the other two levels, while Level 2 and Level 3 coefficients do not differ significantly. These findings are consistent with other papers (Coval et al. 2008, Longstaff and Rajan 2008) and suggest that mark-to-model assets are overvalued compared to their market value.

Song et al. (2010), based on a sample of 431 US banks, used the modified residual income model proposed by Ohlson (1995) for studying the fair-value hierarchy impact on market prices, confirming the presence of a discount on Level 2 and Level 3 net assets. Their results present

[6] Net financial assets = financial assets - financial liabilities

coefficients for Level 2 and Level 3 financial instruments significantly lower than that of Level 1, with an implied discount of about 30%. According to the authors' analysis, the discount size varies and would be linked to governance mechanisms that can mitigate information asymmetry between management and the market. Thus reducing measurement error in fair-value estimates would improve the value relevance for Levels 2 and 3. Among the factors influencing the discounts are the following: board independence, audit committee financial expertise, the frequency of audit committee's meetings, the percentage of shares held by institutional investors, the size of the auditor's team, and the reliability of control systems. Goh et al. (2011) support Song et al.'s (2010) arguments, suggesting that, the higher the amount of financial instruments belonging to Level 3, the more voluntary disclosure is provided in financial statements. This leads to a lower stock volatility, confirming that the market perceives less risky assets/liabilities in Level 3.

So far, the empirical evidence has focused on US. In Europe, Bosch (2012) investigates the value relevance of fair value in accordance with the IFRS 7 amended hierarchy by using a modified Ohlson model (1995). Based on a sample of listed banks in EU countries (27 EU) and EFTA, he finds that all three levels of the fair-value hierarchy are relevant to investors, although Level 3 is perceived as less reliable than the other two levels, showing a lower regression coefficient and proving to be statistically different from level 1 and level 2. Bosch checks these results for different regulation regimes (i.e., country specific laws) and bank sizes. He finds that European Monetary Union banks (EU 15) show greater value relevance for any fair value entry than the subsample of listed banks in other European countries, suggesting that different regulations yield different levels of trust in accounting information. Unexpectedly, small banks show greater value relevance than large banks; the author believes that the market value of larger banks relies on information that is only partially reflected in financial statements.

SFAS 157 has also fueled a lot of research on value relevance in the field of information risk. The higher the "opacity" of the inputs used to estimate the fair value, the greater the information risk. Riedl and Serafeim (2011), analyzing a sample of 467 financial companies, suggest that information risk is higher when the quality of financial reporting is so poor that it does not allow reliable estimation of valuation inputs. The authors estimate the implicit beta for financial instruments in Levels 1, 2, and 3, showing a progressive and increasing contribution to CAPM beta from Level 1 to Level 3.

Arora et al. (2010) study the effects of information risk in terms of credit risk. Specifically, they examine the relationship between the credit term structure, made of different maturity credit default swaps (CDS), and uncertainty in measuring the fair value of Level 2 and Level 3 financial instrument, during the crisis period (August 2007 - July 2009). They confirm Duffie and Lando’s theory (2001) that the uncertainty inherent in asset measurement leads to a flat spread curve. Strong correlation between the dependent variable (1Y/CDS 5Y CDS) and the independent variable—which represents the uncertainty of the estimated fair value (the ratio between the financial instruments of Level 2 and Level 3 and the total assets)— suggests that Level 2 and Level 3 financial instruments are the main factor driving a flat credit-term structure.

On the same topic, Lev and Zhou (2009) further investigate whether the discount on financial instruments at fair value represents liquidity risk. If information provided in financial statements is reliable and relevant to investors, then market price reaction at the announcement of certain negative events should consider information relating to the fair-value hierarchy. The authors, through an event study, focused on the market reaction to the announcement of 44 events in 2008—the sample consisted of U.S. firms, financial and nonfinancial—in the context of systemic illiquidity. They observe that negative market reaction is mainly linked to the weight of level 3 instruments, while the market proves to be indifferent to Level 1 and Level 2 weights. Investors thus seem to reward more liquid companies, ones that are more efficient in managing their assets (the so-called flight to quality).

Alternatively, as a proxy for liquidity risk, Liao et al. (2010) use the bid-ask spread. If the objective of SFAS 157 is to make more transparent and reliable information about financial instruments measured at fair value, it is expected to lead to a reduction of information asymmetry and narrower bid-ask spreads. However, empirical evidence, based on 1,334 observations in US during 2008, shows that, contrary to expectations, Level 1 financial instruments are positively and significantly correlated with the bid-ask spread. Although Level 1 consists of listed financial instruments, not subject to management manipulation, these measures are always and a priori considered uncertain by investors and thus bear information risk.

Some researchers have studied the relationship between the information provided by the fair-value hierarchy and the quality of analysts’ consensus estimates. If it is true that bad information is conveyed through financial statements, this information may also affect the way estimates are drawn. In this regard, Li (2010) argues that the disclosure provided under SFAS 157 does not improve the quality of information for financial analysts. In particular, the author notes that the information relating to Level 2 and Level 3 assets is negatively correlated with measures of information quality and that all three levels have a positive and significant correlation with measures of the estimates' dispersion and forecast error. These results do not lead to the conclusion that SFAS 157's adoption produced lower quality information for equity analysts. In fact, Li (2010) points out that results should be interpreted in the context of market illiquidity and that they do not represent a normal economic environment. Li's (2010) remarks are corroborated by Parbonetti et al. (2011), who generalize the concept in arguing that, the more banks' financial statements are exposed to fair-value accounting, the more dispersed are analysts' forecasts and the higher the forecasting errors.

Literature on value relevance of the fair-value hierarchy shows that, in the US, measures of Level 3 fair value (and sometimes Level 2), though relevant, are valued at a discount to their book value (as reported in financial statements). In particular Kolev (2008) detects a discount of Level 3 financial instruments, relative to Level 1, at about 35%, while Song et al. (2010) find an implied discount of Level 3 financial instruments of 30%.

The fair-value hierarchy under amended IFRS 7 follows the same three levels as SFAS 157 (Exposure Draft of October 2008). Thus, under efficient markets hypothesis, Level 3 financial instruments should be priced at discount to book value in Europe, too. This leads to our first hypothesis:

Hp1: For the European banking sector, financial instruments classified in Level 3 are valued at discount in relation to their book value.

The aim of the paper, once it has established whether the market attaches a discount to Level 3 financial instrument, is to understand the reasons beneath any discount. Changes in Level 3 financial instruments, as required by IFRS 7 paragraph 27B, allow further investigation of the intrinsic allocation of the discount to each change determinant, illuminating the reasons behind the market's assigning a value lower than book value.

Since some banks do not meet disclosure requirements, providing no evidence about changes in their portfolio of assets classified as Level 3, we can investigate whether the market incorporates information risk in pricing their stock. Verecchia (2001) shows that greater disclosure for firms limits the information risk, which is a source of systematic and nondiversifiable risk. Additional disclosure under IFRS 7 should limit this risk: this should therefore raise the value of the bank, all else equal. Our second hypothesis is therefore that the market values Level 3 financial instruments differently depending on the completeness of disclosure.

Hp2: A portion of the Level 3 discount is due to the lack of disclosure, and thus it should disappear once disclosure has been provided.

When disclosure required by IFRS 7 is provided, components of changes in Level 3 financial instruments might be valued differently than the entire portfolio of Level 3 financial instruments, assigning premiums or discounts related to the more detailed information content of the single item disclosed. Research has shown that transfers to Level 3 are judged negatively by the market. Therefore, within Level 3 portfolio, items with different natures may coexist: some may be more genuine—as the beginning of the year portfolio was audited in the previous year—and may be characterized by higher opacity, which might negatively influence banks' valuations. The latter components are those that would feed into a discount for the entire portfolio of Level 3 financial instruments and can be summarized as follows.

a) The amount of transfer of financial instruments from Level 1 and Level 2 to Level 3 (TO_L3) might be subject to greater manipulation in terms of value and should therefore be penalized by the market in the overall bank's valuation. Even assuming no manipulation has happened, the transfer by itself into a different level of fair value, without change in book value, represents an implication of lesser liquidity and thus an implied lower value of the instruments transferred. This leads to our third hypothesis:

   Hp3: Higher levels of transfers from Level 1 and Level 2 to Level 3 should lead to greater discounts on Level 3 financial instruments.

   The penalty, in terms of value, could stem from two different roots: the first one is the potential for earnings management—greater opportunities for value manipulation—given by higher amount of Level 3 financial instruments; the second one joins the liquidity discount hypothesis in that the market assigns a discount to financial instruments that significantly reduce banks' liquidity. If the latter occurs, one should see an opposite sign effect in transferring financial instruments from Level 3 (FROM_L3) to Levels 1 and 2. In other words, if the liquidity discount hypothesis is true, one should observe the assignment of a liquidity premium in transferring financial instruments upward. This leads to our fourth hypothesis:

Hp4: The market assigns a premium to assets transferred from Level 3 to Levels 1 and 2, when transfers are genuine.

b) The discount should be greater for banks that have revalued most of the portfolio of Level 3 financial instruments. Hence our fifth hypothesis:

Hp5: The market assigns a discount to those companies that most revalued Level 3 financial instruments, as disclosed by the amount of profits generated by Level 3 assets.

4. Sample selection and descriptive statistics

Our analysis covers the entire period (2008-2012) in which IFRS 7 has been available either on an early adoption or a mandatory basis. The choice of an extended period is not accidental since we aim to capture the incremental effect of additional disclosure on the same sample of banks considered; we are focusing on the broadest timeframe available. The data reflect public information available to investors. Time and cross effects should guarantee that general trends of assets and liabilities are neutralized, creating a net effect on value.

We extract from Factset database a sample of European banks by using the following procedure. At first, we select any banks within European Union (27 countries), Norway, and Switzerland (29 countries) by using Standard Industry Classification (SIC) Code 60— "Depository Institutions [231 banks]. We delete banks that did not adopt International Accounting Standards (IAS/IFRS) beginning in 2008, by using Factset datatype "Accounting Standard Followed 23 = IFRS" [166 banks]. Next noncommercial banks are dropped, excluding the following SIC Codes:

- 6019: "Central Reserve Depository Institutions, Not Elsewhere Classified" (- 1 bank)
- 6062: "Credit Unions, Not Federally Chartered" (- 1 bank)
- 6099: "Functions Related to Depository Banking, Not Elsewhere Classified" (- 6 banks)

By matching Factset Sectors and the Dow Jones Sector (-20 banks) and verifying data availability (-18 banks), more banks are excluded, resulting in a sample of 120 banks (TABLE 1).

We obtain data from two sources: the amounts of Level 1, Level 2, Level 3 (hereinafter L1, L2 and L3) assets and liabilities and related disclosures are manually collected from banks' annual financial statements. Basic financial statement figures, market, and other data are extracted from FactSet Database. Companies' market values are extracted as of Dec. 31 of each year, once verified that fiscal year date is the same for all companies within the sample, while accounting measures are extracted at year-end from Factset Fundamentals. Monetary amounts expressed in local currency are converted into euros by using Factset implied[7] exchange rate at fiscal year-end.

Table 4 shows the percentage of nonzero values within the database for manually collected data. Around 26% of banks voluntarily reported the fair-value hierarchy in 2008, whereas, after IFRS 7 became mandatory, adoption immediately reached 99% (during 2009).[8] Furthermore, about 73% of the banks disclosed changes in Level 3 assets in 2009, whiles by 2012 the figure rose to 94%.[9] The lag effect is probably caused by the strength of the enforcement that gradually spread to smaller entities.

Table 2 presents descriptive statistics of the main data used in the analysis, as extracted from database or financial statements. The average size of the banks included is about €9 billion in book value of common equity and €207 billion in total assets. Out of €9 billion average book value, slightly more than €2 billion consist of intangible assets acquired externally: hence the need to adjust book value to account for different levels of M&A activity and obtain homogeneous items. Net income is generally positive, but note that, in about 18% of firm-year observation, net income is negative. As in previous research (Barth et al. 1998), the model should be tested considering the different market value elasticities to positive and negative accounting returns.

Fair-value financial assets—the so-called trading book—rank at 38% of total assets, with an average amount of fair0value assets standing at around €78 billion. Level 1 assets are clearly the primary fair-value financial asset held, being almost 9.5times the amount of Level 3 assets. Nonetheless, it is against tangible book value that one can appreciate the relevance of fair value

[7] The ratio of total assets in euros to total assets in local currency has been used for this purpose, to make sure accounting variables are homogeneous to each other.

[8] Those statistics are not comparable to the information provided by ESMA in the follow-up statement on application of disclosure requirement issued in October 2010. The ESMA sample was based on companies within FTSE Eurotop index, which includes nonbanking institutions that are required to disclose fair value. Thus it can be argued that the results are the same. CESR reports that around 95% of the entities disclosed fair value information using the fair value hierarchy (L1, L2, and L3) in 2009 financial statements and that early adoption (limited to the fair-value hierarchy) was around 50% in 2008. The differences in percentages within our sample are due to the fact that the CESR sample considers nonbanking institutions—thus arises the different materiality of IFRS 7 information—but focuses exclusively on large companies, ones that most likely are required by stockholders to disclose further information.

[9] Level 3 reconciliation of changes disclosures has been provided for 90% to 95% of CESR sample. The sample considered in our analysis shows a lag effect on full adoption of IFRS 7; the disclosure result for year 2012 is perfectly in line with CESR data.

assets on equity valuation: fair-value Level 3 net assets[10] count for as much as 20% of tangible book value, while Level 1 and Level 2 assets are, respectively, slightly more than 2.5 times and 80%.

Since the analysis aims to capture the impact of fair value disclosure on market values, it is interesting to explore the time and cross[11] dynamics of the variables under scrutiny. By construction, the sample considers both a pre-IFRS 7 and a post-IFRS 7 adoption period, to capture the disclosure effect on value. In other words, any publicly available information has been recorded, given that, under the efficient market hypothesis, investors should use all available information to value a firm.

In absolute terms, fair value net assets increase in 2009: this is simply due to a disclosure effect, given that a high number of companies started to disclose fair-value figures only in 2009. While Level 1 net assets jump from €978 billion to €2.111 billion, Level 3 net assets increase just by 2%, from €188 billion to €193 billion. In fact, Level 3 net assets are actually decreasing, starting 2009 with net negative investments (cumulative net sales of assets) at around €53 billion and net transfer out of Level 3 for €7.5 billion. By 2012, net Level 3 assets fall by other €70 billion, at around €112 billion. It is reasonable to assume that Level 3 assets decreased by more than half on a constant sample basis from 2008 to 2012. This trend has to be linked directly to IFRS 7 adoption and the related enforcement, given that Levels 1 and 2 net assets do not show a similar pattern. Level 1 net assets surged in the period 2009 to 2012 from €2.111 billion to €2.521 billion, while Level 2 net assets marginally increased from €681 billion to €693 billion.

What is more interesting is to unpack the assets dynamic: is every bank getting rid of Level 3 assets, or there is a limited number of companies doing it? Table 3 show statistics for variables used in the regression analysis, in which fair value assets are scaled over tangible book value, to avoid sample and size effects. Mean and median values between 2009 and 2012 show a decrease in Level 1 net assets, consistent with a general decrease in Level 1 net assets incidence on tangible book values. The decrease in median Level 2 net assets (from 0.38 to 0.10) is not supported by a decrease in mean Level 2 net assets, which means that most of the banks decreased Level 2 assets, but some major ones highly increased their holdings. Nonetheless Level 3 net assets show the opposite dynamic, with the mean value falling from 0.22 to 0.12, and median values standing at around 3% to 4% of tangible book value.[12] Medium and large banks disposed of Level 3 net assets, while banks

[10] Reference is made to net amounts, in coherence with the denominator.
[11] For the sake of brevity, cross sample statistics are omitted, and the most interesting ones are presented within the paragraph. Additional tables are available upon request.
[12] Even though median marginal movements might be significant, their size on book value is not material compared to the decrease in mean value.

with little capital involved did not change their assets allocation substantially. Interestingly enough, northern European countries show a nonstop decrease in Level 3 incidence (UK from 0.21 to 0.15, Germany from 0.48 to 0.12, France from 3.8 to 1.2) and, in some cases, a steep drop (Switzerland from 0.76 to 0.04), while southern European incidence flattened (Italy from 0.11 to 0.10) or even increased (Greece and Portugal).

The assets dynamic seems to suggest that IFRS 7 introduction had a significant impact on banks' behavior: most of large holders significantly decreased their involvement in Level 3 assets, mainly through negative net investments. Lack of information about the 2008 fair-value hierarchy still leaves evidence of an even higher decrease of Level 3 net assets, realized within 2008, the year in which IFRS 7 was not yet mandatory but in which companies acknowledged the potential impact from disclosure requirement through IASB Exposure Draft.

5. Description of the model and the variables used in regression analysis

Regression models used in the following analysis are drawn from the residual income model (RIM) by Ohlson (1995), which is particularly suitable for banks valuation. The value of each bank equals the sum of initial book value, which captures the value of all the activities already recorded at fair value, and the net present value of residual earnings, which captures the value of intangible assets and unrecorded capital gain/loss on assets held at their historical cost. In the case of banks, intangible assets consist of core deposit intangible assets, assets under management/administration-related intangible assets, and credit card-related intangibles and brands, while the typical unwritten capital gain/loss is represented by loans. RIM allows us to draw a formal link between the net present value of residual incomes and full fair value accounting (assets that arise from positive net present value in deposit-taking, lending and asset management activities) while, in practice, as documented elsewhere, it offsets aggressive or conservative accounting policies (for example, the amount of loan-loss provisioning). Furthermore, Begley, Chamberlain, and Li (2006) show that an equity-side residual income approach is more consistent for valuation of banks since banks generate value both from assets and liabilities (deposits and loans). We thus extend the Ohlson model to capture the incremental effect, as a premium or discount, that further balance-sheet information might convey to users of financial statements.

If every asset and liability is stated at fair value, under a hypothetically perfect full fair value accounting,[13] bank equity value (S) is equal to the book value of common equity (BV):

$$\text{Equity Value (S)} = \text{Asset Fair Value (FVA)} - \text{Liabilities Fair Value (FVL)}$$

$$= \text{Book Value}_{\text{Full fair value}}\ (BV_{FF}) \quad (1)$$

Under this assumption, if markets are efficient and accept balance-sheet fair value measures, the price-to-book multiple for every bank should equal one. However, markets clearly express prices widely different from book values: for a given market value, the price-to-book ratio depends on how book values are accounted for. In practice, not every asset is recorded at fair value, because of held to maturity accounting under IAS 39, tangible asset recognition under IAS 16 or simply because intangible assets internally generated cannot be identified within the balance sheet. Regarding the latest issue, it is notable that some companies will have higher book values because of intense M&A activities[14]; other companies will have lower book values as a consequence of no acquisitions. Since the nature of intangible assets under IFRS 3 business-combination accounting might be suspected of generating bias in the equity capital measure[15] and not every asset is written at fair value under IFRS accounting, it is convenient to arrange equation (1) so as to separately identify intangible assets:

$$\text{Equity Value (S)} = \text{Book Value IFRS } (BV_{IFRS}) + \text{Delta unrecognized Intangible Assets}^{16}\ (\Delta INT) + \Delta \text{ Unrealized capital gains/losses (CG).}$$

That is equivalent to:

$$\text{Equity Value (S)} = \text{Tangible Book Value (TBV)} + \text{Intangible Assets (INT)} + \text{Unrealized capital gains/losses (CG),} \quad (2)$$

where the term "intangible assets" includes goodwill. Identifiable intangible assets, specific to the banking industry, include the following: core deposits, brand, assets under management, and credit-card intangibles. On the other hand, CG in (2) reflects unrealized capital gains on loans.

[13] In a full fair value environment, all intangible assets at a given date are booked on the balance sheet, so that current income can be obtained as the product of intangible fair value measure and the specific required return on the intangible asset.

[14] A hypothetical spin-off would lead to the booking of all unrecognized intangible assets and eventually the presence of goodwill.

[15] Only externally acquired intangible assets are recorded on the balance sheet. Deducting intangible assets is consistent with the Basel 3 approach.

[16] It includes both internally generated intangible assets and differences in the fair value of externally acquired intangible assets between date of acquisition and the current date.

Equation (2) is consistent with the Feltham-Ohlson model (1995), which assumes the following model to hold for equity valuation:

$$P_t = TBV_t + \frac{(ROE_{t+1} - r) \times TBV_t}{coe - g} \qquad (3)$$

where P = price; TBV = tangible book value; ROE = return on equity; r = required return (or cost of equity capital); g = growth. The second part of equation (3) shows that the price of a bank is higher (or lower) than tangible book value when the market expects positive (or negative) residual incomes. (The difference between ROE and r is called residual income.) That happens when intangible assets are valuable and/or net assets recorded on the balance sheet have a fair value greater (or lower) than their book value. Comparison between equation (2) and (3), assuming market efficiency, clearly states the following identity:

$$\frac{(ROE_{t+1} - r) \times TBV_t}{coe - g} = \text{INT} + \Delta\text{CG}$$

this allows a formal reconciliation between the expected value of future residual incomes and full fair value accounting (where intangible assets and differences in net fair value of assets represent the logical delta between cost accounting and full fair value accounting).

When valuing a bank, the market might still decide to apply a premium or discount to some assets and liabilities recorded on the balance sheet, even if those assets are apparently recorded at fair value. This might happen either because of the assets' lack of liquidity—the market may perceive that the reporter did not give enough consideration to liquidity—or because the market perceives earnings management and thus attaches a higher information risk to the relevant assets. For those reasons, equation (2) is missing variables that the market actually considers in equity valuation. It should be re-written as follows:

Equity Value (S) = Tangible Book Value (TBV) + Intangible Assets (INT) + Unrealized capital gains/losses (CG) + Premium/discounts on net assets,

or equivalently:

$$P_t = TBV_t + \frac{(ROE_{t+1} - r) \times TBV_t}{coe - g} + \sum_{n=1}^{N} \delta_n \times B/S\_figure_n \; (4)$$

where B/S figures represents the balance sheet figure over which to compute the premium and δ is the premium or discount to be applied to the book value of the asset (liability) as recorded on the balance sheet to get the fair market valuation of the asset (liability). Premiums and discounts are defined as differences in fair value that cannot be expressed in residual income terms.

Adding balance sheet measures to residual income models allows regression coefficients – in this case δ_n - to capture the relative premium or discount the market assigns to those assets and liabilities. Most importantly δ_n just represents the fraction of B/S_figure that should be deducted (or added) from the book value.

Before digging into the model, one has to consider that absolute value measures suffer from heteroscedasticity, especially within a sample that considers both big and small banks. Value relevance research has stressed the need to scale accounting and market measures to avoid heteroscedasticity of residuals while performing regression analyses. Thus accounting figures are scaled on tangible book value, allowing a meaningful and consistent interpretation of regression coefficients with previous literature. Note that results are not unbiased by the choice of the scalar: scaling by tangible book value allows interpretation of the dependent variable as a multiple and, most importantly, reduces the tangible book value variable as part of the intercept in regression analysis.

In fact, dividing both sides of equation (3) by tangible book value, yields the following:

$$\frac{P_t}{TBV_t} = \frac{TBV_{i,t}}{TBV_{i,t}} + \frac{(ROTE_{t+1} - r) \times TBV_t}{(r-g) \times TBV_t} = 1 + \frac{(ROTE_{t+1} - r)}{(r-g)} = 1 + \frac{(ROTE_{t+1})}{(r-g)} - \frac{(r)}{(r-g)} \quad (5)$$

We think this design is particularly suited for testing additional accounting disclosure, since any accounting measure is already included within the TBV—the intercept—and only figures that are effectively monitored by the market can contribute with a plus or a minus in value. With this equation, as explained in detail later, accounting variables that are genuinely correlated with value, as assets figures, do not result in statistically significant coefficients, because they are already captured by tangible book value within the intercept.

From a fundamental valuation standpoint, the equation portrays that price-to-book values greater (or lower) than one incorporate a positive difference between the market value and book value of the entity, generally experienced as a result of future expected return on book values greater (or lower) than required returns and/or through positive (negative) differences between market and book value of single assets and liabilities. As long as assets generate income and liabilities bear interest, ROE captures any implicit capital gain/loss on assets and liabilities already booked in common equity (even goodwill).

To test our hypothesis, questioning whether Level 3 net assets are valued differently from the balance sheet value, a further step is required, introducing balance sheet variables as in (4) while still scaling for tangible book value, as follows:

$$\frac{P_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \sum_{n=1}^{N} \beta_{b\_s\ figures\ ,n} \times \frac{B/S\ Figures_{i,t,n}}{TBV_{i,t}} + \varepsilon_{i,t} \quad (6)$$

Equation (6) is consistent with the price-to-book multiple decomposition that is the most widely used to value a bank. The model, building on equation (4)[17], extends the residual income approach by adding "n" balance sheet variables to the Ohlson model. Parameters for "B/S figures over TBV" should provide evidence of the relative premium/discount that the market assigns to the balance sheet value of each accounting figure considered.

Coefficient interpretation in equation (6) is theoretically identical to the one that can be inferred by reviewing results generated by running equation (4) as a regression: $\beta_{b\_s\ figures\ ,n}$ represents the specific premium for the "n" balance sheet variable. In general, adding additional balance sheet variables to the first part of the equation presented above - $\propto + \beta_{ROTE} \times ROE_{i,t+1} + \beta_{beta} \times Beta_{i,t}$ - should not increase the explanatory power of the model and should not yield to statistically significant $\beta_{b\_s\ figures\ ,n}$ coefficients, since residual incomes already capture differences between market and book values. However, residual incomes might miss some information considered by the market: thus, if our hypothesis holds, adding L1 to L3 net assets as balance sheet variables should result in the L3 net assets coefficient being negative and statistically significant. In other words, regression coefficients mimic the investor assessment about the premium/discount assigned to each asset category in determining the whole value of the bank. (US evidence shows that Level 3 assets are valued at a discount.) Consistent with the equation [4], we then expect that the intercept in regression [6] will assume a value of one; a higher (lower) value should imply that the market appreciates some hidden asset (liabilities) not written on the balance sheet (e.g., the value of derivatives out of balance sheet). We then expect that the parameter β_{ROTE} should be positive and equal the inverse of the capitalization rate (r – g) of residual incomes.

Under an econometric perspective, the model in regression (6) is equivalent to the following:

[17] The model in equiation (5) can be arranged in a neater way by excluding cross sample constant of cost of capital (risk free rate and ERP), as follows:

$$\frac{P_{i,t}}{BV_{i,t}} = \propto + \beta_{ROTE} \times ROE_{i,t+1} + \beta_{beta} \times (Rf_t + Beta_{i,t} \times ERP_t) + \varepsilon_{i,t} = \propto + \beta_{ROTE} \times ROE_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \varepsilon_{i,t}$$

$$\frac{P_{i,t}}{TBV_{i,t}} = \beta_{TBV\_ex\_FVA,n} \times \left\{ \frac{TBV_{i,t} - \sum_{n=1}^{N} B/S\ Figures_{i,t,n}}{TBV_{i,t}} \right\} + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \sum_{n=1}^{N} \gamma_{b\_s\ figures\ ,n} \times \frac{B/S\ Figures_{i,t,n}}{TBV_{i,t}} + \varepsilon_{i,t} \quad (7)$$

where the coefficient γ represents the valuation multiple on Level 1 to 3 net assets expressed by the market as a comprehensive. Note that coefficient γ in equation (7) equals the sum of the coefficient α and $\beta_{b\_s\ figures,n}$ in equation 6:

$\gamma_{b\_s\ figures,n} = \alpha + \beta_{b\_s\ figures,n}$

We believe that model in regression (6), although equivalent to the one in (7), is more suitable to our research question: it gives an immediate idea about the statistical significance of the discount (by appreciating whether the coefficients on Level 1 to Level 3 net assets are statistically different from 0) in a residual income framework, within the price-to-tangible-book-value multiple. We underline that the latter is the most widely used multiple used by practitioners to value banks. Moreover, by comparing model (6) with model (7), it can be shown that the latter has one more variable (Tangible Book Value – Net Asset from Level 1 to 3), which is dropped in the other model and which could introduce multi-collinearity in the model.

Hp 1: testing

To test our first hypothesis, we run the following regression:

$$\frac{P_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t} + \beta_{D_{ROTE}} \times \mathrm{D}ROTE_{i,t} + \beta_{GROWTH} \times GROWTH_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \beta_{L1} \times L1_{i,t} + \beta_{L2} \times L2_{i,t} + \beta_{L3} \times L3_{i,t} + \sum_{k=1}^{K} \beta_{Contro\ l,k} \times Control_{k,i,t} + \varepsilon_{i,t} \quad (8)$$

This regression unveils the relationship between the price-to-book value multiple computed at the end of each accounting year, residual income determinants, and fair value hierarchy variables, with the two latter values both extracted at year end. Note that equation (8) sets year-end date "t"[18] as a point where simultaneously prices and fair values figures are related. In fact, it would be questionable to relate prices collected at the filing date with fair value figures estimated months before, given that market prices fluctuate and, during the financial crisis, price volatility increased sharply.

[18] Dec. 31 of each accounting year, once verified that every bank within the sample closes at the same date.

Book values at year-end (t) comprise income generated during the current year (t). Thus, to obtain a beginning measure of equity capital, net income of the period is deducted. We denote tangible book value designed in such a way as $TBV_{i,t}$ (tangible book value for company "i" at the end of year "t"). This approach is coherent with residual income model, in that yearly return on equity is compared with beginning-of-the-year book value to obtain a current (t) residual income measure. The approach is also robust to M&A activities[19] since all figures and market data are collected at the same time (t).

$ROTE_{i,t}$ is the return on tangible equity, where current net income is used as a proxy for expected income. As book value measures are considered net of intangible assets, the ROTE variable is adjusted for intangible assets amortization, net of taxes. As one can see in statistics attached, net income for the sample is relatively low—even negative in a sizable portion of the sample—while PTBV is always positive by definition. (Both prices and tangible book values are positive.[20]) Negative net income banks do still quote a positive market price because of market recovery expectation. In this sense, an adjustment to the model needs to be carried out to take into account the subjectivity of the relationship between PTBV and ROTE, as ROTE becomes negative. As in Barth et al. (1998), a dummy variable (D_{ROTE}) has been created with a multiplicative design, assigning a value equal to $ROTE_{i,t}$ if $ROTE_{i,t}$ is negative and zero otherwise. The interaction of ROTE with D_{ROTE} should yield an absolute value for $\beta_{D\text{-}ROTE}$ close to $\beta_{ROTE,}$ with opposite sign, which means that, for negative ROTE, the β_{ROTE} slope effect is canceled out.

$Beta_{i,t}$ coefficient is extracted for each bank of the sample: if market beta was not statistically significant, bank-industry beta was used, based on the sample of company observed (the average beta for banks in the same country and the same year); otherwise the observation has been dropped. As detailed in equation (5) and (6), beta, within Ohlson model, is necessary to control for, as it soaks up cost of capital variance within the sample. Moreover, beta (and cost of capital) allows the capture of omitted variables in the model that could explain the reasons behind the premium/discount attached to each activity.

a) A premium to net asset could be attached by the market because it values the trading book as a whole instead of valuing single activities. So the market could assign a premium to the

[19] Market capitalization and consolidated accounting figures at year-end reflect acquisition activities. Previous year-end capital measures exclude the effect of acquired entities, causing inconsistency between income measures (extracted at year-end) and capital measures (extracted as of previous year-end). Deduction of net income from end of the year book value overcomes the issue.

[20] The positive attribute of tangible book value is true because the sample consists of banks that must by law hold positive net capital.

whole portfolio to appreciate the diversification benefit. We believe that this diversification benefit is captured first through cost of capital (diversification benefits are captured in market beta) and second through the tier 1 capital ratio variable (diversification benefit could be captured trough a higher Tier 1 ratio, all else equal).

b) A premium/discount could be related to the underlying hedging policy adopted by a specific bank: debt securities included in the trading book are sometimes held to offset interest changes that affect other assets/liabilities not included in trading book. Thus, as underlined by Nissim and Penman (2007), "changes in the fair value of liability instruments (deposits or securities issued) are likely to offset changes in the fair value of investment securities." Market beta could capture long-term hedging benefits not already captured by current earnings.

Growth is a variable that controls for net income growth. To lose the fewest observations, growth has been designed as the difference between two consecutive year-end's net income scaled over $TBV_{i,t}$. Growth is expected to contribute with a positive coefficient to the price-to-book multiple; growth is also a value determinant within the Ohlson model.

L1, L2, and L3 represent the amount of Level 1 to 3 net assets at year-end, manually extracted from balance sheets and scaled over tangible book value. Liabilities at fair value represent only a small portion of the aggregate absolute value of figures at fair value, and their frequency is so limited that regressions considering assets and liabilities separately do not allow[21] for additional variables to be considered (this is anyhow consistent with previous literature). We expect β_{L3} to be characterized by a negative sign while β_{L1} and β_{L2} to be not statistically different from zero: within residual income model, when assets are already recorded at fair values, no incremental value should be recognized on balance sheet items, as fair market value is already captured within the book value of common equity.[22] In running the regression, we controlled for fair value hierarchy disclosure by introducing a dummy variable, LEVEL, which equals one if the Level 3 hierarchy is disclosed and zero otherwise.

Finally, a set of control variables has been used to control for leverage, turnover, size, and business model effects. As a proxy for leverage, tier 1 ratio has been used, as it is widely adopted among bank appraisers. Nissim (2007) suggests that bank holding companies with more excess capital[23] are more valuable since, on one side, excess capital provides growth opportunities, and, on the other

[21] Considering assets and liabilities separately would lead to a doubling of explanatory variables.
[22] Common equity is the algebraic sum of assets and liabilities: if assets and liabilities are expressed at fair value, this is definitely reflected in common equity.
[23] Capital in excess over regulatory requirements (Basel 3).

side, it lessens the potential need for equity injection. Tier 1 is thus expected to contribute positively to explanation of P/TBV variance. This hypothesis is also consistent with Modigliani and Miller's theory: for a given company, all else equal, higher leverage means higher risk and lower valuation multiples.

Turnover and the natural logarithm of total assets (defined as "size") are naturally correlated with the size of the bank. During the crisis, big banks were under pressure due to a contagion effect and thus bore additional risk compared with smaller ones and yielded a lower P/TBV ratio. Bigger banks are also more prone to trading activities that are riskier per se than banking activities. For these reasons, we expect both coefficients to be negative. To avoid the possibility that bank business models might affect the results of the analysis, we included a variable that considers the business model: activities other than lending are scaled over total assets to produce a ratio that can proxy for trading activities (without specifically mimicking them).[24]

As becomes apparent when comparing equation (5) with the first part of equation (6), the intercept α, when statistically significant, represents the price-to-tangible-book multiple in case every other variable be not statistically different from zero.

Hp 2, 3, 4 and 5: testing

Acknowledging the discount on Level 3 net assets, we questioned whether the additional fair value disclosure, required by IFRS 7, reduces the discount applied by the market. To investigate the issue, multiplicative dummy variables are set on L1 to L3 balance sheet variables so that, when disclosure is provided, the dummy variable assumes a value equal to the balance sheet L1 to L3 variable, and, when disclosure is not provided, the dummy variable equals zero. This modeling allows the incremental effect of disclosure on L1 to L3 accounting variables, to be set apart from the accounting variable itself. Additional disclosure-specific variables, such as net income or transfer to and from Level 3 net assets, are then added to the equation to complete information disclosed to the market. Those details might illuminate the reasons for the discount, assigning a different coefficient to each part of Level 3 net assets at year-end[25] (Hp 3 testing).

After those additions, equation (8) appears as follows:

[24] This choice avoids unnecessary correlations between trading activities and fair value net assets considered within the analysis.

[25] Also, those additional variables can be seen to provide an incremental effect on level 3 net assets valuation, by considering that year-end net assets consist partially of changes those assets incurred during the year.

$$\frac{P_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t} + \beta_{D_{ROTE}} \times \mathrm{D}\_ROTE_{i,t} + \beta_{GROWTH} \times GROWTH_{i,t+1} + \beta_{beta} \times Beta_{i,t}$$
$$+ \beta_{L1} \times L1_{i,t} + \beta_{D_{L1}} \times D_{L1_{i,t}} + \beta_{L2} \times L2_{i,t} + \beta_{D_{L2}} \times D_{L2_{i,t}} + \beta_{L3} \times L3_{i,t} + \beta_{D_{L3}} \times D_{L3_{i,t}}$$
$$+ \beta_{NI\_L3} \times NI_{L3_{i,t}} + \beta_{INV\_L3} \times INV_{L3_{i,t}} + \beta_{FROM\_L3} \times FROM_{L3_{i,t}} + \beta_{TO\_L3} \times TO_{L3_{i,t}}$$
$$+ \beta_{SQUAD\_L3} \times SQUAD + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t} \quad (9)$$

Additional disclosure of changes in level 3 includes net income (NI_{L3}), net investment (INV_{L3}), transfer from Level 3 ($FROM_{L3}$) and to Level 3 (TO_{L3}). SQUAD has been added as a control variable to identify any other movement not classified (or not disclosed) in changes in Level 3. We also controlled for companies that disclose the fair value hierarchy but do not own any Level 3 assets (DISC)—since those banks are not required to provide additional disclosure—to distinguish them from banks that own Level 3 net assets and do not provide additional disclosure.

In equation (9), coefficients $\beta_{D_{L1}}$, $\beta_{D_{L2}}$and $\beta_{D_{L3}}$ have to be added respectively to β_{L1}, β_{L2}, and β_{L3} to obtain true L1, L2, and L3 coefficients, representing the discounts assigned to those assets for companies that provide additional disclosures on Level 3 net assets. By design, the discount on Level 3 net assets should be read as the sum of coefficients $\beta_{D_{L3}} + \beta_{L3}$ for banks giving disclosure and β_{L3} otherwise.

We expect β_{L3} to be still negative within this model, possibly even wider in size: companies that do not provide additional disclosure should in fact still obtain a discount on Level 3 assets, consistently. with literature. $\beta_{D_{L3}}$ coefficient is instead expected to be positive so that the aggregate discount the market assigns to those companies effectively reduces to $\beta_{D_{L3}} + \beta_{L3}$.

Additional disclosure of changes in level 3 includes net income (NI_{L3}), net investment (INV_{L3}), transfer from Level 3 ($FROM_{L3}$) and to Level 3 (TO_{L3}). SQUAD has been added as a control variable to identify any other movement not classified (or not disclosed) in changes in Level 3. We also controlled for companies that disclose a fair value hierarchy but do not own any Level 3 assets (DISC)— those banks are not required to provide additional disclosure—to distinguish them from banks that own Level 3 net assets and do not provide additional disclosure. Additional variables should capture differential effects brought by specific change in Level 3 items: we do not expect additional variables to gather significance except for those variables that contribute in generating the Level 3 overall discount. Transfer from and to Level 3 might represent either a significant change in liquidity of the financial instrument transferred or, alternatively, a clue of earnings management. We therefore expect those variables to be significant. Under an aseptic approach, a positive sign on β_{FROM_L3} should be read as evidence of the information risk hypothesis—the variable assumes a negative sign if positive net assets are transferred out of Level 3—while a negative one would lead to the conclusion that premiums and discounts are attributed on a liquidity rank basis.

In considering the possibility that both attitudes co-exist, another argument can be set forth: small transfers from Level 3 to a higher level in the hierarchy can be due to the higher liquidity of the financial instrument being valued, but large transfers of Level 3 assets upward, during a period of decreasing liquidity within the markets, cast doubt on the genuineness of those transfers, suggesting potential earnings management. Assume that the sub-sample of transfers from Level 3 upward can be divided depending on the size of the transfer and that big and small transfers follow the aims described above. We can then model an incremental dummy variable, FROM_L3_SMALL, that synthetically breaks up the sub-sample in two parts: companies with small transfers (modeled as incremental dummy variable by FROM_L3_SMALL) and the ones with big transfers (implicitly captured by FROM_L3 variable). FROM_L3_SMALL is equal to FROM_L3 only in the case that the transfer from L3 is greater than the median of the sample (FROM_L3): since FROM_L3 is designated by a negative coefficient, FROM_L3_SMALL represents the case in which transfers are, in absolute value, small[26]. Hence we expect that β_{FROM_L3} coefficient does not change sign-wise, while $\beta_{FROM\_L3\_SMALL}$ coefficient should come out positive and greater than β_{FROM_L3}: if the algebraic sum of $\beta_{FROM\_L3\_SMALL}$ and β_{FROM_L3} returns a positive coefficient, that is evidence that the market assigns a premium to small transfers of financial instruments out of Level 3, while it assigns a further discount whenever the size of the transfer exceeds an average "normal" amount.

6. Results of the analysis

Table 5 reports ordinary and Spearman rank-order correlations for the pooled sample. Ordinary correlations show greater co-movement between PTBV and Level 1 assets than Level 2 and Level 3 assets, confirming the hypothesis that market-to-market estimates are more directly incorporated in market prices than market-to-model estimates.

Table 6 reports regression results for models 1, 2, and 3. The model 1 tests Hp 1, that is, whether L3 activities are traded at a discount in the European banking sector. Regression results, with country and year fixed effects, do report coefficients consistent with previous literature, suggesting that the

[26] Recall that the absolute value of Level 3 assets is greater than the absolute value of Level 3 liabilities, so negative transfers (positive FROM_L3 variable) are associated with a low transferring activity.

market assigns a material discount over Level 3 fair value net assets reported on the balance sheet. The size of the discount, that is exactly equal to the β_{L3} coefficient is 10,8%. This figure is consistent with previous literature, although lower compared with the one that implicitly[27] appears in Song (2010), probably because of a different level of enforcement and time adoption dynamics within the European sample compared to US samples used in previous research. Outcomes also show that Level 1 assets are valued at a premium over book value and Level 2 assets are fairly accounted, as the market does not recognize either premiums or discounts. The premium incurred by Level 1 assets equals 9% and might as well be related to one of the following dynamics.

a) A liquidity premium that the market assigns to a bank holding large amounts of liquid assets: Level 1 assets can be rapidly disposed of, providing additional capital the bank might need during the year. This is an attribute that is often valued positively by the market (as already seen is literature with banks holding excess capital). This hypothesis would also be consistent with an illiquidity discount on Level 3 net assets, as a sort of climax that entails all types of fair value assets, ranked by the market on the basis of their relative liquidity.
b) Diversification/hedging benefits not already captured by earnings or beta.
c) The value some banks can extract from trading: value generation through portfolio management could be due alternatively to the ability of bank management (through market timing or stock/sector picking) or to the existence of some high frequency trading systems that allow generation of extra profits even under efficient market hypothesis.

Coefficients of L1 to L3 net assets are tested by using Wald hypothesis: β_{L1}, β_{L2}, and β_{L3} are statistically different from each other, validating regression results. Importantly the Level 3 standard error is more than twice the Level 1 and Level 2 standard error, revealing beyond doubt a higher measurement error in Level 3 fair value estimates. In other words, we believe that the source of a higher standard error for Level 3 net assets is the underlying valuation measurement error. This follows prior literature (Barth, 1994) in noting that investment security gain and losses are not captured by financial markets, because of measurement error in their estimates.

Building on regression results, ROTE and D_ROTE variables are significant at 1% level, with opposite coefficients, as expected: in particular D_ROTE has a lower absolute value than ROTE, suggesting that high losses still yield to a lower price to tangible book value but in a more tempered

[27] Song scales accounting figures on number of shares, so that the coefficient interpretation is different from ours. The Level 3 coefficient in Song is 0.683 and represents a 32% discount (1 – 0.683 = 0.317) on book values for level 3 net assets.

manner. The coefficient on ROTE is equal to 5.8, implying a capitalization rate for bank residual income equal to 17.2% (= 1/5.8).

Growth and beta variables are not significant. Currently, growth requires additional capital that the market is not willing to provide, given the high uncertainty about the net present value generated by new activities. Beta is not significant probably because the variable is strongly correlated to some control variables (size, turnover, type of business, and leverage) that are statistically significant. Control variables that are proximal to significance do present the correct sign in the regression, except for turnover and size. In theory, for a general business, the higher the turnover, the lower the liquidity discount on the stock, and the higher the PTBV. In practice, during the financial crisis, big banks were under pressure due to a contagion effect and bore additional risk compared with smaller ones and yielded a lower PTBV ratio. (The contagion effect has been the subject of an increasing number of research papers.) Furthermore, bigger banks are more prone to trading that is per se riskier than banking activities. For these reasons, both coefficients are negative and reduce the PTBV. Moreover, empirical research (Baele, 2007) has confirmed that CAPM beta best captures return for the biggest and most diversified banks (compared to the Fama-French model or other multifactor models). Big financial institutions are more sophisticated players that can efficiently hedge, significantly reducing specific risks, but they remain more exposed than some other industries to systemic risk. The greater the size and diversification of a bank, the greater the exposure to economic cycles, the greater the resulting beta.

All statistics are Newey-West standard error and covariance adjusted.

Hp 2 to 5 are then tested by using equation 9 (splitting for Hp4 testing FROM_L3 variable in FROM_L3 and FROM_L3_SMALL dummy variable). Table 6 shows regression results where $\beta_{D_{L3}}$ mimics β_{L3} with the opposite sign). The size of the discount, β_{L3} = 30,2%, has increased from the results reported in Table 6 – Model 1 (10.8%), being now even more consistent with literature (Song reports a 31,7% discount). The relative premium expressed by $\beta_{D_{L3}} (= 0{,}33)$. This clearly shows that companies that fully disclose information about Level 3 (including additional disclosure required by IFRS 7), all else being equal, completely offset the discount the market generally appoints to those assets. Hp2 is thus verified. $\beta_{D_{L1}}$ and $\beta_{D_{L2}}$ are not statistically significant, confirming that no cross effects exist because of additional disclosure of Level 3 assets on Level 1 and Level 2 valuation. The Wald test shows that, considering the sum of the L1 to L3 coefficient with their related dummy variables coefficient, Level 1 assets are still valued differently from Level 2 assets, while Level 3 assets are not distinguishable from either Level 1 or Level 2 assets. In other words, disclosure effectively provides additional evidence that fills the gap between Level 2 and Level 3 assets, so that no significant difference exists between the two categories. But a question remains unanswered: how additional information contributes in extinguishing the Level 3 discount.

Transfers from and to Level 3 happen to be the only two significant variables among the ones built on changes in Level 3 fair value. FROM L3 shows a positive coefficient, while TO L3 shows a negative one. Given that, by design, FROM L3 variable represents a decrease in Level 3 assets, an increase in the absolute value of both variables leads to a decrease in the PTBV multiple. Theoretically, if the liquidity hypothesis were to hold, one would expect assets exiting from Level 3 to resume their fair market price by canceling the illiquidity discount, thus increasing PTBV.[28] This does not happen. We then tested the last specification (reported in model 3), splitting FROM_L3 variables depending on the size of the transfer.

Results, presented in Table 6, Model 3, show that for big transfers, prevail the information risk hypothesis with positive β_{FROM_L3} coefficient is confirmed, while for small transfers (FROM_L3_SMALL), the coefficient $\beta_{FROM\_L3\_SMALL}$ becomes negative and higher in absolute value than β_{FROM_L3}, yielding a net negative sign (since the variable is modeled as an incremental dummy variable, the true coefficient to be applied to small transfer is $\beta_{FROM\_L3\_SMALL} + \beta_{FROM\_L3}$). The reason is that the market perceives that accounting choices exist within hierarchy classification and that increased earnings management risk emerges, brought by the high level of transfer between levels of the fair value hierarchy, leading to a lower price-to-tangible-book multiple. However, if those transfers are not particularly significant in size, the market perceives that a genuine upgrade in financial instrument's liquidity might have occurred: thus it rewards a premium for the increased liquidity (Hp 3 and 4). Notably β_{FROM_L3} coefficient happens to be statistically different from β_{TO_L3} but not from $-\beta_{TO\_L3}$: given the opposite sign of the underlying variables, this confirms that the discounts on transfer <u>from</u> and <u>to</u> Level 3 are not statistically distinguishable, in general terms. Coming down to a different level of transfers out of Level 3, $\beta_{FROM\_L3\_SMALL} + \beta_{FROM\_L3}$ net coefficient, while indifferent to β_{TO_L3}, proves to be statistically different from $-\beta_{TO\_L3}$, confirming

[28] It can be argued that "FROM L3 variable," being not netted with the opposite "TO L3" variable, is the only one among additional disclosure variables that might be misspecified, since it does not theoretically represent a share of Level 3 net assets at year-end but just an outflow from Level 3: coefficient interpretation as an incremental effect might be compromised. For this reason, we tested a different specification, subtracting (algebraic sum is allowed since all balance sheet variables are scaled by the same TBV of company "i" at year "t") transfer of assets out of Level 3 (FROM L3) from the aggregate amount of Level 1 and Level 2 assets (L1+L2), obtaining a net amount of Level 1 and Level 2 assets. Doing so, under the hypothesis that the discount is homogeneous in the sample, we effectively split the portion of Level 1 and Level 2 assets coming from Level 3 net assets from Level 1 and Level 2 net assets before transfer. In this case, the FROM L3 variable should capture exclusively the premium/discount the market assigns to this specific category of assets, which has been transferred upward in the hierarchy during the year. Results do not change significantly, and the coefficient diagnostic does not change by any means.

that the second is a discount and the first a premium and giving a feeling that the premium compensates for the discount previously assigned (given that the coefficients' absolute values are not distinguishable between each other).

The general picture we can draw from the regression results in model 2 and 3 as follows.

a) The discount on Level 3 activity disappears if disclosures pursuant to IFRS 7 are given.
b) Profit and loss at year-end on Level 3 activity are judged with the same coefficient of Level 3 activity at the beginning of each year, leading to the conclusion that there is no earnings management on earnings generated by Level 3 net assets;
c) Transfers from Level 1 and 2 to Level 3 are always negatively judged by the market; small transfers from Level 3 to Level 1 and 2 are positively judged, while big transfers are negatively judged. We believe that these results are consistent with both liquidity theory and earnings management theory: markets apply a liquidity discount (a liquidity premium) when a company transfers small net assets from Level 1 and 2 (from level 3) to level 3 (to level 1 and 2). When transfers are bigger, markets apply a higher discount on Level 3 net assets. We believe that this result is consistent with the earnings management hypothesis: sometimes a company transfers assets from Level 1 and 2 to Level 3 not because of a loss in liquidity but only to avoid current and future losses. The market reacts to this behavior by applying a higher discount that incorporate the avoided losses.

7. Conclusion

This article investigates, for a sample of European quoted banks, why fair value estimates of illiquid financial instruments are not fully incorporated into market prices. First, by using the Ohlson framework on a European sample, we find Level 3 financial instruments being valued at discount by the market. The measure of the discount within our findings (10%) is lower than the one outlined in previous literature, probably because of the different level of enforcement and time adoption dynamics within the European sample compared with prior US samples. In fact, the literature does not provide any evidence of the reason beneath the discount, while we show that the additional disclosure required by amended IFRS 7 effectively cancels out the discount, resulting in a lower overall discount on the entire sample.

Our results strongly support the efforts made by national and supra national authorities, like ESMA, to enforce IFRS 7. As an example of enforcement activities, in March 2010, a coordinating committee of the Bank of Italy, CONSOB, and ISVAP issued a document on IFRS 7 disclosure. The document, while not adding any further requirements, calls for full compliance with IAS/IFRS disclosure requirements so that all necessary information is made public in a context of high uncertainty. With specific regard to fair value hierarchy, the document focuses on the need to correctly determine and disclose: the specific level of the fair value estimate in accordance to the weight of used inputs (observable and unobservable); changes in measurement inputs; transfers of financial instruments from and to Level 3 (from/to Level 1 and 2); and the reasons for these transfers and a sensitivity analysis for Level 3 fair value estimate. The following is an excerpt from the document:

"More generally the 3 authorities considering the need to disclose correct information on financial instruments to the market, especially in the current market situation, call for directors to pay the greatest possible attention to the quality of disclosure on financial instruments, in line with the provisions of IFRS 7*"*[29]

With authorities riding the disclosure wave, we question whether the positive effect on market prices is due to the greater amount of information by itself or whether there are other reasons that might justify the discount. Among earnings management, liquidity, and disclosure opacity, we conclude that the latter two coexist. By splitting Level 3 net assets fair value through the additional disclosure pursuant to IFRS 7 § 27B:

$$Net\ Asset\ Level\ 3_{i,t} = Net\ Asset\ Level\ 3_{i,t-1} + Net\ Changes\ in\ Level\ 3_{i,t}$$

where:

$$Net\ Changes\ in\ Level\ 3_{i,t} = Net\ Profit\ Level\ 3_{i,t} + Net\ Investments\ Level\ 3_{i,t} + Net\ trasnfer\ FROM\ Level\ 3_{i,t} + Net\ transfer\ TO\ Level\ 3_{i,t} + Net\ other\ changes\ in\ Level\ 3_{i,t}$$

we implicitly analyze the valuation multiple attached to each type of sub-activity as incorporated in bank's market price. Differences among valuation multiples exist only for net transfers FROM Level 3 and for net transfers TO Level 3, where we find a negative and statistically significant value. No difference, in statistical terms, exists between the valuation multiple of net profit realized

[29] Fiscal years 2009 and 2010 – Disclosure in financial reports on asset impairment tests, financial debt contract clauses, debt restructuring and fair value hierarchy , Bank of Italy-Consob-Isvap Document no. 4 of 3 March 2010, Bank of Italy, Consob and Isvap coordination forum on applying IAS/IFRS., downloadable at http://www.bancaditalia.it/vigilanza/att-vigilanza/accordi-altre-autorita/accordi-aut-italiane/tavolo_coordinamento/fin_reports09_10.pdf, pp 11

by Level 3 financial instruments during the year and the valuation multiple related to Level 3 net assets at the beginning of fiscal year (thus yielding to a nonstatistically significant incremental coefficient estimate). Therefore we can exclude the hypothesis that banks manage earnings through profit and loss realized on Level 3 net assets.

Focusing on transfers in and out of Level 3 category, empirical evidence strongly supports the presence of a discount on the aggregate amount of transfer from and to Level 3 category. While transfers of financial instruments TO Level 3 reflect their lower liquidity and potential greater opacity of accounting policies (i.e., bank management might be induced to transfer financial instruments downward in fair value hierarchy to actively and subjectively manage the valuation process), transfers FROM Level 3 show a dichotomous behavior. Small genuine transfers are rewarded for recovery in liquidity the financial instrument might have experienced, while big transfers are treated as opaque transactions. Those results support the hypothesis that large transfers of financial instruments within the fair value hierarchy layers are discounted from market prices because of the possibility that management engaged in earnings management.

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TABLE 1

Sample Selection

			Financial Institutions		x Years	= Observations
Sample Selection Criteria			**Considered**	**Deleted**		
1		**SIC Code = 60 - Depositary Istitutions** **Regions = EU + NO +CH**	**231**			
2	-	Accounting Standard Followed 2008-2009-2010 = 23 (IFRS)		65		
	=	**Resulting after Step 2**	**166**			
3	-	Eliminazine SIC Code = 6019-6062-6099		8		
	=	**Resulting after Step 3**	**158**			
4		**Matching cum Factset Sector e DJ Sector**		**20**		
		Factset Sector - Eliminazione di:				
		Financial/Rental/Leasing		3		
		Investments Banks/Brokers		8		
		Investment Managers		2		
		Investment Trust/Mutual Funds		1		
		DJ Sector - Eliminazione di:				
		Investment Services		5		
		Real Estate		1		
5		**Missing Data**		**18**		
	=	**European Sample Selected**	**120**		5	**600**
6	-	Missing Data				60
Number of Company-Year Observations in OLS Regressions						**540**

TABLE 2

Descriptive Statistics for the sample selected

Variable →	Company Market Cap. as of 31/12/t	Common Equity t	Intangible Assets t	Net Income t	Amortization of Intangibles t	Tax Rate t	Total Assets t	TIER 1 t	Beta t	Turnover t
Source:	Factset	Factset	Factset	Factset	Factset	Factset	Factset	Factset	Factset	Factset
N	591	587	587	587	600	600	587	600	556	585
Sum (EUR)	3'942'122	5'321'716	1'237'227	108'152	43'022	-	121'476'641	-	-	-
Means	6'670	9'066	2'108	184	72	26.91%	206'945	10.52%	1.04	56.37%
Std.Dev.	15'809	18'781	5'130	2'357	202	5.40%	452'006	3.20%	0.68	77.08%
Q25	271	623	8	9	0	25.00%	8'935	8.62%	0.53	3.29%
Median	1'216	1'504	76	78	5	28.00%	23'351	10.60%	0.91	24.40%
Q75	4'509	6'792	966	259	36	31.40%	131'174	12.32%	1.42	78.21%

Variable →	Net Financial Instruments - Level 1 t	Net Financial Instruments - Level 2 t	Net Financial Instruments - Level 3 t	Net Profit/Loss t	Net Investments t	Transfer TO Level 3 (+sign) t	Transfer FROM Level 3 (-sign) t	Check delta Level 3 t	Financial Assets at FV (L1+L2+L3)	TBV t
Source:	Financial Statements	Financial Statements	Financial Statements	Financial Statements	Financial Statements	Financial Statements	Financial Statements	Financial Statements	-	-
N	587	587	587	586	586	586	586	586	587	583
Sum (EUR)	10'221'949	3'204'683	811'447	-68'975	-121'354	110'836	-82'002	7'667	46'124'102	3'987'397
Means	17'414	5'459	1'382	-118	-207	189	-140	13	78'576	6'839
Std.Dev.	51'727	26'693	5'685	1'186	1'317	1'044	844	236	246'075	13'859
Q25	28	-3	0	-0.2	-1.4	0.0	0.0	0.0	383.5	593.2
Median	926	56	21	0.0	0.0	0.0	0.0	0.0	1'974.3	1'328.9
Q75	6'581	1'122	232	0.0	0.0	0.0	0.0	0.0	15'250.5	5'265.1

			A	B	C	D	E	F	$G_t = (A\text{-}B\text{-}C\text{-}D\text{-}F)_{t+1}$	
Sum of (EUR):	**Net Financial Instruments - Level 1 t**	**Net Financial Instruments - Level 2 t**	**Net Financial Instruments - Level 3 t**	**Net Profit/Loss t**	**Net Investments t**	**Transfer TO Level 3 (+sign) t**	**Transfer FROM Level 3 (-sign) t**	**Check delta Level 3 t**	**Beginning Net Financial Instruments - Level 3 t**	**TBV t**
2008	977'757	644'854	187'970	-	-	-	-	-	568'361	553'790
2009	2'111'391	681'501	193'086	-61'345	-52'688	25'432	-33'023	7'766	965'456	745'920
2010	2'456'859	550'163	172'256	1'508	-28'170	24'037	-26'749	1'058	916'811	821'780
2011	2'154'472	635'144	138'754	750	-21'541	44'170	-10'912	-2'326	647'685	908'844
2012	2'521'471	693'021	119'381	-9'887	-18'954	17'198	-11'318	1'168	843'809	957'062
Totale	10'221'949	3'204'683	811'447	-68'975	-121'354	110'836	-82'002	7'667	3'942'122	3'987'397

TABLE 3

Descriptive Statistics for variables used in OLS Regressions, broken down by year

YEAR		2008	2009	2010	2011	2012	All
PTBV	N	118	119	119	117	108	581
	Means	1.20 x	1.26 x	1.14 x	0.77 x	0.82 x	1.04 x
	Std.Dev.	1.18 x	0.93 x	0.97 x	0.80 x	0.85 x	0.97 x
	Q25	0.59 x	0.74 x	0.56 x	0.24 x	0.32 x	0.41 x
	Median	1.00 x	1.12 x	0.90 x	0.55 x	0.64 x	0.85 x
	Q75	1.55 x	1.73 x	1.52 x	1.06 x	1.02 x	1.39 x
ROTE	N	119	119	119	117	109	583
	Means	10.24%	6.84%	6.11%	-7.55%	-1.57%	2.92%
	Std.Dev.	0.21	0.12	0.16	0.47	0.27	0.28
	Q25	4.41%	3.84%	3.00%	-3.44%	-1.78%	1.96%
	Median	8.85%	7.52%	7.84%	6.05%	4.82%	6.97%
	Q75	15.90%	12.45%	12.35%	9.69%	10.44%	12.22%
D_ROTE	N	119	119	119	117	109	583
	Means	-2.75%	-1.97%	-2.82%	-14.50%	-8.14%	-5.97%
	Std.Dev.	0.11	0.07	0.12	0.44	0.24	0.24
	Q25	0.00%	0.00%	0.00%	-3.44%	-1.78%	0.00%
	Median	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Q75	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
GROWTH	N	119	119	119	116	109	582
	Means	11.46%	-0.05%	0.18%	14.30%	-4.65%	4.35%
	Std.Dev.	0.18	0.14	0.12	0.45	0.35	0.29
	Q25	1.37%	-2.90%	-3.59%	-1.16%	-4.74%	-2.21%
	Median	7.58%	0.79%	-1.10%	1.38%	-0.58%	1.02%
	Q75	15.26%	4.58%	3.23%	7.82%	3.74%	6.58%
BETA	N	117	115	100	116	108	556
	Means	0.82	1.28	0.85	0.96	1.29	1.04
	Std.Dev.	0.48	0.89	0.47	0.61	0.71	0.68
	Q25	0.44	0.57	0.65	0.49	0.71	0.53
	Median	0.78	1.23	0.77	0.85	1.19	0.91
	Q75	1.12	1.79	1.14	1.30	1.92	1.42
Turnover	N	118	119	119	117	112	585
	Means	0.66	0.56	0.53	0.52	0.54	0.56
	Std.Dev.	0.88	0.69	0.77	0.75	0.76	0.77
	Q25	0.04	0.05	0.03	0.03	0.03	0.03
	Median	0.29	0.30	0.25	0.15	0.18	0.24
	Q75	0.93	0.78	0.70	0.69	0.81	0.78

YEAR		2008	2009	2010	2011	2012	All
SIZE	N	119	119	119	117	113	587
	Means	10.32	10.37	10.43	10.46	10.54	10.42
	Std.Dev.	2.00	1.96	1.95	1.96	1.94	1.96
	Q25	9.03	9.07	9.10	9.17	9.27	9.09
	Median	10.01	10.06	10.16	10.03	10.06	10.06
	Q75	11.71	11.77	11.78	11.78	11.82	11.78
TIER1	N	120	120	120	120	120	600
	Means	0.09	0.10	0.11	0.11	0.12	0.11
	Std.Dev.	0.02	0.03	0.03	0.03	0.03	0.03
	Q25	0.07	0.09	0.09	0.09	0.11	0.09
	Median	0.09	0.10	0.11	0.11	0.12	0.11
	Q75	0.10	0.12	0.13	0.13	0.13	0.12
BUSINESS	N	119	119	119	117	113	587
	Means	0.28	0.29	0.30	0.30	0.32	0.30
	Std.Dev.	0.15	0.14	0.15	0.15	0.15	0.15
	Q25	0.17	0.19	0.18	0.18	0.22	0.18
	Median	0.25	0.27	0.28	0.28	0.30	0.27
	Q75	0.35	0.37	0.39	0.38	0.41	0.38
LEVEL	N	120	120	120	120	120	600
	Means	0.74	0.01	0.01	0.08	0.14	0.20
	Std.Dev.	0.44	0.09	0.09	0.26	0.35	0.40
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	1.00	0.00	0.00	0.00	0.00	0.00
	Q75	1.00	0.00	0.00	0.00	0.00	0.00
DISC	N	120	120	120	120	120	600
	Means	0.76	0.19	0.18	0.23	0.22	0.31
	Std.Dev.	0.43	0.40	0.38	0.42	0.41	0.46
	Q25	1.00	0.00	0.00	0.00	0.00	0.00
	Median	1.00	0.00	0.00	0.00	0.00	0.00
	Q75	1.00	0.00	0.00	0.00	0.00	1.00

YEAR		2008	2009	2010	2011	2012	All
L1	N	119	119	119	117	109	583
	Means	0.74	1.98	2.16	1.72	1.81	1.68
	Std.Dev.	2.30	2.41	3.24	2.32	2.14	2.56
	Q25	0.00	0.35	0.52	0.28	0.27	0.03
	Median	0.00	1.43	1.41	1.15	1.27	1.06
	Q75	0.22	2.72	2.61	2.16	2.27	2.12
L2	N	119	119	119	117	109	583
	Means	0.46	0.39	0.27	0.37	0.39	0.38
	Std.Dev.	2.37	2.17	1.82	1.49	1.53	1.91
	Q25	0.00	-0.08	-0.08	-0.05	-0.02	-0.01
	Median	0.00	0.38	0.22	0.26	0.10	0.06
	Q75	0.00	0.99	0.74	0.77	0.69	0.72
L3	N	119	119	119	117	109	583
	Means	0.13	0.22	0.19	0.13	0.12	0.16
	Std.Dev.	0.44	0.73	0.69	0.30	0.26	0.53
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.04	0.04	0.03	0.03	0.02
	Q75	0.00	0.16	0.12	0.13	0.13	0.12
D_L1	N	119	119	119	117	109	583
	Means	0.00	1.20	1.76	1.53	1.63	1.22
	Std.Dev.	0.00	1.86	3.33	2.39	2.21	2.33
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.25	0.75	0.64	1.11	0.01
	Q75	0.00	1.73	2.03	2.04	2.17	1.71
D_L2	N	119	119	119	117	109	583
	Means	0.00	0.39	0.20	0.31	0.32	0.24
	Std.Dev.	0.00	1.49	1.45	1.49	1.51	1.33
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.78	0.61	0.72	0.53	0.27
D_L3	N	119	119	119	117	109	583
	Means	0.00	0.19	0.18	0.13	0.12	0.12
	Std.Dev.	0.00	0.73	0.69	0.30	0.26	0.49
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.02	0.02	0.02	0.03	0.00
	Q75	0.00	0.13	0.11	0.12	0.12	0.08
Begin_L3_Adj	N	119	119	119	117	109	583
	Means	0.48	0.22	0.19	0.13	0.12	0.23
	Std.Dev.	1.34	0.74	0.69	0.30	0.26	0.79
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.08	0.04	0.04	0.03	0.03	0.04
	Q75	0.39	0.16	0.12	0.13	0.13	0.16

YEAR		2008	2009	2010	2011	2012	All
NI_L3	N	119	119	119	117	108	582
	Means	0.00	-0.01	0.00	-0.01	0.00	0.00
	Std.Dev.	0.00	0.12	0.05	0.04	0.02	0.06
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.00	0.00	0.00	0.00	0.00
INV_L3	N	119	119	119	117	108	582
	Means	0.00	-0.03	-0.02	-0.01	0.00	-0.01
	Std.Dev.	0.00	0.15	0.13	0.12	0.08	0.11
	Q25	0.00	0.00	-0.01	0.00	-0.01	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.00	0.00	0.00	0.00	0.00
TO_L3	N	119	119	119	117	108	582
	Means	0.00	0.01	0.00	0.01	0.00	0.01
	Std.Dev.	0.00	0.05	0.03	0.04	0.01	0.03
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.00	0.00	0.00	0.00	0.00
FROM_L3	N	119	119	119	117	108	582
	Means	0.00	-0.02	-0.01	0.00	0.00	-0.01
	Std.Dev.	0.00	0.09	0.05	0.03	0.01	0.05
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.00	0.00	0.00	0.00	0.00
SQUAD	N	119	119	119	117	108	582
	Means	0.00	0.01	0.01	0.00	0.00	0.00
	Std.Dev.	0.00	0.09	0.09	0.15	0.13	0.10
	Q25	0.00	0.00	0.00	0.00	0.00	0.00
	Median	0.00	0.00	0.00	0.00	0.00	0.00
	Q75	0.00	0.00	0.00	0.00	0.00	0.00
Mean L1/ Mean L3		5.92	9.13	11.17	13.11	15.33	10.65
Mean L2/ Mean L3		3.69	1.78	1.42	2.83	3.29	2.39

TABLE 4

Percentages of non-zero values and adoption rate

Base:	Entire Sample (120 Obs/Year)			Companies that reports FV L3 net assets different from zero				
% Object:	Companies reporting values different from zero			Companies reporting disclosure values different from zero				
	Net Financial Instruments - Level 1	**Net Financial Instruments - Level 2**	**Net Financial Instruments - Level 3**	**Net Profit/Loss t**	**Net Investments t**	**Transfer TO Level 3 (+sign) t**	**Transfer FROM Level 3 (-sign) t**	**Check delta Level 3 t**
2008	25.8%	25.0%	23.3%	-	-	-	-	-
2009	97.5%	99.2%	80.0%	66.7%	70.8%	25.0%	26.0%	67.7%
2010	97.5%	98.3%	81.7%	73.5%	79.6%	32.7%	39.8%	50.0%
2011	92.5%	92.5%	75.0%	90.0%	88.9%	46.7%	34.4%	70.0%
2012	88.3%	88.3%	70.8%	92.9%	90.6%	41.2%	48.2%	56.5%

Base:	Companies that have financial instruments of Level 3 and are required to provide additional disclosure
% Object:	Companies reporting additional disclosure
	Net Financial Instruments - Level 1
2008	0.0%
2009	72.9%
2010	80.6%
2011	90.0%
2012	94.1%

TABLE 5

Ordinary and Spearman Rank Order correlation on the balanced sample among variables used in OLS regressions.

	PTBV	ROTE	D_ROTE	BETA	GROWTH	SIZE	BUSINESS	TURNOVER	TIER1	L1	L2	L3	D_L1	D_L2	D_L3	NI_L3	INV_L3	FROM_L3	TO_L3	SQUAD
PTBV	1.000	0.474	0.280	0.145	-0.155	0.177	0.396	0.185	0.183	0.272	0.091	0.156	0.179	0.163	0.084	-0.023	-0.073	-0.006	0.016	-0.020
ROTE	0.380	1.000	0.688	-0.076	-0.406	0.049	0.040	0.006	-0.023	0.030	0.106	0.026	-0.021	0.102	-0.036	0.170	0.020	0.067	-0.056	-0.024
D_ROTE	0.154	0.934	1.000	-0.205	-0.398	-0.057	-0.094	-0.144	-0.024	-0.037	0.104	-0.047	-0.069	0.087	-0.066	0.186	-0.006	0.064	-0.045	-0.019
BETA	0.054	-0.109	-0.113	1.000	0.045	0.560	0.406	0.602	0.121	0.294	0.028	0.264	0.336	0.056	0.217	-0.114	-0.163	-0.266	0.313	-0.015
GROWTH	-0.104	-0.529	-0.558	-0.034	1.000	0.055	-0.007	0.138	-0.177	-0.166	-0.113	-0.158	-0.231	-0.148	-0.223	-0.110	-0.025	0.032	-0.108	-0.024
SIZE	0.042	-0.013	-0.025	0.553	0.044	1.000	0.501	0.655	-0.035	0.302	0.039	0.179	0.261	0.036	0.107	-0.079	-0.243	-0.283	0.395	-0.055
BUSINESS	0.310	0.049	0.013	0.372	-0.005	0.532	1.000	0.448	0.320	0.496	0.122	0.315	0.444	0.166	0.245	-0.044	-0.127	-0.232	0.279	-0.061
TURNOVER	0.038	-0.021	-0.043	0.468	0.015	0.617	0.363	1.000	0.008	0.235	0.041	0.252	0.266	0.071	0.186	-0.064	-0.147	-0.244	0.323	-0.034
TIER1	0.164	0.069	0.090	0.118	-0.142	-0.034	0.287	-0.020	1.000	0.211	0.135	0.201	0.328	0.236	0.310	-0.002	0.016	-0.094	0.122	-0.069
L1	0.309	0.083	0.028	0.209	-0.127	0.258	0.457	0.112	0.078	1.000	0.134	0.509	0.696	0.095	0.390	-0.076	-0.089	-0.255	0.286	0.023
L2	0.088	0.032	0.039	0.049	0.028	0.117	0.272	0.083	0.088	0.040	1.000	0.120	0.104	0.789	0.114	-0.030	-0.077	-0.067	0.012	-0.060
L3	0.068	0.066	0.040	0.177	-0.086	0.157	0.187	0.111	0.041	0.251	0.032	1.000	0.506	0.195	0.792	0.021	-0.005	-0.318	0.346	0.113
D_L1	0.233	0.041	0.007	0.299	-0.176	0.264	0.470	0.120	0.172	0.766	-0.069	0.235	1.000	0.260	0.714	-0.082	-0.114	-0.362	0.430	-0.063
D_L2	0.081	0.042	0.054	0.059	-0.037	0.110	0.266	0.051	0.177	-0.078	0.674	-0.024	-0.043	1.000	0.273	-0.055	-0.114	-0.124	0.075	-0.045
D_L3	0.067	0.048	0.032	0.157	-0.124	0.103	0.133	0.039	0.093	0.218	-0.024	0.880	0.310	-0.011	1.000	0.005	-0.026	-0.403	0.442	-0.023
NI_L3	-0.025	0.029	0.021	-0.098	-0.014	-0.085	-0.134	-0.046	-0.042	-0.108	-0.066	0.173	-0.137	-0.098	0.186	1.000	0.028	-0.032	-0.110	-0.018
INV_L3	-0.022	-0.020	-0.042	-0.137	0.081	-0.115	-0.119	-0.063	-0.043	-0.016	-0.081	-0.215	-0.040	-0.123	-0.247	0.130	1.000	0.153	-0.201	0.030
FROM_L3	-0.032	0.016	0.025	-0.123	0.030	-0.166	-0.175	-0.106	-0.062	-0.115	-0.059	-0.332	-0.167	-0.098	-0.382	-0.079	0.252	1.000	-0.410	0.003
TO_L3	0.027	0.040	0.030	0.215	-0.084	0.297	0.313	0.226	0.078	0.169	0.150	0.407	0.239	0.228	0.470	-0.057	-0.400	-0.381	1.000	-0.024
SQUAD	0.027	-0.029	-0.039	0.059	0.023	0.009	0.030	0.016	0.017	0.117	-0.016	0.170	0.095	-0.006	0.172	-0.189	0.078	-0.103	-0.027	1.000

Underlined values represent ordinary correlations while non underlined ones are spearman rank order correlations

TABLE 6

Hypothesis	Model
Testing Hp1: "For the european banking sector, financial instruments classified in level 3 are valued at discount in relation to their book value"	Model 1
Testing Hp2: "A portion of Level 3 discount is due to the lack of disclosure, thus it should disappear once disclosure has been provided".	Model 2
Testing Hp3: Higher levels of transfers from L1 and L2 to Level 3 should lead to greater discounts on Level 3 financial instruments.	Model 2
Testing Hp4: The market assigns a premium to assets transferred from Level 3 to Level 1 and Level 2, when transfers are genuine.	Model 3
Testing Hp5: The market assigns a discount to those companies that most revalued Level 3 financial instruments, as disclosed by the amount of profits generated by Level 3 Net Assets.	Model 2

$$\frac{P_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t} + \beta_{D_{ROTE}} \times \mathrm{DROTE}_{i,t} + \beta_{GROWTH} \times GROWTH_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \beta_{L1} \times L1_{i,t} + \beta_{L2} \times L2_{i,t} + \beta_{L3} \times L3_{i,t} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t} \quad (Model\ 1)$$

$$\frac{P_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t} + \beta_{D_{ROTE}} \times \mathrm{D\_}ROTE_{i,t} + \beta_{GROWTH} \times GROWTH_{i,t+1} + \beta_{beta} \times Beta_{i,t} + \beta_{L1} \times L1_{i,t} + \beta_{D_{L1}} \times D_{L1_{i,t}} + \beta_{L2} \times L2_{i,t} + \beta_{D_{L2}} \times D_{L2_{i,t}} + \beta_{L3} \times L3_{i,t} + \beta_{D_{L3}} \times D_{L3_{i,t}} + \beta_{NI\_L3} \times NI_{L3_{i,t}} + \beta_{INV\_L3} \times INV_{L3_{i,t}} + \beta_{FROM\_L3} \times FROM_{L3_{i,t}}$$

$$+ \left[\beta_{FROM\_L3\_\mathrm{SMALL}} \times FROM_{L3\_\mathrm{SMALL}_{i,t}}\right] + \beta_{TO\_L3} \times TO_{L3_{i,t}} + \beta_{SQUAD\_L3} \times SQUAD + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t} \quad (Model\ 2) \text{ and [Model 3]}$$

Dependent Variable = PTBV

		Model 1		Model 2		Model 3	
Indipendent Variables		**Coeff**	**p-value ǀ t-stat**	**Coeff**	**p-value ǀ t-stat**	**Coeff**	**p-value ǀ t-stat**
C		0.658 **	2.5% ǀ 2.245	0.642 **	4.1% ǀ 2.046	0.637 **	4.2% ǀ 2.041
ROTE		5.800 ***	0.0% ǀ 6.719	5.837 ***	0.0% ǀ 6.580	5.828 ***	0.0% ǀ 6.570
BETA		-0.006	91.9% ǀ (0.102)	-0.001	98.2% ǀ (0.022)	0.001	98.5% ǀ 0.019
L1		0.088 ***	0.0% ǀ 4.973	0.092 ***	0.5% ǀ 2.804	0.091 ***	0.6% ǀ 2.774
L2		0.016	28.9% ǀ 1.062	0.018	39.2% ǀ 0.856	0.018	40.0% ǀ 0.842
L3		-0.108 **	3.6% ǀ (2.102)	-0.302 **	5.8% ǀ (1.902)	-0.306 **	5.6% ǀ (1.916)
D_L1				-0.011	77.0% ǀ (0.293)	-0.009	80.8% ǀ (0.244)
D_L2				0.004	88.3% ǀ 0.148	0.004	87.7% ǀ 0.155
D_L3				0.330 *	6.9% ǀ 1.826	0.323 *	7.6% ǀ 1.775
NI_L3				0.266	36.6% ǀ 0.905	0.313	29.7% ǀ 1.043
INV_L3				-0.101	60.3% ǀ (0.521)	-0.130	50.7% ǀ (0.664)
FROM_L3				1.052 ***	0.3% ǀ 3.006	1.216 ***	0.3% ǀ 3.009
FROM_L3_SMALL						-3.825 ***	0.0% ǀ (3.755)
TO_L3				-1.841 *	6.8% ǀ (1.826)	-1.803 *	7.0% ǀ (1.814)
SQUAD				-0.014	94.9% ǀ (0.064)	0.012	95.9% ǀ 0.051
Control Variables	**D_ROTE**	-5.695 ***	0.0% ǀ (6.407)	-5.760 ***	0.0% ǀ (6.339)	-5.737 ***	0.0% ǀ (6.310)
	GROWTH	0.094	56.1% ǀ 0.582	0.096	55.3% ǀ 0.594	0.097	54.9% ǀ 0.600
	SIZE	-0.039	18.5% ǀ (1.327)	-0.039	18.7% ǀ (1.322)	-0.039	18.2% ǀ (1.336)
	BUSINESS	1.100 ***	0.3% ǀ 2.992	1.203 ***	0.2% ǀ 3.186	1.227 ***	0.1% ǀ 3.258
	TURNOVER	-0.141 ***	0.2% ǀ (3.155)	-0.125 ***	0.6% ǀ (2.777)	-0.127 ***	0.5% ǀ (2.810)
	TIER1	1.273	13.8% ǀ 1.487	1.561 *	8.6% ǀ 1.723	1.564 *	8.6% ǀ 1.718
	DISC			-0.068	45.5% ǀ (0.749)	-0.072	42.7% ǀ (0.794)
	LEVEL	0.066	52.9% ǀ 0.630	0.086	57.5% ǀ 0.561	0.084	58.4% ǀ 0.548
Country and Year Fixed Effect							
Number of Observations		**540**		**540**		**540**	
Adj R^2		**72.96%**		**73.20%**		**73.25%**	

The table continues in the following page

CONT'D

Coefficients Equality Test (Wald Test)	**Model 1**		**Model 2**		**Model 3**	
	F-stat	p-value	F-stat	p-value		
Test of L1=L2	10.007	0.002				
Test of L1=L3	12.394	0.001				
Test of L2=L3	5.409	0.020				
Test of L1 + D_L1 = L2 + D_L2			7.800	0.005		
Test of L1 + D_L1 = L3 + D_L3			0.638	0.425		
Test of L2 + D_L2 = L3 + D_L3			0.007	0.932		
Test of FROM_L3 = FROM_L3_SMALL					16.236	0.000
Test of FROM_L3 = TO_L3					7.740	0.006
Test of FROM_L3 + FROM_L3_SMALL = TO_L3					0.345	0.557
Test of FROM_L3 = - TO_L3					0.306	0.580
Test of FROM_L3 + FROM_L3_SMALL = - TO_L3					11.060	0.001

*, **, *** Indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively

This table provides the results of OLS regression used in testing hypothesis 1, that Level 3 assets are valued at discount. PTBV is the price to tangible book value multiple, ROTE is the adjusted return on tangible book value, BETA is bank's CAPM beta, L1, L2 and L3 are the net amounts of Level 1 to 3 assets scaled over tangible book value, D_L1,D_L2 and D_L3 are dummy variables that is equal to L1 to L3 when additional disclosure is provided, NI_L3, INV_L3, FROM_L3, TO_L3 SQUAD are respectively Net income, Net Investments, Transfer from and to and Other Movements of Level 3, FROM_L3_SMALL is a dummy variable that is equal to FROM_L3 for small transfer. D_ROTE is a dummy variables that controls for negative rote, GROWTH is the difference between two consecutive net incomes scaled over tangible book value as a proxy for growth, SIZE is the natural logharitm of total assets, TURNOVER is common shares' turnover, TIER1 is the tier 1 ratio and LEVEL is a dummy variable that detects if L1 to L3 variables are zero because of disclosure, while DISC controls for companies that do not need to provide additional disclosure, not holding Level 3 financial instruments.

T-statistics are adjusted for autocorrelation and heteroscedasticity in the error term, following Newey-West. Fair Value Hierarchy and additional disclosure variables have been tested for multicollinearity by using VIF (Variance Inflation Factor), showing no multicollinearity

Description of variables used in regression analysis

Variable	Description	Source
$TBV_{i,t} = BV_{i,t} - Intangible_{i,t} - NI_{i,t}$	tangible book value for company "i" at the end of year "t"	-
$BV_{i,t}$	common equity for company "i" at the end of year "t"	Factset Fundamentals
$Intangible_{i,t}$	intangible assets and goodwill for company "i" at the end of year "t"	Factset Fundamentals
$NI_{i,t}$	net income for company "i" at the end of year "t"	Factset Fundamentals
$PTBV_{i,t} = \frac{MV_{i,t}}{TBV_{i,t}}$	price to tangible book value for company "i" at the end of year "t"	-
$MV_{i,t}$	market value for company "i" at fiscal year end; if all shares are traded it is equal to the market capitalization of the company; when non-traded shares exists, those are added to the calculation basis by the proportion of their nominal or par value.	Factset Prices
$\text{ROTE}_{i,t} = \frac{NI\_Adj_{i,t}}{TBV_{i,t}}$	return on tangible equity for company "i" at the end of year "t"	-
$NI_{Adj\ i,t} = NI_{i,t} + [Amortization_{i,t} \times (1 - t_{c,t})]$	net income adjusted for company "i" at the end of year "t"	-
$Amortization_{i,t}$	amortization of intangible assets for company "i" at the end of year "t"	Factset Fundamentals
$t_{c,t}$	tax rate of country "c" at time "t"	KPMG, "Corporate and Indirect Tax Survey", consulted by KPMG website[30] on March 2013
$D_{\text{ROTE},\ i,t}$	takes value equals to $\text{ROTE}_{i,t}$ if $\text{ROTE}_{i,t}$ is negative, and zero otherwise	-
$\text{GROWTH}_{i,t} = \frac{NI\_Adj_{i,t} - NI\_Adj_{i,t-1}}{TBV_{i,t}}$	net income growth for company "i" at time "t"	-
$L1_{i,t} = \frac{Level\ 1\ net\ Assets_{i,t}}{TBV_{i,t}}$; $L2_{i,t} = \frac{Level\ 2\ net\ Assets_{i,t}}{TBV_{i,t}}$;	Fair value of net assets Level 1; Level 2 or Level 3, scaled over TBV, for company "i" at time "t"	Banks annual financial statement

30 http://www.kpmg.com/global/en/services/tax/tax-tools-and-resources/pages/corporate-tax-rates-table.aspx

$L3_{i,t} = \frac{Level\ 3\ net\ Assets_{i,t}}{TBV_{i,t}}$		
$D\_L1_{i,t}$; $D\_L2_{i,t}$; $D\_L3_{i,t}$	Dummy variable that assumes value equal to L1, L2 or L3, when additional IFRS 7 disclosure is provided, and zero otherwise	-
$Profit/loss_{i,t}^{Level\,3}$	Net profit/loss recorded for net assets level 3 for company "i" at time "t"	Banks annual financial statement
$inv/disp_{i,t}^{Level\,3}$	Net investments (investments – disposal) of net fair value level 3 assets for company "i" at time "t"	Banks annual financial statement
$transfer\_from_{i,t}^{Level\,3}$	Transfer of level 3 net assets from level 3 to level 1 or level 2 for company "i" at time "t"	Banks annual financial statement
$transfer\_to_{i,t}^{Level\,3}$	Transfer of level 1 or level 2 net assets to level 3 for company "i" at time "t"	Banks annual financial statement
$NI\_L3_{i,t} = \frac{Profit\ /loss_{i,t}^{Level\,3}}{TBV_{i,t}}$	Net profit/loss recorded for net assets level 3 scaled over TBV for company "i" at time "t"	-
$INV\_L3_{i,t} = \frac{inv/disp_{i,t}^{Level\,3}}{TBV_{i,t}}$	Net investments of net fair value level 3 assets scaled over TBV for company "i" at time "t"	-
$FROM\_L3_{i,t} = \frac{transfer\_from_{i,t}^{Level\,3}}{TBV_{i,t}}$	Transfer of level 3 net assets from level 3 to level 1 or level 2, scaled over TBV, for company "i" at time "t". The variable assumes negative sign if net assets are transferred outside Level 3.	-
$FROM\_L3\_SMALL_{i,t}$	A multiplicative dummy variable that assumes value equals $FROM\_L3_{i,t}$ if $FROM\_L3_{i,t}$ is above the median of the variable itself, and zero otherwise.	-
$TO\_L3_{i,t} = \frac{transfer\_to_{i,t}^{Level\,3}}{TBV_{i,t}}$	Transfer of level 1 or level 2 net assets to level 3, scaled over TBV, for company "i" at time "t"	-
$TA_{i,t}$	Total assets of company "i" at time "t"	Factset Fundamentals
$SIZE_{i,t} = \ln(TA_{i,t})$	Natural logarithm of $TA_{i,t}$	-
$BETA_{i,t}$	Beta 1Y for company "i" at time "t" extracted from Factset Database. If company's beta is characterized for a low R^2 (less than 10%), country-year average beta was used.	Factset
$BUSINESS_{i,t}$		
$TURNOVER_{i,t}$	1Y turnover for company "i" at time "t" computed as ratio between cumulated volume 1Y over share outstanding at year end. If the outcome happens to be greater than one, annualized 3 months volume has been used for computation.	Factset

$TIER\_1_{i,t}$	Tier one ratio for company "i" at time "t"	Factset
$SQUAD_{i,t}$	Other movements of Level 3 net assets, scaled over TBV, for company "i" at time "t"	Banks annual financial statement
$DISC_{i,t}$	Dummy variable equals one if company has not (or has not disclosed) level 3 net assets and zero otherwise	-
$LEVEL_{i,t}$	Dummy variable equals one if company discloses fair value hierarchy and zero otherwise	-