EFRAG
European Financial Reporting Advisory Group

DRAFT ENDORSEMENT ADVICE AND EFFECTS STUDY REPORT ON IFRS 13 FAIR VALUE MEASUREMENT

INVITATION TO COMMENT ON EFRAG'S ASSESSMENTS

Comments should be sent to commentletters@efrag.org or uploaded via our website by 18 December 2011

EFRAG has been asked by the European Commission to provide it with advice and supporting material on IFRS 13 *Fair Value Measurement* (IFRS 13). In order to do that, EFRAG has been carrying out an assessment of IFRS 13 against the technical criteria for endorsement set out in Regulation (EC) No 1606/2002 and has also been assessing the costs and benefits that would arise from its implementation in the European Union (the EU) and European Economic Area.

A summary of IFRS 13 is set out in Appendix 1.

Note to constituents

IFRS 13 *Fair Value Measurement* includes consequential amendments to IFRS 9 *Financial Instruments*, which has not yet been endorsed in the EU. Those consequential amendments are not addressed in this Draft Endorsement Advice and will be considered together with the related requirements in IFRS 9.

Before finalising its two assessments, EFRAG would welcome your views on the issues set out below. Please note that all responses received will be placed on the public record, unless the respondent requests confidentiality. In the interest of transparency EFRAG will wish to discuss the responses it receives in a public meeting, so we would prefer to be able to publish all the responses received.

EFRAG initial assessments summarised in this questionnaire will be amended to reflect EFRAG's decisions on Appendix 2 and 3.

1 Please provide the following details about yourself:

(a) Your name or, if you are responding on behalf of an organisation or company, its name:

1) RENATO MAINO, FORMER CHIEF CREDIT RISK OFFICER AT INTESA SANPAOLO, LECTURER IN CREDIT RISK MANAGEMENT AT BOCCONI UNIVERSITY, CENTRE FOR RESEARCH IN APPLIED FINANCE

2) VERA PALEA, PROFESSOR IN FINANCIAL REPORTING AND ANALYSIS, UNIVERSITY OF TURIN, DEPARTMENT OF ECONOMICS

(b) Are you a:

Other

RESEARCHERS

(c) Please provide a short description of your activity:

DOING EMPIRICAL RESEARCH ON FINANCIAL REPORTING AND ITS EFFECTS ON ECONOMY AND FINANCIAL STABILITY

(d) Country where you are located:

ITALY

(e) Contact details including e-mail address:

renato.maino@unibocconi.it

vera.palea@unito.it; vera.palea@gmail.com

2 EFRAG's initial assessment of IFRS 13 is that it meets the technical criteria for endorsement. In other words, it is not contrary to the principle of true and fair view and it meets the criteria of understandability, relevance, reliability and comparability. EFRAG's reasoning is set out in Appendix 2.

(a) Do you agree with this assessment?

No

If you do not, please explain why you do not agree and what you believe the implications of this should be for EFRAG's endorsement advice.

Exit price does not suit the evaluation of private equities held with a strategic intent because they are not held for capital gain purposes as they are part of long-term investments devoted to exploit business opportunity or relationship, with no expectation of any capital gain. While the objective of a fair value intended as an exit price is to make financial statement more transparent, it is also clear that such an exit price does not necessarily reflect the manner in which cash flows associated with an asset is realized. For instance, evidence shows that the performance of private equities is relatively different from publicly traded companies. Hence, using market multiples – which are categorised within Level 2 inputs as they are supposed to be highly unbiased - and transaction multiples for evaluating private equities held with a strategic intent is misleading.

In case of private equities held with a strategic intent, exit price is in contrast to the explicit purpose of the European Union Regulation 1606/2002, which has introduced the IAS/IFRS accounting system in the European Union in

order to ensure a high degree of transparency in financial statement as well as the efficient functioning of the capital market.

Fair value of private equities should be assessed taking into consideration the opportunities actually available to the specific entity and not according exit price.

Here below you can find our contribution on such an issue.

Fair Value Measurement for Private Equities: a Plus or a Minus for Stakeholders?

Authors:

RENATO MAINO, Bocconi University

VERA PALEA*, University of Turin

A PAPER BY **CAREFIN**

CENTRE FOR APPLIED RESEARCH IN FINANCE, BOCCONI UNIVERSITY

*Corresponding Author: Prof. Vera Palea, University of Turin, Department of Economics "Cognetti de Martiis", via Po 53, Turin, Italy. E-mail address: vera.palea@unito.it

Abstract

This paper consists in a field-test of IFRS 13, *Fair Value Measurement,* on private equities, whose fair value assessment is based on valuation techniques. Its aim is that of offering empirical evidence on the potential economic effects of the application of such a standard in the European Union.

Our study consists in a comparison of different valuation techniques that can be used to assess the fair value of a portfolio of private equities. We form a portfolio of 20 equities listed on the stock exchange which we treat as if they are private and evaluate using market multiples, transaction multiples and an option approach. We then compare results one another as well as with their real exit price.

Results show that different valuation techniques provide very different fair values which can alter comparison among financial reports, mislead performance analysis and appraisals as well as management choices and compensation. Value creation largely varies depending on the selected valuation technique.

Our findings raise some doubts on the reliability of valuation techniques which should provide fair values that faithfully reflect the real world economic phenomena. This issue is particularly critical for market and transaction multiples which are categorised by IFRS 13 within Level 2 inputs as they are supposed to be highly unbiased.

KEYWORDS: Fair Value Accounting, IFRS 13, Private Equities, Valuation Techniques.

JEL CLASSIFICATION: M41, M48, G20

1. Introduction

Standard setters and an extensive academic literature believe that fair value accounting provides the most relevant information to financial statement users (Barth, Beaver and Landsman, 2001). Fair value accounting is supposed to ensure a higher degree of transparency of financial statements, which should lead to a higher value-relevance of accounting data and a better capability of financial market to reflect the actual value of a firm. An extensive use of fair value measurement should increase the quantity of private information brought into public domain, thus leading to a more efficient resource allocation and capital formation.

In May 2011, the IASB issued IFRS 13, *Fair Value Measurement*, which is the result of a joint project conducted by the IASB together with the FASB. IFRS 13 sets out a single framework for measuring fair value, it provides comprehensive guidance for all fair value measurements required or permitted by IFRS and it increases the convergence between IFRS and US GAAP through the same definition of fair value and an alignment of measurement and disclosure requirements.

IFRS 13 will become effective in January 2013. However, in order to come into force in the European Union, it must go through an endorsement process which consists in several steps and involves many institutions at the European level. One of these is the European Financial Reporting Advisory Group (EFRAG), which delivers its advice to the European Commission whether the standard meets the criteria of endorsement. The EFRAG also prepares, in cooperation with the Commission, a study about the potential economic effects of the application of a given standard in the European Union. During its work, the EFRAG conducts and invites companies to participate to field-testing of the new standard.

Purpose of this paper is to contribute to the field-test of such an accounting standard by providing some empirical evidence of its application to private equities. Private equities must be recorded at fair value with no exception as IFRS 9 has removed the rule that equities which do not have prices quoted in an active market and whose fair value cannot be measured reliably shall be measured at cost.

Since private equities do not have a directly observable exit price, they need to be evaluated according to Level 2 or Level 3 fair value hierarchy.

Many constituents of the standard setting process raise the concern that it can be very difficult, or even impossible, to obtain sufficient information to measure the fair value of some private equities without making judgements that result in such a subjective measure that would not be decision-useful. As a consequence, their fair value measurement might be unreliable (Barth 2004, Song and Han Yi 2010).

Valuation uncertainty when fair value measurement is based on valuation techniques is a key issue especially for financial institutions. For this reason, the Financial Stability Board, in its November 2011 *Report to G20 Leaders,* recommends that standard setters explore whether firms should be required to adjust valuations to avoid overstatement of income when significant uncertainty about valuation exists.

Claims have also been made that fair value may misrepresent management's intent to hold an asset to its maturity (Ryan 2007). In fact, especially in the banking sector, private equities are generally held not for trading and capital gain purposes as they are part of long-term investments devoted to exploit commercial or entrepreneurial relationship or a business opportunity.

Furthermore, empirical evidence shows that the historical performance of private equities is relatively different from publicly traded companies. This implies that making reference to valuation techniques based on market prices could not summarize faithfully their expected cash flows and could not be predictive of their fair value or not predictive enough to be reliable for financial reporting purposes (*Investment Benchmarks Report 1999*, *Investment Benchmarks Report, Buyouts and Other Private Equity, Venture Economics* 1999; Moskowitz and Vissing-Jorgensen 2002; Kaplan and Schoar 2002; Quigley and Woodward 2002; Cochrane 2003; Ljungqvist and Richardson 2003, among others). Hence, a market-based fair value may not be the most relevant measurement for private equities (Ryan 2007).

In our study we form a portfolio of companies listed on the stock exchange which we treat as they are private. We evaluate our portfolio according to different valuation techniques – market multiples, transaction multiples and an option approach - and we compare results one another as well as with their market prices. We use market price to test the reliability of the different valuation techniques, that is their capability to provide a faithful representation of the real-world economic phenomena that they purports to represent. As pointed out by IFRS 13, a quoted price in an active market provides the most reliable fair value.

Our research contributes to the fair value accounting literature in different ways.

First of all, our paper advances knowledge and extend prior research as it allows assessing whether, and how well, changes in fair values measured through valuation techniques incorporate changes in real-world exit prices and therefore make financial reporting a reliable reference for financial statement users in order to adjust their own expectations.

While most studies test fair value measurements indirectly by using their value relevance as a proxy for reliability (Barth 1994; Petroni and Wahlen 1995; Barth and al. 1996; Eccher et al. 1996; Nelson 1996; Carroll et al. 2003; Song and Han Yi 2010), our research tests fair value reliability directly by comparing fair values obtained by valuation techniques with real market prices.

Furthermore, in this study we suggest using a particular option approach in order to assess the fair value of private equities. The option approach allows dealing well with highly uncertain environment and times – such as the ones we are currently experiencing - and for this reason it deserves renewed consideration (Dixit et al. 1994; Courtney et al. 2000). Following the suggestion offered by Merton (1974) in his seminal article, we choose to use the financial distress situation as a clear and strong barrier. An option approach which uses firm's insolvency as a strike price can easily be implemented, especially by banks, due to internal rating diffusion, third party evaluations and advanced simulation tools. The option approach suits the evaluation of private equities held with a strategic intent very well since the strategic intent can be read as an option whose value is embedded in a business opportunity (Cochrane 2003). The option approach we apply is compliant with IFRS 13

and it involves Level 2 inputs such as credit risk and risk premium, which are directly observable and do not need any adjustment.

Our findings contribute to the literature on fair value accounting by showing that different valuation techniques provide very different portfolio fair values, which can alter comparison among financial reports, mislead performance analysis and appraisals as well as management choices and compensation. Value creation, in fact, largely varies depending on the selected valuation technique. Differences are relevant not only among valuation methodologies but also if compared with actual values given by market prices.

Our results show that none of the valuation techniques reflect the severity of the financial market crisis which started in 2007. On average, transaction multiples provide the highest portfolio fair values, coherently with the fact that transaction multiples include only successful transactions and incorporate synergy expectations and other positive factors which contribute to increase transaction prices. Fair values based on market multiples also outperform actual values, consistently with the fact that market multiples are based on average values which elide the idiosyncratic component of risk. In contrast, the option approach leads to fair values (not statistically significant) which are closer to actual values than market multiples and show a stronger correlation with book value. Moreover, fair values based on the option approach steadily increases over the holding period, reflecting market volatility more than the falling prices related to the financial market turmoil.

Overall, our results raise some doubts over the reliability of valuation techniques which should provide fair values that faithfully reflect the real world economic phenomena they purport to represent. This issue is particularly critical for market and transaction multiples which are categorised within Level 2 inputs as they are supposed to be highly unbiased.

Our findings are of direct interest to accounting policy makers since one of the explicit purpose of the European Union Regulation 1606/2002, which has introduced the IAS/IFRS accounting system in the European Union, is to ensure a high degree of transparency in financial statement. The IAS/IFRS Framework also states that fair value accounting is expected to provide investors with useful information to predict the capacity of firms to generate cash flow from their assets. Our paper, instead, shows that fair value measurements obtained through valuation techniques are not capable of reaching such purposes.

Our findings are also of direct interest to banking regulators since capital requirements are based on accounting reports. Fair value measurements through valuation techniques deserves careful analysis due to its potential effects on credit cycle and real economy financing.

The remainder of this paper is organized as follows. Section 2 describes the Background for research whereas section 3 describes our research design and data. Section 4 presents our empirical results and section 5 concludes.

2. Background

IFRS 13 defines fair value as the price that would be received to sell an asset (or paid to transfer a liability) in an orderly transaction between market participants at the measurement date. IFRS 13 points out that the fair value shall be an exit price, that is the market price from the perspective of a market participant who holds the asset or owes the

liability. IFRS 13 also clarifies that fair value is a market-based, not an entity-specific, measurement. Hence, the firm's intention to hold an asset or to settle or otherwise fulfil a liability is irrelevant. For instance, the application of blockage factors to large position of identical financial assets is prohibited given that a decision to sell at a less advantageous price because an entire holding, rather than each instrument individually, is sold represents a factor specific to the firm.

If observable market transaction or market information are not directly observable, the objective of a fair value measurement still remains the same, that is to estimate a market-based exit price of a the financial asset, and the firm shall use valuation techniques.

Valuation techniques used to measure fair value shall be consistent with the market approach, income approach or cost approach. The market approach uses prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities. The income approach uses valuation techniques to convert future amounts (e.g. cash flows or income and expenses) to a single present amount. According to IFRS 13, such valuation techniques include present value techniques, option pricing models - such as the Black-Scholes-Merton formula and the binomial model – and the multi-period excess earnings method. The cost approach, instead, reflects the current replacement cost, that is the amount that would currently be required to replace the service capacity of an asset.

IFRS 13 categorizes inputs to valuation techniques into a fair value hierarchy which gives the highest priority to quoted prices (unadjusted) in active markets for identical assets or liabilities (Level 1 inputs) and the lowest priority to unobservable inputs (Level 3 inputs).

Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities that the firm can access at the measurement date. An active market is a market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing information on an ongoing basis. A quoted price in an active market provides the most reliable evidence of fair value and must be used to measure fair value whenever available. With Level 1 inputs information asymmetry between management and investors is very low.

Level 2 inputs are inputs, other than quoted prices, that are observable - either directly or indirectly - for the asset or liability. Level 2 inputs include quoted prices for similar assets or liabilities in active markets; quoted prices for identical or similar assets or liabilities in markets that are not active; inputs other than quoted prices that are observable for the asset or liability such as interest rates and yield curves observable at commonly quoted intervals, volatilities, prepayment speeds, loss severities, credit risks, default rates; inputs that are derived principally from or corroborated by observable market data by correlation or other means.

Adjustments to Level 2 inputs that are significant to the entire measurement result in a fair value measurement categorised within Level 3. Level 3 inputs are unobservable inputs for an asset or liability fair value measurement. Unobservable inputs are inputs for which market data are not available and, therefore, need to be developed on the basis of the best information available about the assumptions that market participants would use when pricing the asset or liability. Level 3 inputs are subject to the highest degree of information asymmetry between preparers and users. For this reason, IFRS 13 enhances disclosure by

requiring firms to provide fair value measurement by input level in the hierarchy, enabling users to assess the relative reliability of fair value measurements.

Proponents of fair value accounting argue that fair value information provide capital market participants with relevant information that is not readily available from other sources. They contend that fair values provide better information for making forward-looking economic decision (Barth 2006).

In contrast, critics to fair value measurement argue that estimates of current value do not provide consistently reliable information (Watts 2003 and 2006). Fair value are less verifiable by investors, subject to greater estimation error by management and prone to managerial manipulation. Opponents also point to the illiquid markets during the financial crisis in which fair value were difficult to estimate (Ferguson 2008). These shortcomings create information asymmetry between investors and managers and they can represent a serious threat to fair value reliability (Landsman 2007, Penman 2007).

One of the main concerns over using fair value accounting also stems from the increase in financial statement volatility. Volatility in accounting data is a concern especially for banking regulators due to its procyclical effect on capital requirements and real economy financing (Enria et al. 2005).

In a semi-strong form of market efficiency, volatility from period-to-period in fair value measurements and, therefore, in financial statements derives from two sources (Barth 2004). One is the firm's activity during the period and changes in economic conditions. This volatility, called *inherent volatility*, derives from economic, not accounting, forces. Inherent volatility is the volatility of the asset or liability itself. Hence, changes in market price derive from changes in fundamental value.

However, there is another source of volatility, which is called *estimation error volatility*. Estimation error volatility is related to the fact that accountants usually do not observe the fair value of an asset/liability and need to estimate it. Estimation error volatility is natural and unavailable when using fair values, because most fair values are not observable directly from market prices and must be estimated[1].

Fair values obtained by valuation techniques entails estimation errors and the resulting asset volatility is attributable not only to inherent changes in economic conditions, but also to measurement errors.

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[1] To see these sources of volatility, consider an asset or liability to be measured, *x*. In a fair values-based accounting system, *x* can be thought of as the fair value of the asset or liability. The mean of *x* is $\bar{x}$ and the variance of *x* is σ_x^2. Thus, at any point time, the realization of *x* is drawn from a distribution. The variance of *x*, σ_x^2, is its inherent volatility. Usually, accountants do not observe *x* and need to estimate it. Thus, the amount recognized in the financial statements is X = x + ε, where ε is the estimation error, which has a variance of σ_ε^2. In a simple setting, ε has mean zero, which indicates that the recognized amount, *X*, is an unbiased measure of *x*. In such a setting, the estimation error, *X* – *x*, equals ε and σ_ε^2 is the estimation error volatility of *x*. Assuming *X* and *x* are uncorrelated, $\sigma_X{}^2 = \sigma_x^2 + \sigma_\varepsilon^2$. So, the volatility of the recognized amount, *X*, is greater than the volatility of the underlying amount, *x*.

Inherent volatility relates to relevance, which is an information notion, whereas estimation error volatility relates to reliability.

A long-standing debate of fair value accounting has been centred on the reliability of different fair value measurements.

Several studies assess the reliability of different fair value measurements by investigating their value relevance and find that reliability varies with the source of information (Barth 1994, Petroni and Wahlen 1995, Barth and al. 1996, Eccher et al. 1996, Nelson 1996, Carroll et al. 2003, Song and Han Yi 2010). Petroni and Wahlen (1995), for instance, find that fair values of equities and Treasury securities are value-relevant whereas fair values of municipal and corporate bonds are not, suggesting securities actively traded in the market are more reliably associated with the market value of equity. Song and Han Yi (2010) document fair values based on the Level 1, 2 and 3 inputs and find that Level 1 and Level 2 assets are values similarly, while Level 3 assets are valued at least. In contrast, Goh et al. (2009) document that investors value Level 2 assets less than Level 1 net assets but do not value Level 2 and Level 3 net assets differently.

The more subjective nature of fair values makes them prone to greater estimation error by management. Hence, less observable fair values are naturally subject to greater information asymmetry between investors and management. Both information asymmetry and estimation error inherent to the production of specific accounting information increase investors' adverse selection, liquidity risk, and information-processing costs, all of which increase a firm's cost of capital (Diamond and Verrecchia 1991, Baiman and Verrecchia 1996, Palea 2007). From an investor's perspective, accounting amounts that are less reliable are assigned a higher cost of capital and, therefore, are valued less than more reliable accounting amounts.

As shown in Bushman and Smith (2001), less reliable accounting information reduces the ability of investors to monitor managerial behaviour, potentially reducing the firm's operating performance and future cash flow. Without the disciplining mechanism afforded by reliable financial accounting information, managers are held less accountable for their actions and therefore operate the firm less efficiently or extract private benefits directly, both of which are detrimental to firm value.

Because these problems become more severe as fair value inputs become less observable by investors, fair value measurement of private equities deserves careful consideration. Relative to other asset class, private equity investments are illiquid as there is no secondary market for such investments, investors have little control over how capital is invested and the investment profile covers a long horizon (Ljungqvist and Richardson 2003). For this reason, claims have been made that fair value may misrepresent management's intent to hold an asset to its maturity and a market-based fair value may not be the most relevant measurement attribute. (Ryan 2007).

Actually, evidence shows that the performance of private equities is relatively different from publicly traded companies (*Investment Benchmarks Report 1999*, *Investment Benchmarks Report, Buyouts and Other Private Equity, Venture Economics* 1999, Moskowitz and Vissing-Jorgensen 2002, Kaplan and Schoar 2002, Quigley and Woodward 2002, Cochrane 2003, Ljungqvist and Richardson 2003). This implies that making reference to market prices could not summarize faithfully the stream and the timing of their expected future cash flows and

could not be predictive of their fair value, or not predictive enough, to be reliable for financial reporting purposes.

Moreover, especially in the banking industry, private equities are generally held with a strategic intent as they are part of a long-term investment devoted to exploit business opportunity or commercial or entrepreneurial relationship, with no expectation of any capital gain. The strategic intent makes private equities closer to subordinated credits rather than to equity ownership. Hence, using market prices could be highly misleading[2].

This issue brings back to two competing world views, or broad schools of thought, on the purpose of financial statements and on fair value measurement.

The first view, which we call the *fair value view*, believes that financial statement should meet the needs of passive investors by reporting fair value derived from current market prices. IFRS 13 has clearly been developed within this theoretical context. The use of both market multiples, which are based on quoted prices for similar assets in active markets, and transaction multiples, which are based on prices paid in previous acquisition of firms with similar characteristics, is perfectly coherent with such a view.

Conversely, the second view, which we call the *alternative view*, claims that financial statement should reflect the financial position and performance of a specific entity, and entity-specific assumptions should be made when they reflect the actual opportunities available to the reporting entity. Hence, fair value measurement should result in an entity-specific valuation (Whittington 2008 for a discussion).

The difference between these two visions is not between historical cost and current value, but between those who wish to measure fair value using hypothetical market prices and those who wish to measure fair value on the basis of the opportunities actually available to the specific entity. While the objective of a fair value intended as a market-based exit price is to make financial statement more transparent, it is also clear that the such an exit price does not necessarily reflect the manner in which cash flows associated with an asset will be

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[2] The Basel Committee, in its *Working Paper on Risk Sensitive Approaches for Equity Exposures in the Banking Book for IRB Banks* (2001), discusses such an issue and reaches the same conclusion. For this reason, it allows banks which use recognized internal rating based approach to use an alternative method for regulatory capital calculation, called PD/LGD, for equity investments – even if public - that are part of a long-term customer relationship in which returns on investment are based on regular and periodic cash flows not derived from capital gains and there is no expectation of future capital gain or of realising any existing gain in the long term. In almost cases, the estimated probability of default is readily available as the financial institution has also lending and/or general banking relationships with the portfolio company

The Basel Committee detailes a definition of private equities held with a strategic intent which includes the following:

(a) Direct Holdings – Holdings in securities, and other financial assets whose principal values is directly related to the value of ownership interests in a commercial endeavour, whether voting or non-voting, that convey a residual interest in the assets and income of the enterprise.
(b) Indirect Holdings and Fund Investments – Holdings in a corporation, partnership, limited liability company or other type of enterprise (including any form of special purpose vehicle) that issues ownership interests and is engaged in the business of investing in the instruments defined above.
(c) Residual Interests – Holdings in residual ownership interests of commercial enterprises that allow the enterprise to waive or defer interest or other contractual remuneration to the holder, such as perpetual preferred shares.
(d) Any security (other than convertible bonds) that ranks pari passu in liquidation with any element included in (a), (b) or (c) above.

realized. Hence, a market-based exit price could lead to amounts that are inappropriate to represent the real values of certain investments.

The alternative view has long been supported by a wide range of constituents of the standard-setting process who commented on the *Fair Value Measurement Project* and the *IASB Conceptual Framework Project* from a practical perspective. In July 2010, the Financial Stability Board itself pointed out that "*while reaffirming the framework of fair value accounting, we have agreed that the accounting standards setters should improve standards for the valuation of financial instruments based on their liquidity and investor's holding horizons*".

In contrast to the market and transaction multiples, the option approach allows better incorporating into fair values the specific economic scope and the actual opportunities underlying investments, which would be taken into consideration by market participants.

As stated above, the option approach suits the case of private equities held with a strategic intent particularly well as the strategic intent can be read as an option for the holding company on the future return of a venture whose value is embedded in business related operations and/or entrepreneurial relationships (Cochrane 2003).

The barrier (i.e. the strike price) of the option can be the liquidation value, when initial assumptions go wrong and the expected returns are not met. An implicit, strong and clear defined barrier can be the financial distress situation, when the firm's solvency collapses below the debt value. Consequently, a definition of the barrier which is exclusively financial can be used following the suggestion offered by Merton (1974). In such a framework, the intent of the holding is that of permanently staying in a business unless the subsidiary's financial structure does not fall in financial distress, that is the cumulated debt amount is meaningfully higher than the asset value.

The option approach we apply is compliant with IFRS 13 and it involves Level 2 inputs such as credit risk and risk premium, which are directly observable and do not need any adjustment. Appendix 1 provides details about the option approach we applied.

3. Research Design

In order to assess fair values as well as profits and losses deriving from different valuation techniques applied to private equity investments held with a strategic intent, we consider a portfolio of 20 listed companies which we assume to be private. We assume to hold these investments over a period of 5 years, from the beginning of 2006 to the end of 2010, and we set up an equally weighted investments' portfolio at the starting point. The period we consider includes the financial market turmoil started in 2007.

We evaluate these equities using three techniques considered by IFRS 13 - the transaction multiples, the market multiples and the option approach – and we compare the results one another as well as with market capitalization and book value at the same measurement date. We use the book value as a proxy for the equity method of accounting prescribed by the IAS 28.

In order to understand whether and how much valuation technique measurements result in reliable fair values, we compare fair values obtained by valuation techniques with the "real" market price at the measurement date.

Sample and data

The sample used in this research consists in 20 European non-financial firms operating in high investment-intensive or cyclical industries such as chemicals, energy, aerospace and defence, technology, automobiles, telecom, healthcare, natural resources, homebuilding and related sectors. The high level of risk related to their business made them particularly suitable for an option approach valuation.

The sample firms were randomly selected from the above sectors. Table 1 reports the list of companies included in the sample.

(Please insert Table 1 about here)

A brief description of the sample firms is in Appendix 2.

For each sample firm we calculated the equity fair value according to the market multiple, transaction multiple and option approaches over the 2006-2010 period. The total observations were 120. We then computed profits and losses, in absolute and relative values, for each firm over the same period and the observations were 100.

Data on market capitalization were obtained by Datastream. Market multiples and transaction multiples were obtained from Fitch Ratings. Table 2 and 3 respectively reports market multiples and transaction multiples for the different industries here considered.

(Please insert Tables 2 and 3 about here)

The market and the transaction multiples were applied to the EV/EBITDA margin and the equity fair value of was obtained by subtracting the net financial debt from, or summing, the net cash and cash equivalent to the enterprise value. The transaction multiples used in this paper are a mean between the transaction multiples of the year of measurement and the year before. More over, we made the assumption that a 35% majority premium was incorporated into the transaction price.

The viability of these methodologies is based on best practices of group management and governance.

Accounting figures (EBITDA, Book Value, Net Financial Position) were extracted by companies' financial reporting, and standardised on common criteria basis.

To perform the option approach a particular methodology was applied. We assumed that the rating assigned by the official agencies was fair and it reflected the actual expected default probability for the rated company over a time horizon of 12 months. Official ratings assigned by Standard and Poor's were used in order to assess the firm's probability to default. Having the probability of default (implied in the rating *pro-tempore* assigned) and applying the Merton approach, asset values and asset volatility were computed. Knowing the

outstanding net debt, the equity value was obtained following the methodology described in Appendix 1.

Rating agencies' actual default rate are "real world", whereas the Black-Scholes-Merton formula is valid in a "risk neutral" world. The risk premium needed to reconcile the two measures was extracted from the market expected Earning to Price ratios, observed at measurement dates on the European stock market, according with IBES forecasts. Finally, interest rates at the measurement dates were obtained by Datastream.

4. Results

The adoption of different valuation techniques in order to assess our portfolio fair value provides very different results. Differences are relevant not only among the valuation methodologies but also if compared with the actual values.

Table 4 displays statistics for the sample data. The first two columns from left report book value and market capitalization as references.

(Please insert Table 4 about here)

As it results from Table 4, fair values based on market multiples and transaction multiples outperform, on average, actual values given by market capitalization. Market multiples double actual values (+ 118,3 percent) in mean and are 37.2 percent higher in median, whereas transaction multiples outperform market capitalization by 63.2 percent in mean and 22.6 percent in median. Moreover, market multiple values are, on average, more than 4 times the book value, transaction multiple values more than 3 times, while market capitalization is only 2 times the book value.

Differences between transaction multiples and actual values can be explained by the fact that transaction multiples include only successful transactions and incorporate synergy expectations as well as other positive factors taken into account by the buyer, which contribute to increase transaction prices. Transaction multiples, therefore, include some entity-specific measurement whereas, according to IFRS 13, fair value should be a truly market-based measurement.

Differences between market multiples and actual values, instead, are attributable to the fact that market multiples are based on a certain number of firm comparables. Market multiples provide the same effect of portfolio diversification as they elide the idiosyncratic component of risk. The lower the risk is the higher the fair value is, too.

Differences in mean have been tested statistically with T-test while differences in median have been tested with Wilcoxon test. The Wilcoxon test indicates that differences between market and transaction multiples, on the one hand, and market capitalization, on the other hand, are statistically significant at 0.01 level (two-tail test). The T-test rejects the null hypothesis of no differences in mean at 0.01 level (two-tail test). Hence, the probability that differences in mean and median are due to sample selection is extremely low.

The option approach shows, on average, a higher mean (+8.8 percent) and a lower median (-23.4 percent) compared to market capitalization. However, such differences are not statistically supported. Both the null hypotheses of no differences in mean and in median are accepted at the conventional 0.01, 0.05, 0.1 levels used in economic research (p-value is 0.265 for the mean and 0.438 for the median).

From a statistical point of view, these results mean that differences between the option approach and market capitalization could just be due to sample selection. From an economic perspective, they might suggest that fair values based on the option approach are less biased, with respect to actual values, than transaction and market multiples.

Moreover, as it results from Table 4, all the valuation techniques show a higher standard deviation - which measures fair value volatility - compared to market capitalization. Volatility related to transaction multiples doubles the actual one while volatility related to market multiples is even more than three times higher. Hence, transaction and market multiples prove to be highly time- and cycle- specific.

Conversely, fair value volatility under the option approach results to be the lowest among the different valuation methodologies. Its standard deviation is only 22 percent higher than the actual one. As we will comment later on, this result is consistent with the fact that, in option pricing, volatility is a value. The higher the volatility is the higher the asset fair value is, too. Differently from the other valuation methodologies, portfolio fair value computed under the option approach has in fact increased steadily over the holding period.

A variance ratio test has also been performed for the standard deviation. Differences in variance with market capitalization are statistically supported for all the three valuation models. Finally, book value standard deviation is 43 percent the actual one and 14 percent the highest one provided by market multiples.

Table 5 provides Pearson's correlation coefficients among fair values based on market multiples, transaction multiples and the option approach, on the one hand, and market capitalization and book value, on the other hand.

(Please insert Table 5 about here)

As it results from Table 5, all the three valuation approaches show a high and statistically significant correlation both with book value and market capitalization. However, market and transaction multiples show a slightly stronger correlation with market capitalization while the option approach has a stronger correlation with book value.

A stronger correlation between market multiples and market capitalization was expected given that market multiples include non-diversifiable risk factors which affect, at the same time, the current value of the portfolio firms and as well as that of their comparables.

Transaction multiples, instead, show a lower correlation with actual values, coherently with the fact that they are based past transactions and, therefore, they apply to valuation with a lag time.

Fair values based on the option approach show a stronger correlation with book value than with market capitalization. Under the option approach, capital inflow is in fact critical to investor in order to decide whether to abandon a certain investment.

Table 6 to 8 display our portfolio fair values per year.

The first two columns (from left) are portfolio references and report book values and actual values, respectively. The remaining three columns display the results of the different valuation methodologies we used to assess portfolio fair values.

Table 6 displays the portfolio fair values as they would be reported in the balance sheet, at the end of each financial year, under transaction multiples, market multiples and the option approach. Figure 1 also depicts portfolio values and their polynomial interpolation.

(Please insert Table 6 about here)

As shown in Table 6, differences in the value created by our portfolio after five years are astonishing and raise some doubts on the capability of valuation techniques to provide stakeholders with a faithful representation of the real-world economic phenomena they purport to represent.

In each reporting year, the portfolio fair values computed according to transaction multiples, market multiples and the option approach outperform the current market value, none of which reflects the severity of the financial market crisis. While market capitalization has reduced by 20.6 percent at the end of the holding period, the same portfolio has increased by 26 percent under the market multiples, by 7.8 percent under the transaction multiples and by 68.7 percent under the option approach.

Since 2008 the actual value of our portfolio has quoted below its book value. At the end of 2010 its actual value is 36.9 percent lower than its book value. Conversely, at the end of the holding period, portfolio fair values under market multiples and transaction multiples are nearly the same and they outperform book value by 19.1 percent in the case of market multiples and by 17.1 percent in the case of transaction multiples.

At the same date the portfolio fair value is 88.6 percent higher than its actual value under market multiples and 85.4 percent higher under transaction multiples. As stated before, such result is not surprising for market multiples, which tend to elide idiosyncratic risk. Transaction multiples, instead, are case of "revealed preferences" since they refer only to successful transactions and include synergy expectations as well as other positive factors taken into account by the buyer, which contribute to increase the transaction price.

Differently from the other valuation techniques, the option approach provides portfolio fair values that are less exposed to market cycle. Apart from 2008, portfolio values have steadily increased over the holding period. At the end of 2010, the portfolio fair value is 2.5 times its actual value and 1.6 times its book value. It outperforms market multiples by 34.2 percent and transaction multiples by 36.5 percent. On average, fair values under the option approach are 13.2 percent higher than the market multiples, 64.5 percent higher than the

actual values, 35 percent higher than the book value and nearly the same than transaction multiples.

Such results are consistent with the fact that, in option pricing, volatility implies not only possible future losses, but also potential future gains. Hence, volatility is a value and it is positively correlated with asset and equity value. Conversely, in market-based methodologies, volatility is considered just in terms of risk of losses and it is translated into a higher expected return which reduces asset value.

Table 6 also indicates that standard deviation under the transaction multiples, the market multiples and the option approach is higher than the actual one. Differences in standard deviation between valuation techniques and actual values provide a proxy for portfolio measurement errors. Standard deviation is 1.26 time the actual one the under market multiples, 2.26 times under the transaction multiples and 2.29 times under the option approach.

In conclusion, using valuation techniques, our portfolio would be reported in the balance sheet at higher and much more volatile values than the actual ones.

(Please insert Figure 1 about here)

However, the main concern for management and shareholders is in the financial year income statement. Investment choices, value creation and management compensation are based on profit and loss analysis and on result comparison. Therefore, assessing the impact of different valuation techniques on profit and loss account is key to assess their suitability and reliability.

Table 7 displays portfolio profits and losses per year. As in Table 5, the first two columns (from left) are portfolio references and displays profits and losses based on book value and market value, respectively. The remaining three columns report the results of our computations based on the three valuation techniques described above.

(Please insert Table 7 about here)

Table 7 shows that the income statement based on valuation techniques would report, on average, a value creation which the actual values do not. On average, market multiples show a profit of 194.62, transaction multiples a profit of 66.82 and the option approach a profit of 515.45. Book value also shows an average profit of 216.17, whereas actual values report an average loss of 129.85.

Moreover, portfolio profits and losses computed using transaction multiples - which are by nature time- and cycle- specific - show a higher volatility and, therefore, lead to a more swinging view of value creation than actual values. However, the average profit of 66.82 under transaction multiples is the lowest of the three valuation techniques. Such result is not surprising if we consider that in market-based methodologies volatility is considered just in terms of potential future losses and implies a higher expected return, a lower asset value and, consequently, a lower value creation.

Conversely, the portfolio values computed under the option approach reflect the volatility of the market environment more than falling market prices. In option pricing volatility is a value and, in fact, our portfolio shows an average value creation of 515.45, the highest amount among the different valuation techniques.

(Please insert Figure 2 about here)

Same conclusions could be drawn by observing portfolio returns over the holding period. Table 8 and Figure 3 depict our portfolio returns per year.

(Please insert Table 8 and Figure 3 about here)

Results in Table 8 confirm that, on average, portfolio returns computed under the transaction multiples, the market multiples and the option approach are higher than the actual values. Shareholders would observe a portfolio return which is, on average, ten times the actual one under the transaction multiples; more than 3 times under the market multiples and more than 5 times under the option approach. Also portfolio return based on book value is, on average, more than 2 times the actual one.
In 2008, however, all the portfolio returns – included those computed on book value - are negative. In 2009, market capitalization shows a recovery while transaction multiples still report a negative return of -34.4 percent, probably due to the lag time with which such multiples are applied. At the same date the portfolio return under market multiples is slightly negative, coherently with the fact that market multiples tend to elide the idiosyncratic component of risk.
Moreover, portfolio returns based on transaction multiples show the highest volatility, which could mislead shareholders' appraisal of management effectiveness.
Finally, Table 9 and Figure 4 display the portfolio price-to-book value ratios per each year.

(Please insert Table 9 and Figure 4 about here)

Differences in valuation techniques and between valuation techniques and actual values are really outstanding. None of the valuation techniques reflects the devaluation occurred during the crisis. Just in 2010 transaction multiples indicate a loss compared to portfolio book value, whereas market multiples and the option approach still show value creation.

5. Summary and conclusions

Our paper consists in a field-test of the new IFRS 13, *Fair Value Measurement,* on private equities, whose fair value assessment is based on valuation techniques. Its aim is to offer empirical evidence on the potential economic effects of the application of such an accounting standard in the European Union.

According to IFRS 9, private equities must be recorded at fair value with no exception. IFRS 13 states that fair value must be a market-based measurement and the firm's intention to hold the asset is irrelevant.

One of the main concerns over using fair value accounting is related to the subsequent volatility in accounting data. Volatility in accounting data represents a major issue for regulators, especially for banking regulators as capital requirements are largely based on financial report. Volatility in accounting data also makes bank management more prone to procyclical behaviors with unintended consequences on credit cycle and real economy financing.

The fair value of private equities is assessed using valuation techniques, which also include market multiples. Empirical evidence, however, shows that the historical performance of private equities is relatively different from publicly traded companies. Therefore, making reference to market prices could not summarize faithfully their expected cash flows and could not be predictive of their fair value or not predictive enough to be reliable for financial reporting purposes. Moreover, in almost any case, private equities are not held for capital gain purposes as they are part of a long term investment devoted to exploit a particular business opportunity, with no expectation of any future capital gain.

Our field testing consists in a comparison of different valuation techniques which can be used to assess private equities' fair value. Its goal is to provide evidence on valuation uncertainty when fair value measurement is based on valuation techniques. This is a so important key issue, especially for financial institution, that the Financial Stability Board, in its November 2011 *Report to G20 Leaders,* recommends that standard setters explore whether firms should be required to adjust valuations to avoid overstatement of income when significant uncertainty about valuation exists.

In our paper, we form a portfolio of 20 equities listed on the stocking exchange which we treat as if they are private and we evaluate using market multiples, transaction multiples and an option approach. We then compare the results of valuation techniques with one another as well as with the actual market prices.

The differences we find are astonishing. Our portfolio fair values under transaction multiples, market multiples and the option approach outperform the market prices and do not reflect the severity of the financial market crisis. Its fair value varies from half to double according to the valuation techniques used and profits and losses are differently distributed during the time.

On average, transaction multiples provide the highest portfolio fair values, coherently with the fact that they are case of "revealed preferences". In fact, they refer only to successful transactions and incorporate synergy expectations and other positive factors which increase transaction prices.

Market multiples, instead, are average values which elide the idiosyncratic component of risk.

Moreover, transaction and market multiples lead to highly volatile fair values, thus proving that market-based techniques are largely affected by the economic cycle as well as by market trends, which amplify effects and value appraisals.

Differently from the other valuation techniques, the option approach provides portfolio fair values reflecting market volatility rather than falling market prices. In option pricing a high volatility is a value because it implies not only the possibility of future losses but also that of

gains and, in fact, the portfolio fair value under the option approach steadily increases over the holding period.

In conclusion, our field-testing shows that different valuation techniques provide very different fair values which can alter comparison among financial reports, mislead performance analysis and appraisals as well as management choices and compensation. Value creation largely varies depending on the selected valuation technique.

Our results raise some doubts over the reliability of valuation techniques which should provide fair values that faithfully reflect the economic real world phenomena. This issue is particularly critical for market and transaction multiples which are categorised within Level 2 inputs as they are supposed to be highly unbiased.

Evidence on this point is of direct interest to accounting policy makers since the explicit purpose of the European Union Regulation 1606/2002, which has introduced the IAS/IFRS accounting system in the European Union, is to ensure a high degree of transparency and comparability in financial statement as well as the efficient functioning of the capital market.

The IAS Framework also states that fair value accounting is expected to provide investors with useful information to predict the capacity of firms to generate cash flow from their assets.

Our field-testing, instead, questions whether fair values assessed using valuation techniques are able to effectively enhance transparency and value relevance of accounting data, especially for private equities, whose performance are relatively different from publicly traded companies.

From this point of view, the option approach has critical elements related to the extreme sensitivity of some parameters such as corporate assets volatility, which need to be derived from other inputs. However, with internal rating diffusion, third party evaluations and advanced simulation tools, this approach can effectively support valuation in case of private equities held with a strategic intent, which can be read as an option whose value is embedded in a business opportunity.

Appendix 1: The option valuation methodology

As mentioned above, the option valuation method adopted in this paper follows a Merton approach. The holding's intent is read as the opportunity to permanently stay in the business unless the subsidiary financial structure is falling in financial distress, which means that it is not going in default because of a cumulated debt amount meaningfully higher than subsidiary assets value.

In this perspective, let's assume that the subsidiary asset value (A_i) follows a stochastic Wiener diffusion process described in this way:

$$dA_i = \mu_i A_i dt + \sigma_i A_i dx_i$$

in which

- A_i is the enterprise value and t is the time span to the expiration date of the option barrier B[3],
- X_i is a stochastic normally distributed standardized variable (Z) that perturbs the asset value A_i with volatility σ_i .

The enterprise value A_i at T may be written as:

$$\log A_i(T) = \log A_i + \mu_i T - \frac{\sigma_i{}^2 T}{2} + \sigma_i \sqrt{T} X_i$$

Based on the Merton's option approach, the probability to breach the debt barrier at debt maturity is:

$$p_{def_i} = P[A_i(T) \langle B_i] = P[X_i \langle c_i] = N(c_i)$$

where c_i is the financial distress threshold (*liquidation point*), defined as[4]:

$$c_i = \frac{\log B_i - \log A_i - \mu_i T + \frac{\sigma_i^2 T}{2}}{\sigma_i \sqrt{T}}$$

[3] In a Merton approach this barrier is the outstanding debt at the expiration date T. Hence B is the outstanding debt at that date. In our approach is the holding's liquidation point.

[4] In the sake of simplicity dividend payment is considered as negligible.

and *N* is the cumulative normal distribution operator.

In the Merton approach c_i is the unknown, dependent variable. In our application we suppose to have an external assessment of c_i, usually defined as probability of default, very often denoted as PD. This assessment could be derived from rating agencies' public rating class or could derive from the application of banking internal rating models[5]. These PDs are usually referred to "real world" frequencies, which means that are based on observed default rates over a pre-set period, usually 12 months.

Combining the equations defined before, PD formulation in the real world is:

$$PD = N\left(\frac{\ln(B) - \ln(A_i) - \mu T + \frac{1}{2}\sigma_A^2 T}{\sigma_A \sqrt{T}}\right)$$

in which *ln* is the natural logarithm, B is the debt face value, A_i is the firm's asset value (equal to the market value of equity and debt, net of available cash and equivalents), μ is the expected return, T is the remaining time to overall debt maturity, σ_a is the instantaneous assets value volatility (standard deviation); N is the cumulated normal distribution operator.

It is worth noting that the Black-Scholes-Merton (BSM) formula is valid in a so called "risk neutral approach" (see Vasicek, 1984). Hence the solution needs risk neutral probabilities. Here we have real world default probability, which means the default frequencies observed among public rated bond issuers. To pass from actual to risk neutral default probabilities, a calculation is needed. Let's define the value of a credit contract as:

$$V_F = C_0 e^{-rt}(1 - q_t w)$$

in which

V = credit market value of contract of F face value,

C_t = initial credit face value

w = loss given default

Using Black-Scholes-Merton formula, we can define

$$q_{\text{risk neutral world}} = N(-Z)$$

[5] This second source is spreading up and down the world because of the new banking regulation that recognize internal rating for regulatory capital purposes.

$$p_{\text{real world}} = N(-Z^1)$$

in which

$$Z = \frac{\left[\ln\left(\frac{V}{D}\right) + r_{\text{riskfreeee}} - \frac{\sigma^2}{2}\right]}{\sigma_v} \quad ; \quad Z^1 = \frac{\left[\ln\left(\frac{V}{D}\right) + r_{\text{riskyworld}} - \frac{\sigma_v^2}{2}\right]}{\sigma_v}$$

so

$$q = N\left\{N^{-1}(p) + \frac{r_{\text{riskyworld}} - r_{\text{riskfree}}}{\sigma_v}\right\}$$

Having an assessment of the PD, F is known and μ is exogenously set using market data. For our purposes, market risk premium for a risk averse investment in the economy is set as the Earning-to-Price value less the risk free rate. Earning-to-price ratio is extracted from I/BE/S 12 months forecasts (source: Thomson Reuters Datastream) on the Eurostoxx market[6].

Then, we forced the BSM formula to generate the available rating agency's implied PD, simultaneously moving T and σ_v. In particular T is set at the minimum level to reach a feasible solution in the real world (if less than 1 is set to 1); asset value volatility is then iteratively extracted to reach the solution. In this way we reach an assessment of assets value. Equity value is then extracted as

$$E = V \cdot N(d_1) - De^{-iT}N(d_2)$$

in which:

$$d_1 = \frac{\left\{\ln\left(\frac{V}{D}\right) + \left(\mu + \frac{\sigma_v^{\ 2}}{2}\right)T\right\}}{\sigma_v\sqrt{T}}$$

$$d_2 = d_1 - \sigma_v\sqrt{T}$$

Following this way we obtain an equity value consistent with the rating implied PD, based on outstanding debt, time horizon, expected return and business risk (i.e. assets value volatility).

It is worth noting that the option approach differs from the usual discounted cash flow valuation method (DCF), in particular due to the role crucial of volatility. In the DCF method increasing volatility implies a reduction of value, all being equal, because it improves the risk adjusted discount rate. In real option method instead the higher the volatility is, the higher the value is because it implies potential larger future opportunities, not only risks. At the same time longer time horizons and higher risk free rates enhance real option values while they negatively impact on DCF values. That is to say that applying different valuation methodologies, despite the fact that are based on the same market observations, by the different methods'

[6] For a deeper analysis on these topics, see Duffie Darrell, Antje Berndt, Rohan Douglas, Mark Ferguson, and David Schranz, 2005, Measuring Default-Risk Premia from Default Swap Rates and EDFs, Stanford University.

assumptions we reach opposite impacts on final values and, therefore, on showed returns and performances.

Appendix 2: Brief profile of the portfolio companies

Finmeccanica is a world leader in the aerospace, defence and security industry. Its main pillars are helicopters, defence and security electronics and aeronautics, which generate 73 percent of its revenues and accounts for 74 percent of its workforce. In the space sector, it controls satellite services. Finmeccanica also designs, develops and manufactures rolling stock, transport solutions and railway signalling systems and has a well stablished position in the power generated markets where it is specialised in the supply of systems and components for power generation, including energy.

Sanofi-Aventis is a global healthcare leader that offers a range of healthcare assets, including pharmaceutical products (prescription medicines, generics, consumer health care and animal health) and human vaccines.

ENI is an integrated energy company active in 77 countries - including Venezuela, Iraq, Alaska, Angola, Cina, Ecuador, Democratic Republic of Congo, Togo - which operates in oil and natural gas exploration, production, transportation, transformation and supply as well as in petrochemicals, oilfield services construction and engineering.

At the time of data collection, **Fiat** was operating both in the automobile and in capital goods sectors. In February 2011 the group has been splitted in Fiat and Fiat Industrial, the former focused on automobiles, the latter on capital goods. In the automobile sector, Fiat designs, produces and sells cars for the mass market under the Fiat, Lancia, Alfa Romeo and Abarth brands and luxury cars under the Maserati and Ferrari brands. It also operates in the components sector through Magneti Marelli, Teksid and Fiat Powertrain and in the production systems sector through Comau. In the industrial sector Fiat designs, produces and sells trucks, commercial vehicles, buses, special vehicles, tractors and agricultural and construction equiments in addition to engines and transmissions for those vehicles and engines for marine applications.

EDF is a world's leading nuclear energy company with solid positions not only in major European countries but also in emerging markets such as Brazil, China, India and Russia.

Iberdrola is number one energy company in Spain. It has made a major commitment to the use of cleaner technologies, becoming a world leader in wind energy and one of the companies with the lowest CO_2 emission levels in the electricity sector.

UPM is a fibre-based business focused on renewable and recyclable materials. It operates in the fields of paper, energy, biofuels, pulp, forest and wood sourcing, timber, label materials, plywood, wood plastic composite and rfid.

Rhodia is an international chemical company, which provides specialty chemicals and solutions to diversified markets, including automotive, electronics, flavors and fragrances, health, personal and home care, consumer and industrial goods.

Clariant is a leading company in the chemical field. It has a wide range of businesses which make additives, detergents and cleaning products, emulsions, specialty chemicals and application solutions for consumer care and industrial markets, leather chemicals and technical solutions for the complete leather manufacturing process, products and services to the oil, refinery and mining industries, whiteness, color, coating and strength solutions for the paper market, pigments and textile chemicals.

Telefonica is one of the world leaders integrated operator in the telecommunication sector, providing communication, information and entertainment solutions. Its five brands are Telefonica, Movistar, O2, Vivo and Terra. Its headquarters are in Spain, but it is also present in Europe, Africa and Latin America and operates in 25 countries.

SAP is one of the leading international providers of business software. Its core business is selling licenses for software solutions and related services. Its solutions cover standard business applications and technologies as well as specific industry applications. It also offers consulting, maintenance, and training services for it a software solutions.

Nokia is one of the world leader in mobility and it is mainly focused on network technology and mobile devices and technology. Its current strategy includes plans for a broad strategic partnership with Microsoft to jointly build a new mobile ecosystem.

Volkswagen is one of the world's leading automobile manufacturers and the largest carmaker in Europe. It is made up of nine brands from seven European countries: Volkswagen, Audi, Bentley, Bugatti, Lamborghini, SEAT, Skoda, Scania and Volkswagen Commercial Vehicles. Each brand has its own character and operates as an independent entity on the market. The product range extends from low-consumption small cars to luxury class vehicles. In the commercial vehicle sector, the product offering spans pick-ups, busses and heavy trucks.

The Group operates 48 production plants in thirteen European countries and a further six countries in the Americas, Asia and Africa with a total of 360,000 employees worldwide.

Telecom Italia ***offers infrastructures and technological platforms for voice and data advanced telecommunications services as well as ICT solutions and tools. It is a leading company in Italy with 16.1 million retail network connections, 7 million retail broadband accesses and 30.8 million mobile lines.***

Heidelberg Cement ***is a global market leader in aggregate and a prominent player in the fields of cement, concrete and downstream activities. It has around 53.400 employees and it is present in Europe, North America, Asia, Australia and Africa.***

Xstrata is a major global diversified mining group which operates a diversified worldwide portfolio of metals and mining businesses. Its operations span South Africa, Australia, Colombia, Canada, Peru, Philippines, Argentina, Papua New Guinea, Tanzania, New Caledonia, Spain, Germany.

Statoil is an international energy company with operations in 34 countries. Building on more than 35 years of experience from oil and gas production on the Norwegian continental shelf, it is committed to accommodating the world's energy needs in a responsible manner, applying technology and creating innovative business solutions. Its headquarters are in Norway, but it's present worldwide with 20,000 employees.

Saint-Gobain is one of the world leader in the habitat and construction markets. It designs, manufactures and distributes building materials, providing solutions to meet growing demand, for energy efficiency. The Group's main activities are constructions products, innovative materials, building distribution and packaging.

Bayer is a global enterprise with core competencies in the fields of health care, nutrition and high-tech materials. Its core mission is to research, develop, manufacture and market pharmaceutical and medical products. It also holds global leadership positions in crop protection and non-agricultural pest control. It supplies materials such as polycarbonates and polyurethanes for a wide range of everyday uses and offers services for the chemical

industry including utility supply, waste management, infrastructure, safety, security, analytics and vocational training. It's located in Germany, but it's present worldwide.

Stora Enso is a leading company in the packaging, paper and wood products industry. It offers its customers innovative solutions based on renewable materials. It procures most of its wood from private forest owners, state forests and companies in Finland, Sweden, the Baltic states, Continental Europe and Russia. The Group is based in Helsinki and Stockholm. It has about 26.000 employees and 85 production units world.

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TABLES AND FIGURES

TABLE 1

Sample firms

SAMPLE	
1.	FINMECCANICA
2.	SANOFI AVENTIS
3.	ENI
4.	FIAT
5.	EDF
6.	IBERDROLA
7.	UPM
8.	RHODIA
9.	CLARIANT
10.	TELEFONICA
11.	NOKIA
12.	SAP
13.	VOLKSWAGEN
14.	TELECOM
15.	HEIDELBERGCEMENT
16.	XSTRATA
17.	STATOIL
18.	SAINT GOBAIN
19.	BAYER
20.	STORAENSO

TABLE 2

Market multiples

INDUSTRY	2005	2006	2007	2008	2009	2010
Aerospace and Defense	11.1	11.9	10.7	8.9	8.7	10.5
Auto and Related	7.3	7.8	6.3	7.0	7.3	7.5
Chemicals	8.2	8.7	10.4	6.4	8.6	7.7
Energy	7.7	6.7	7.5	4.5	9.9	9.3
Healthcare	10.7	9.6	9.7	7.0	8.4	9.1
Homebuilding, Building Materials and Construction	6.3	9.2	12.8	20.5	24.8	15.2
Natural Resources	8.8	8.1	8.5	5.9	7.9	9.2
Technology	10.4	11.9	8.2	11.3	9.2	9.9
Telecom and Cable	13.1	17.0	11.3	7.2	12.1	11.2
Utilities	9.6	8.5	8.2	6.4	6.5	7.7

TABLE 3

Transaction multiples

INDUSTRY	2005	2006	2007	2008	2009	2010
Aerospace and Defense	16.55	20.90	23.40	24.20	17.70	13.55
Auto and Related	10.25	8.15	13.25	10.70	8.55	12.10
Chemicals	16.45	15.05	14.95	12.90	15.70	14.90
Energy	10.80	12.00	12.40	12.40	9.55	8.65
Healthcare	20.35	24.30	25.30	26.95	26.70	16.25
Homebuilding, Building Materials and Construction	11.15	14.80	17.45	15.80	13.55	9.35
Natural Resources	12.40	16.65	21.95	12.45	14.75	18.85
Technology	22.15	24.75	24.85	22.90	18.70	17.15
Telecom and Cable	12.55	13.65	16.85	15.9	14.35	12.6
Utilities	8.8	9.75	14.25	14.65	13.5	8

TABLE 4

Asset fair values

	Book Value	Market Capitalization	Market Multiples	Transaction Multiples	O
Mean	25,748***	52,930	115,541***	86,397***	5
Median	14,436***	27,082	37,160***	33,192***	2
Standard Deviation	38,481***	89,593	275,442***	196,037***	109
	-719	455	981	2,365	
Minimum	226,000	538,881	1,679,400	1,303,510	60
Maximum	7,156	8,112	11,283	9,166	1
25 percentile	27,298	62,575	97,776	69,226	4
75 percentile	3.75	3.63	4.39	4.40	
Asimmetry	15.24	13.96	19.94	20.35	1
Kurtosis	120	120	120	120	
Observations					

*** Differences with Market Capitalization are statistically significant at 0,01 level (two tails)

TABLE 5

Asset Value Correlations

	Market Multiples	Transaction Multiples	Option Approach
Book Value	0.944***	0.935***	0.969***
Market Capitalization	0.974***	0.939***	0.915***
Observations	120	120	120

***Correlation coefficients are statistically significant at 0,01 level (two tails)

TABLE 6

Portfolio fair values (€, equally weighted at 2006 year beginning)

End of financial year report:	Book Value	Market Capitalization	Market Multiples	Transaction Multiples	Option Approach
	2,000	2,000	2,000	2,000	2,000
2006	2,301.27	2,518.41	2,991.72	3,439.80	2,997.28
2007	2,729.68	2,972.09	3,645.59	5,260.64	3,361.47
2008	2,703.16	1,567.72	3,243.71	4,204.96	3,192.51
2009	2,906.60	1,911.49	3,193.96	2,759.64	4,729.47
2010	3,165.95	1,999.00	3,770.18	3,707.07	5,059.09
Mean	2,634.44	2,161.45	3,140.86	3,562.02	3,556.64
Standard deviation	420.45	500.40	630.56	1,132.99	1,143.64

FIGURE 1

Portfolio fair values, current market values and polynomial interpolation

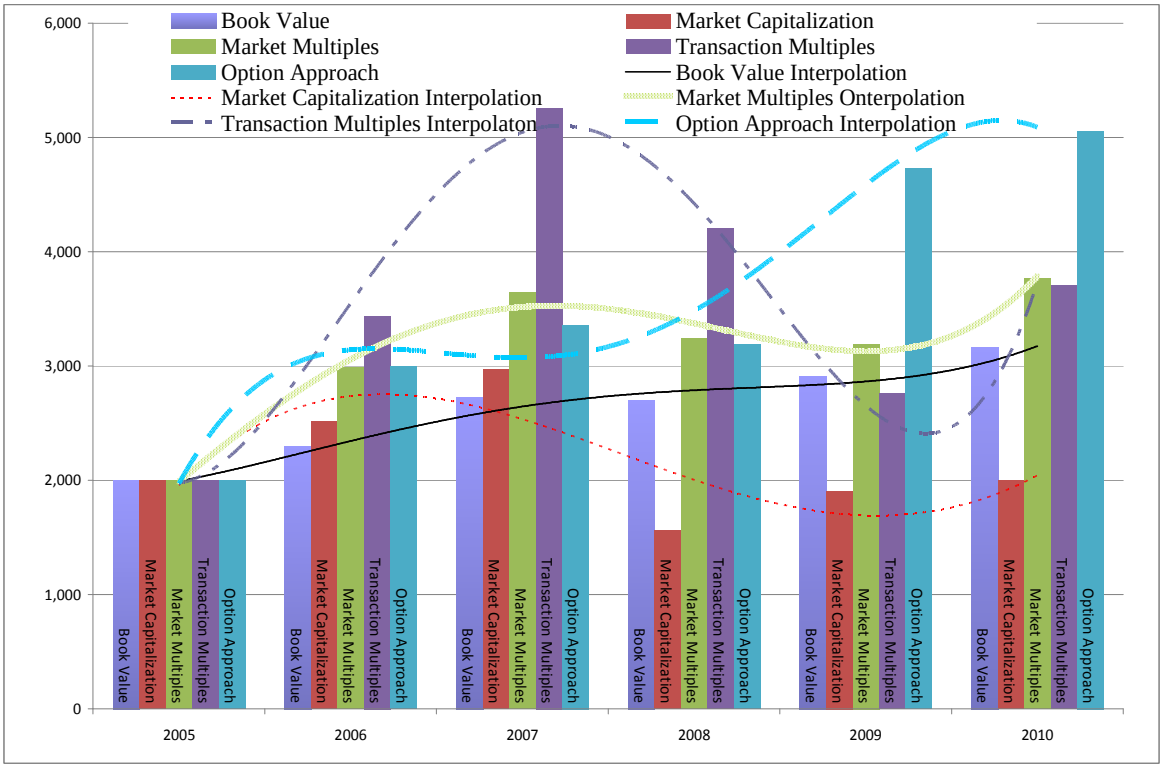

TABLE 7

Portfolio profits and losses (€)

End of financial year report:	Book Value	Market Capitalization	Market Multiples	Transaction Multiples	Option Approach
2006	301.27	518.41	991.72	1,439.80	997.28
2007	428.41	453.68	653.87	1,820.84	364.19
2008	-26.52	-1,404.37	-401.88	-1,055.68	-168.96
2009	203.44	343.78	-49.75	-1,445.32	1,536.95
2010	259.35	87.50	576.22	947.43	329.63
Mean	216.17	-129.85	194.62	66.82	515.45
Standard deviation	167.15	801.98	565.76	1,492.20	662.39

FIGURE 2

Portfolio profits and losses and polynomial interpolation (€)

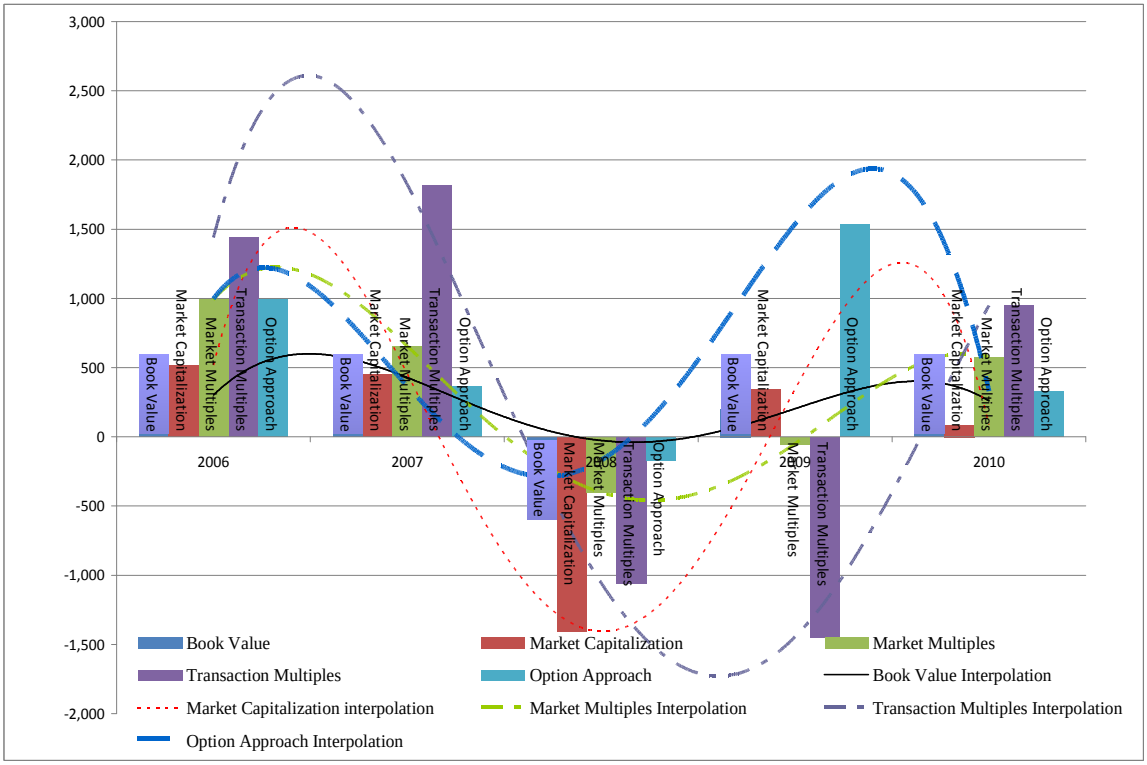

TABLE 8

Portfolio Return

End of financial year report:	Book Value	Market Capitalization	Market Multiples	Transaction Multiples	Option Approach
2006	15.1%	25.9%	49.6%	72.0%	49.9%
2007	18.6%	18.0%	21.9%	52.9%	12.2%
2008	-1.0%	-47.3%	-11.0%	-20.1%	-5.0%
2009	7.5%	21.9%	-1.5%	-34.4%	48.1%
2010	8.9%	4.6%	18.0%	34.3%	7.0%
Mean	9.8%	4.6%	15.39%	46.2%	25.1%
Standard deviation	7.5%	30.1%	23.5%	46.2%	25.1%

FIGURE 3

Portfolio Return

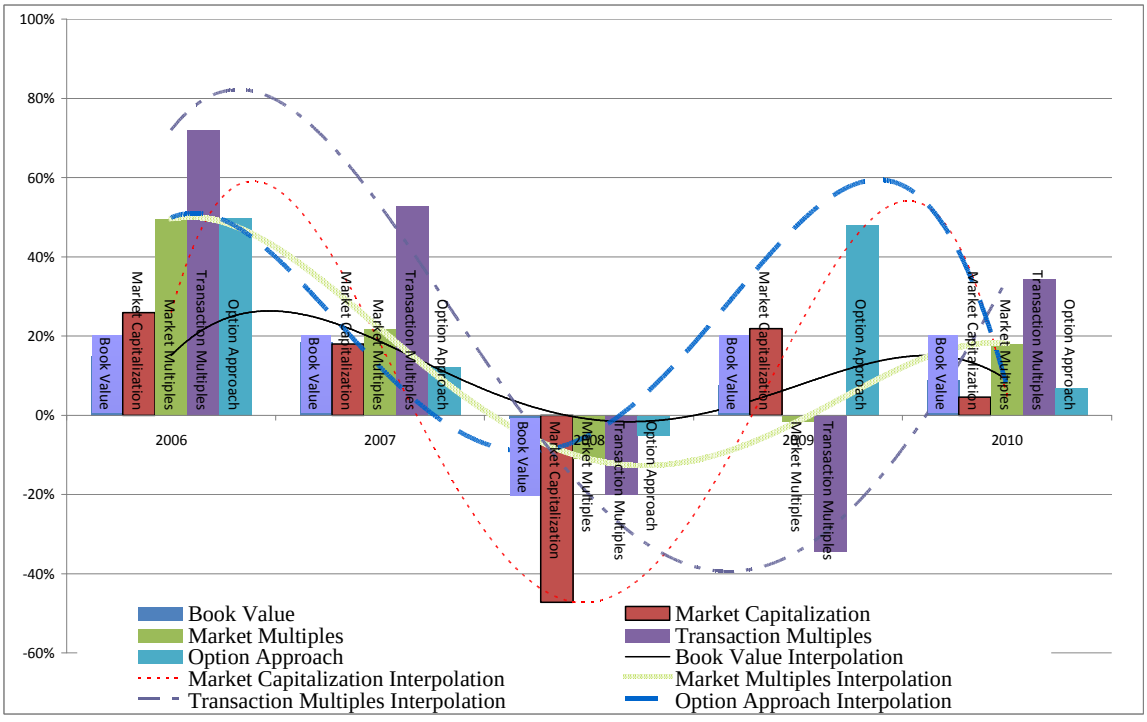

TABLE 9

Portfolio price-to-book value ratios (x)

End of financial year report:	Book Value	Market Capitalization	Market Multiples	Transaction Multiples	Option Approach
2007	1.00	1.09	1.30	1.49	1.30
2008	1.00	1.09	1.34	1.93	1.23
2009	1.00	0.58	1.20	1.56	1.18
2010	1.00	0.66	1.10	0.95	1.63
Mean	1	0.88	1.19	1.39	1.27
Standard Deviation	0.00	0.25	0.14	0.41	0.23

FIGURE 4

Portfolio price-to-book value ratios