

## Market and Transaction Multiples' Accuracy in the European Equity Market

Vera Palea

Department of Economics and Statistics "Cognetti de Martiis"

University of Torino

Campus Luigi Einaudi, Lungo Dora Siena 100

Italy

### Abstract

*In spite of their widespread use in practice, accounting-based multiples are subject of few academic studies. This paper investigates market and transaction multiples' accuracy in corporate equity valuation by considering a sample of listed companies which are assumed to be private and evaluated according to accounting-based multiples. Since equity valuation is particularly challenging under stressed conditions, it focuses on the core period of the recent financial crisis. Results show that transaction and market multiples perform very poorly at least during financial turmoil, i.e. under the most uncertain information condition, and those relevant firm-specific adjustments are necessary. Specifically, equity valuation based on multiples entails measurement errors which tend to overestimate fundamental values and to lead to more results that are volatile.*

**Keywords:** Corporate Valuation, Market Multiples, Transaction Multiples, Financial Reporting.

**Jel Classification:** G30, M40

### Introduction

Market and transaction multiples are commonly applied to corporate valuation. These multiples are ubiquitous in analysts' reports and investment bankers' fairness opinions. Nevertheless, they are subject of surprisingly few academic studies. To fill this gap, this paper investigates the empirical accuracy of transaction and market multiples for corporate valuation purposes and, while doing this, it focuses on a European dataset. Specifically, it examines the valuation accuracy of the EV/EBITDA multiple, which is one of the accounting-based multiples most commonly applied by practitioners (Damodaran 2016). Moreover, since equity valuation is particularly challenging under stressed conditions, it focuses on the core period of the recent financial crisis.

This paper considers a sample of listed equities, which are assumed to be private, and thereby evaluated according to market and transaction multiples. Valuation results are then compared with market prices, which represent the fundamental equity values under the assumption of market efficiency (Fama, 1970). Findings show that both transaction and market multiples do a very poor job in assessing the fundamental value of a firm, suggesting that specific risk factors matter significantly. Results indicate that transaction multiples provide the highest corporate equity values, which is consistent with transaction multiples being cases of 'revealed preferences'. Transaction multiples refer only to successful transactions and incorporate synergy expectations as well as other positive factors which increase transaction prices. Market multiples, instead, are average values which tend to elide the idiosyncratic component of risk, thus exacerbating the market trend. Transaction and market multiples also lead to highly volatile corporate equity values, consistent with these multiples amplifying effects of the economic cycle and value appraisals. Taken as a whole, this paper opens space for further investigation in the area of corporate equity valuation using multiples. Evidence on this point not only is of interest to practitioners, but also to financial reporting policy makers, who recommend market and transaction multiples to assess the fair value of financial instruments.

### 2. Background for Research

In spite of their widespread use in practice, accounting-based multiples are subject of few academic studies. Among the first studies, Alford (1992) test the effects of different methods for identifying comparable firms based on industry membership and proxies for growth and risk on the accuracy of valuation estimates.

Findings show that valuation accuracy increases when the fineness of the industry definition used to identify comparable firms is narrowed, while adding controls for earnings growth, leverage, and size does not significantly reduce valuation errors. In contrast, Kim and Ritter (1999) find that relevant adjustments for differences in growth and profitability are necessary given the wide variation of such multiples within an industry. Liu, Nissim and Thomas (2007), instead, document that forecast market multiples are more accurate than trailing numbers. These results are in line with Lie and Lie (2002).

Some studies ascribe the weaknesses of market multiples in corporate equity valuation to the fact that, in general, investments in private firms perform differently from publicly traded companies (Palea and Maino 2013). Quigley and Woodward (2002) and Moskowitz and Vissing-Jorgensen (2002), for instance, report lower returns for private companies than for public ones. Cochrane (2005) documents an extraordinary skewness of returns for private firms, with most returns that are modest and a long right tail of extraordinary good returns. Liungqvist and Richardson (2003), in general, document that investment in private firms generates excess returns on the order of five to eight percent per annum relative to the aggregate public equity market.

Studies on the accuracy of transaction multiples are even scarcer. Among these, Kaplan and Ruback (1995) compare transactions with the discounted value of cash flows; finding that the enterprise value to earnings before interest, taxes, depreciation and amortization (EV/EBITDA) multiples results in similar valuation accuracy of the discount cash flow model. Taken as a whole, empirical research suggests that corporate equity valuation based on market and transaction multiples cannot provide sufficient reliable information. This is not a trivial issue if one considers that market and transaction multiples are used to assess the fair value of financial instruments for financial reporting purposes. According to IFRS 9, *Financial Instruments*, equity instruments must be valued at fair value. IFRS 13, *Fair Value Measurement*, states that fair value is the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. Fair value is therefore an exit price, i.e. the market price from the perspective of a market participant who holds the asset. If observable market transactions or market information are not directly observable, fair value is determined by using valuation techniques, which can be based on transaction and market multiples. According to IFRS 13, market and transaction multiples must have the highest priority in valuation techniques, as they are corroborated by market data and thereby supposed to be highly unbiased.

Estimation errors due to the use of market and transaction multiples for financial reporting purposes bear important economic consequences. Archival research, for instance, documents that estimation errors in financial information have a cost in terms of investors' adverse selection, liquidity risk and information-processing costs, all of which increase a firm's cost of capital. Diamond and Verrecchia (1991) as well as Baiman and Verrecchia (1996), for instance, document that the cost of capital for firms increases as the quality of information decreases, which is exactly what happens in case of measurement errors. When investors perceive greater uncertainty of accounting numbers, they adjust upward the discount rate, with a negative effect on the value of the firm. Furthermore, estimation errors increase volatility in financial reporting, which is a relevant issue especially for banks, given that capital requirements are largely derived from financial statements. As highlighted by Enria et al. (2004), volatility in financial reporting causes procyclical effects on capital requirements and real economy financing, thus affecting public goods such as financial stability (Enria et al. 2004). Market and transaction multiples' accuracy in corporate equity valuation is therefore a key issue, which goes beyond accounting and finance's research interest.

### **3. Research Methodology, Sample and Data**

This paper replicates the best practice followed by practitioners in corporate equity valuation (Damodaran 2016). It considers a sample of listed companies which are assumed to be private and thereby evaluated according to market and transaction multiples. This portfolio of equities is evaluated over a period of 5 years, from the beginning of 2006 to the end of 2010. Such a period includes the financial market crisis which started in 2007. Equity valuation is particularly challenging under stressed conditions like financial turmoil. Multiples accuracy is therefore investigated under the most uncertain market conditions. I set up an equally weighted portfolio at the starting date, which is evaluated by using accounting-based transaction and market multiples. Results are compared with one another as well as with market capitalization and book value at the same measurement date. Under the assumption of market efficiency, market capitalization provides the actual market equity value (Fama 1970).

The study focuses on 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 makes their evaluation particularly challenging. The sample is randomly selected and includes the following firms: Finmeccanica, Sanofi-Aventis, Eni, Fiat, Edf, Iberdrola, Upm, Rhodia, Clariant, Telefonica, Nokia, Sap, Volkswagen, Telecom, HeidelbergCement, Xstrata, Statoil, SaintGobain, Bayer and Storaenso.

Market and transaction multiples are obtained from Fitch Ratings and are based on historical earning figures. Multiples are selected by matching the characteristics of our sample firms. Valuation models are implemented following the best practitioners' practice. Accordingly, this research focuses on the trailing EV/EBITDA multiple, which is the accounting-based multiple most commonly applied by practitioners (Damodaran 2016). Previous research has also shown that the EV/EBITDA multiple is quite accurate in corporate valuation (Kaplan and Ruback 1995). The corporate equity value is obtained by subtracting the net financial debt from - or summing the net cash and cash equivalent to - the enterprise value, EV.

Transaction multiples used in this paper is a mean between transaction multiples relative to the measurement year and the previous year. However, since equity values computed under transaction, multiples include a control premium; a discount factor is applied to determine minority equity values that can be compared with those obtained from market multiples. I assume an average 35% control premium which, according to past empirical evidence, is rather large, yet realistic (Hanouna et al. 2001). Hence, equity values obtained by assuming such a control premium are rather conservative. I also use different control premiums, up to 50%, as a robustness check (untabulated), but the overall results do not change significantly. Market and transaction multiples are reported in Table 1 and Table 2, respectively. Accounting figures (EBITDA, Book Value, and Net Financial Position) are extracted from companies' financial reporting and standardised on common criteria basis.

**TABLE 1: Market multiples per industry and year**

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

**TABLE 2: Transaction multiples per industry and year**

INDUSTRY	2005	2006	2007	2008	2009	2010
<b>Aerospace and Defence</b>	13.7	14.4	18.0	12.4	10.6	5.9
<b>Auto and Related</b>	3.7	8.9	8.7	4.0	9.1	6.0
<b>Chemicals</b>	9.5	11.1	7.7	10.4	10.6	8.6
<b>Energy</b>	8.0	8.0	8.8	7.2	4.7	7.9
<b>Healthcare</b>	15.7	17.2	16.2	21.5	10.4	11.7
<b>Homebuilding, Building Materials and Construction</b>	8.7	12.2	10.5	10.6	5.9	6.9
<b>Natural Resources</b>	7.8	17.7	8.5	7.9	13.7	10.3
<b>Technology</b>	16.3	16.9	15.9	14.0	9.4	15.5
<b>Telecom and Cable</b>	7.9	11.5	10.7	10.4	7.9	9.4
<b>Utilities</b>	4.8	9.9	8.7	11.9	3.2	9.6

#### 4. Results

Table 3 reports descriptive statistics on corporate equity values computed under market and transaction multiples. The first two columns from left report book value and market capitalization as references. As results from Table 3, transaction and market multiples provide, in general, very different equity values. Differences are relevant not only between market and transaction multiples but also if compared with the actual values.

**TABLE 3: Corporate equity values (Euros, millions)**

	<b>Book Value</b>	<b>Market Capitalization</b>	<b>Market Multiples</b>	<b>Transaction Multiples</b>	<b>Transaction Multiples net of a 35% control premium</b>
<b>Mean</b>	25,748***	52,930	115,541***	116,752***	86,397***
<b>Median</b>	14,436***	27,082	37,160***	44,854***	33,192***
<b>Standard Deviation</b>	38,481***	89,593	275,442***	264,915***	196,037***
<b>Minimum</b>	-719	455	981	3,197	2,365
<b>Maximum</b>	226,000	538,881	1,679,400	1,761,500	1,303,510
<b>25 percentile</b>	7,156	8,112	11,283	12,319	9,166
<b>75 percentile</b>	27,298	62,575	97,776	93,549	69,226
<b>Asimmetry</b>	3.75	3.63	4.39	4.40	4.40
<b>Kurtosis</b>	15.24	13.96	19.94	20.35	20.35
<b>Observations</b>	120	120	120	120	120

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

Equity values based on market and transaction multiples outperform, on average, actual values given by market capitalization. Transaction multiples more than double actual values. These results are not surprising if one considers that transaction multiples include only successful transactions and incorporate premium controls as well as synergy expectations and other positive factors taken into account by the buyers, which contribute to increase transaction prices.

Transaction equity values net of the 35% control premium still remain significantly higher than actual values, thus suggesting that corporate valuation includes more specific entity measurement. Along the same lines, market multiples more than double actual values. Furthermore, market multiple and transaction values are, on average, more than 4 times the book value. Such results for market multiples could be explained by the fact that market multiples are computed on a certain number of comparables and, therefore, tend to elide the idiosyncratic component of risk. Transaction multiple values net of the 35% control premium are still, on average, more than 3 times book value, while market capitalization is only twice.

The Wilcoxon and the *t*-test indicate that differences between market and transaction multiples, on the one hand, and market capitalization, on the other hand, are statistically significant at the 0.01 level (two-tail test). Therefore, statistical analysis supports the claim that market and transaction multiples perform quite poorly, which is in line with previous research (e.g. Kim and Ritter 1999). Table 3 also shows that market and transaction multiples have a higher volatility than market capitalization, which makes equity value estimates fluctuate more than firms' actual values. Standard deviation related to transaction multiples more than doubles the actual one, while volatility related to market multiples is even more than three times higher. As outlined by Barth (2004), standard deviation differences between valuation techniques and actual values can be used as good proxies for measurement errors<sup>1</sup>. Table 4 provides Pearson's correlation coefficients between equity values based on market multiples, transaction multiples, on the one hand, and market capitalization, on the other hand.

<sup>1</sup> According to Barth (2004), in a semi-strong form of market efficiency, volatility from period-to-period in corporate valuation derives from two sources. One is the firm's activity during the period and changes in economic conditions. This volatility, called *inherent volatility*, derives from economic forces. Inherent volatility is the volatility of the asset itself. However, there is another source of volatility, which is called *estimation error volatility*. Estimation error volatility is related to the fact that the equity value needs to be estimated. Corporate valuation entails estimation errors and the resulting volatility is attributable not only to inherent changes in economic conditions, but also to measurement errors.

**TABLE 4: Corporate equity value correlations**

	Market Multiples	Transaction Multiples
<b>Book Value</b>	0.94***	0.94***
<b>Market Capitalization</b>	0.97***	0.94***
<b>Observations</b>	120	120

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

\*Equity values based on transaction multiples are net of a 35% control premium

Both market and transaction multiples show a high and statistically significant correlation with market capitalization. However, market multiples show a slightly stronger correlation with market capitalization. Such a stronger correlation between market multiples and market capitalization is expected given that market multiples capture non-diversifiable risk factors which simultaneously affect our sample companies and their comparables. Transaction multiples, instead, show a lower correlation with actual values than market multiples, coherently with the fact that they are based on past transactions and, therefore, lag market price development. Subsequent analysis confirms this interpretation.

In order to get some insight into the potential effects of using market and transaction multiples for financial reporting purposes, Table 5 reports the overall corporate equity values per year, as they were part of a portfolio of investments held by a firm.

**TABLE 5: Overall corporate equity values\***

	Book Value	Market Capitalization	Market Multiples	Transaction Multiples
<b>2005</b>	2,000.0	2,000.0	2,000.0	2,000.0
<b>2006</b>	2,301.3	2,518.4	2,991.7***	3,439.8***
<b>2007</b>	2,729.7	2,972.1	3,645.6***	5,260.6***
<b>2008</b>	2,703.2	1,567.7	3,243.7***	4,205.0***
<b>2009</b>	2,906.6	1,911.5	3,194.0***	2,760.0***
<b>2010</b>	3,166.0	1,999.0	3,770.2***	3,707.1***
<b>Mean</b>	2,634.4	2,161.5	3,140.9	3,562.0
<b>Standard deviation</b>	420.5	500.4	630.6	1,133.0

\*Equity values based on transaction multiples are net of a 35% control premium. Values are equally weighted at 2006 year beginning

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

As shown in Table 5, corporate equity values based on multiples outperform the current market prices in each reporting year and none of them reflects the severity of the financial market crisis. While market capitalization has reduced by about 20 percent since 2006, the portfolio value has increased both under the market multiples (+26 percent) and the transaction multiples (+7.8 percent). The actual equity values have quoted below their book value since 2008 and, at the end of 2010, are much lower (-36.9 percent). In contrast, at the same date, equity values under market multiples and transaction multiples are nearly the same, they outperform book value and nearly double actual values (+88.6 percent for market multiples, + 85.4 percent for transaction multiples).

Furthermore, corporate equity values computed under multiples are much more volatile than the actual ones. This is a particularly important issue when multiples are used to assess the fair value of financial instruments reported in financial statements by banks. As mentioned, volatility in banks' financial statements causes procyclical effects on capital requirements and real economy financing, and affects public goods such as financial stability (Enria et al. 2004).

Table 6 reports profits and losses on corporate equity values, which are relevant to investment choices, value creation and management compensation.

**TABLE 6: Profits and losses on corporate equity values\***

	Book Value	Market Capitalization	Market Multiples	Transaction Multiples
<b>2006</b>	301.3	518.4	991.7	1,439.8
<b>2007</b>	428.4	453.7	653.9	1,820.8
<b>2008</b>	-26.5	-1,404.4	-401.9	-1,055.7
<b>2009</b>	203.4	343.8	-49.8	-1,445.3
<b>2010</b>	259.4	87.5	576.2	947.4
<b>Mean</b>	216.2	-129.9	194.6	66.8
<b>Standard deviation</b>	167.2	802.0	565.8	1,492.2

Results indicate that, according to market and transaction multiples, financial statements report a value creation which is not there. In fact, market and transaction multiples show, on average, a profit, whereas actual values report a loss. Moreover, equity valuation under the transaction multiples - which are by nature time and cycle-specific - show a higher volatility and, therefore, lead to a more swinging value creation than actual values. The same conclusions can be drawn by observing the overall returns for the equity values.

**TABLE 7: Returns on corporate equity values\***

	Book Value	Market Capitalization	Market Multiples	Transaction Multiples
<b>2006</b>	15.1%	25.9%	49.6%	72.0%
<b>2007</b>	18.6%	18.0%	21.9%	52.9%
<b>2008</b>	-1.0%	-47.3%	-11.0%	-20.1%
<b>2009</b>	7.5%	21.9%	-1.5%	-34.4%
<b>2010</b>	8.9%	4.6%	18.0%	34.3%
<b>Mean</b>	9.8%	4.6%	15.4%	21.0%
<b>Standard deviation</b>	7.5%	30.1%	23.5%	46.2%

\*Returns are computed on transaction multiples values net of a 35% control premium.

As shown in Table 7, equity value return is, on average, more than 4 times the actual one under the transaction multiples and 3 times under the market multiples. However, in 2008 all the returns, including those computed on book value, are negative. In 2009 market capitalization shows a recovery, while transactions multiples still report a negative return, consistently with the fact that they lag market development. At the same date, the return under market multiples is slightly negative, which is consistent with the fact that market multiples tend to elide the idiosyncratic component of risk.

Finally, Table 8 reports the overall price-to-book value ratio per each year, showing that none of the multiples reflects the actual losses incurred during the crisis. Only in 2009 transaction multiples indicate a loss compared to book value, whereas market multiples still show value creation.

**TABLE 8: Price-to-book value ratios\***

	Book Value	Market Capitalization	Market Multiples	Transaction Multiples
<b>2006</b>	1.0	1.1	1.3	1.5
<b>2007</b>	1.0	1.1	1.3	1.9
<b>2008</b>	1.0	0.6	1.2	1.6
<b>2009</b>	1.0	0.7	1.1	0.9
<b>2010</b>	1.0	0.6	1.2	1.2
<b>Mean</b>	1.0	0.8	1.2	1.4
<b>Standard Deviation</b>	0.0	0.3	0.1	0.4

\*Transaction multiples values are net of a 35% control premium.

## 5. Conclusions

This paper examines the accuracy of accounting-based market and transaction multiples in equity valuation. In doing so, it focuses on the valuation accuracy of the EV/EBITDA multiple, which is the most used key driver for corporate valuation in practice (Damodaran 2016).

Consistent with previous research, findings indicate that both market and transaction multiples do a poor job in assessing corporate equity values, suggesting that firm-specific risk factors matters significantly. Results also show that transaction multiples provide the highest equity values, which is consistent with transaction multiples being cases of 'revealed preferences'. In fact, transactions multiples refer only to successful transactions and incorporate synergy expectations as well as other positive factors that increase transaction prices. Market multiples, instead, are average values that tend to elide the idiosyncratic component of risk. Transaction and market multiples also lead to highly volatile equity 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.

Since market and transaction multiples are also used for financial reporting purposes, their accuracy is a relevant issue. According to IFRS 9, *Financial Instruments*, equity instruments must be valued at fair value. IFRS 13, *Fair Value Measurement*, defines fair value as the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. Fair value is therefore an exit price, i.e. the market price from the perspective of a market participant who holds the asset. If observable market transactions or market information are not directly observable, fair value is determined by using valuation techniques, which include transaction and market multiples. Indeed, according to IFRS 13, market and transaction multiples must have the highest priority, as they are corroborated by market data, which should make them highly unbiased.

In contrast, this paper provides some evidence that valuation techniques based on multiples are not be able to provide a faithful representation of the real-world economic phenomena they purport to represent. Assessing equity values by using market-based valuation techniques perform poorly with regard to performance analysis and appraisals as well as management choices and compensation. Moreover, it alters comparison among financial reports, and value creation largely varies depending on the selected valuation technique. Finally, valuation techniques based on market and transaction multiples exacerbate financial reporting volatility, adding volatility due to measurement errors to inherent volatility caused by changes in economic conditions. Taken as a whole, this paper opens space for further investigation in the area of corporate equity valuation using multiples. Evidence on this issue not only is of interest to practitioners, but also to financial reporting policy makers, who recommend the use of transaction and market multiples for financial reporting purposes.

## References

- Alford, A. (1992), "The effect of the set of comparable firms on the accuracy of the price-earnings valuation method", *Journal of Accounting Research*, Vol. 30 No. 1, pp. 94-108.
- Baiman, S. and Verrecchia, R. (1996), "The relation among capital markets, financial disclosure, production efficiency, and insider trading", *Journal of Accounting Research*, Vol. 34 No. 1, pp. 1-22.
- Barth, M.E. (2004), "Fair values and financial statement volatility", in Borio, C. et al. (Eds.), *The market discipline across countries and industries*, MIT Press, Cambridge.
- Cochrane, J.H. (2005), "The risk and return of venture capital", *Journal of Financial Economics*, Vol. 75 No. 1, pp. 3-52.
- Damodaran, A. (2016), [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/)
- Diamond, D.W. and Verrecchia, R.E. (1991), "Disclosure, liquidity, and the cost of capital", *The Journal of Finance*, Vol. 46 No. 4, pp. 1325-1359.
- Enria A., Capiello, L., Dierick, F., Grittini, S., Haralambous, A., Maddaloni, A., Molitor, P.A.M., Pires, F. and Poloni, P. (2004), "Fair value accounting and financial stability", *Occasional Paper No. 13*, European Central Bank.
- Fama, E.F. (1970), "Efficient capital markets: a review of theory and empirical work", *Journal of Finance*, Vol. 25, pp. 383 – 417.
- Hanouna, P., Sarin, A. and Shapiro, A. (2001), "Value of corporate control: some international evidence", working paper, Marshall School of Business.
- Kaplan, S.N. and Ruback, R.S. (1995), "The valuation of cash flow forecasts: an empirical analysis", *Journal of Finance*, Vol. 50 No. 4, pp. 1059-1093.
- Kim, M. and Ritter, J.R. (1999), "Valuing IPOs", *Journal of Financial Economics*, Vol. 53 No. 3, pp. 409-437.
- Lie, E. and Lie, H.J. (2002), "Multiples used to estimate corporate value", *Financial Analysts Journal*, Vol. 58 No. 2, pp. 44-54.

- Liu, J., Nissim, D. and Thomas, J.K. (2007), “Cash flow is king? Comparing valuations based on cash flow versus earnings multiples”, *Financial Analyst Journal*, Vol. 63 No. 2, pp. 56-68.
- Ljungqvist, A. and Richardson, M. (2003), “The cash flow, return and risk characteristics of private equity”, *Finance Working Paper*, No. 03-001, New York University.
- Moskowitz, T. and Vissing-Jorgensen, A. (2002), “The returns to entrepreneurial investment: A private equity premium puzzle?”, *American Economic Review*, Vol. 92, 745-778.
- Palea, V. and Maino, R. (2013), “Private equity fair value measurement: a critical perspective on IFRS 13”, *Australian Accounting Review*, Vol. 23 No. 3, pp. 264-278.
- Quigley, J.M. and Woodward, S.E. (2002), “Private equity before the crash: Estimation of an index”, unpublished working paper, University of California at Berkeley.