Market Consistent Embedded Value: An accurate reflection of value or a volatile distraction?[1]

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Abstract

Researchers have extensively investigated whether supplemental Embedded Value (EV) disclosures are "value relevant", e.g. whether they provide incremental information which helps to explain share price developments. Using cross sectional / time series data from European insurers during the turbulent period 2008-2013, this paper extends the literature in three important areas: First, we investigate the value relevance of both MCEV and the "dampening mechanisms" associated with MCEV. Second, we do so during a period characterized by high market volatility, allowing us to form an opinion about whether MCEV volatility is "artificial" or whether it better reflects share values. Finally, we develop a new, intuitive and direct test of value relevance compared to the regression tests generally used in the literature.

We find that *adjusted MCEV* (e.g. without "dampening mechanisms") is not only value relevant but is a more accurate measure of share value than either MCEV or the less volatile TNAV and EV; in other words, MCEV volatility is not "artificial" and attempts to dampen the volatility of MCEV diminish its ability to explain share price developments. Second, and not surprisingly, that MCEV sensitivities (e.g. to equity indices and interest rate levels) provide valuable information in predicting share price developments and explain the majority of actual share price volatility during this period.

Keywords: Embedded Value; Market Consistent Embedded Value; Value Relevance; Life Insurance; Risk Management

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1. Introduction

On value relevance of Embedded Value Disclosures

Valuing any company is challenging due to limited public information, differences in disclosure practices and financial accounting rules that may not reflect the underlying economics of the business (Copeland, et al, 1994; Rappaport, 1999). Overcoming these issues is even more challenging when valuing life insurers which offer long-term options and guarantees: accounting metrics based on best-estimates such as net income, shareholders' equity and Tangible Net Asset Value (TNAV) typically do not provide a sufficient basis for evaluating the sources of future earnings, the risks to those earnings and, consequently, the present value of these risk-based, balance sheet intensive businesses. The resulting opacity and inherent complexity is often credited as the reason why fewer equity analysts follow the industry and as the source of a structural valuation discount for the sector (De Mey, 2009; Deloitte, 2011; Serafein, 2011).

In an effort to address these issues, the life insurance industry has developed voluntary, supplemental Embedded Value (EV) disclosures, with European CFOs playing a lead role in standardizing the approach (CFO Forum 2004a, b and 2005). Today, around 100 insurance companies, predominantly in Europe and Japan, disclose some form of EV, representing about USD 1 Trillion in shareholder equity (Towers Watson, 2014).

Prior research has generally confirmed that EV reporting is *value relevant*, e.g. that it provides incremental information which helps to explain share price developments. However, EV has been criticized because it depends on managements' long-term expectations of future financial market conditions and does not fairly value embedded options and guarantees, leading to overly optimistic and non-comparable results (PwC, 2008). To address these concerns, Market Consistent Embedded Value (MCEV) was developed by the same European CFOs, effectively removing management discretion regarding future market return assumptions and using capital market techniques to fairly value embedded options and guarantees (CFO Forum 2009a, 2009b)[4].

One adverse consequence of MCEV is that it is inherently more volatile because it depends on current market conditions as opposed to long-term economic assumptions. Some industry practitioners and regulators now believe that the pendulum may have swung too far, with disclosures moving from too stabile to too volatile, resulting in "artificial volatility" according to the EU Commission (2015) in the context of Solvency II. In an effort to mitigate this "artificial volatility" [5], regulators and the industry have created "dampening mechanisms" for MCEV and Solvency II reporting, including the Illiquidity Premium (ILP) (CRO Forum, 2009a), the Volatility- and Matching-Adjustments and yield curve extrapolation based on an Ultimate Forward Rate (UFR) (EU Commission, 2015).

[4] Precursors to MCEV can be found in Swiss Re, 2001, 2005; Tillinghast-Towers Perrin, 2004, 2005; O'Keeffe, et al., 2005.

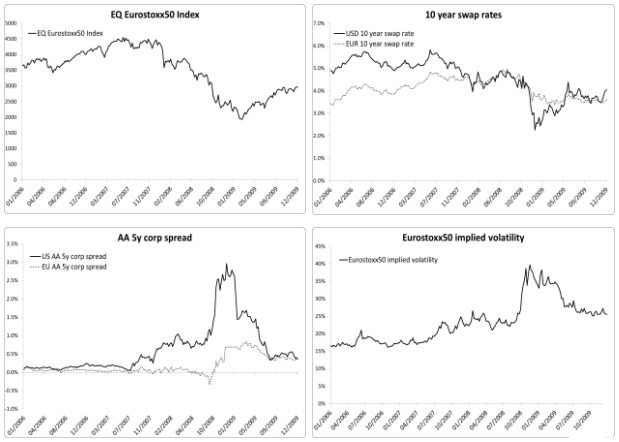
[5] Note that "artificial volatility" can be considered from two perspectives: first, in terms of explaining share price developments (e.g. is MCEV more volatile than share prices?) and, second, from a public policy perspective (e.g. is the frequency of regulatory interventions counterproductive?). Even if the more volatile MCEV better matches share price developments, this does not mean that it is better for determining regulatory solvency ratios: arguably, the amortized cost "banking book" under Basel II provided a safe haven for retail and commercial banks; had mark-to-market or fair valuation also been applied to the banking book, it is not clear that many banks would have survived the 2008 financial crisis or the 2011-12 European sovereign crisis.

Who is right? Do the more stable measures better reflect the way that the sector is valued or is the more volatile MCEV a better predictor of share values? Further, do "dampening mechanisms" such as the illiquidity premium and ultimate forward rate improve or detract from the value relevance of MCEV? These important questions are still open: to date, the value relevance of MCEV has not been investigated, nor has the relevance of MCEV "dampening mechanisms". Furthermore, by focusing on relatively stable EV metrics during generally stable and benign periods, the current literature has missed the opportunity to test the link between financial market turbulence, public disclosures and share price developments in assessing whether MCEV is indeed "too volatile".

Casual analysis leads to strong hypothesis…

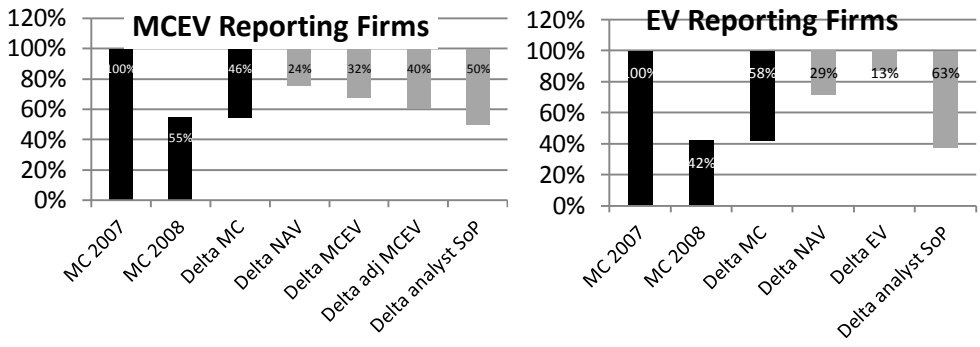
Casual empiricism during the global financial crisis of 2008-09 provides a strong indication that MCEV measures better reflect actual share price developments than more stable accounting and EV metrics and that attempts to dampen that volatility actually reduce the information content of MCEV. As Figure 1 illustrates, the period was characterized by market turbulence including sharply lower equity markets, lower interest rates, higher credit spreads and higher implied market volatilities.

Figure 1: Financial market developments (2007-2009)



Source: Bloomberg

From a theoretical perspective, none of these developments should have been particularly flattering to the market consistent value of life companies offering long-term options and guarantees. Figure 2 below gives an overview of the average valuation results for a sample of European insurers reporting under MCEV and EV principles.



- *Change in market capitalization (MC), accounting shareholder equity (NAV), MCEV and EEV based on annual disclosures, 2007 & 2008 year-end.*
- *Analyst SoP valuation from Merrill Lynch, "Not out of the woods" May 22, 2008; "Pausing the roller coaster to look at valuations" June 23, 2009. Total firm SoP for AXA, Aegon, Aviva, Generali, ING, Swiss Life.*

The companies represented in the Exhibit on the left all reported under the more volatile MCEV principles (Allianz, Aviva, AXA, Ergo, Swiss Life and Zurich Financial Services). The average decline in book equity or Net Asset Value (NAV) for these companies was -24%, somewhat smaller than the average decrease in MCEV at -32%. However, the average decrease in MCEV would have been closer to -40% without the application of the illiquidity premium which was only applied for the first time by some of the firms in 2008 (Aviva and AXA). Interestingly, the estimated -40% "clean" decrease in MCEV is closer to the actual share price development of -45,5% and the -50% average decrease in the Sum-of-Parts (SoP) valuations of the Life businesses taken from a sell-side analyst.

The second set of firms represented in the exhibit on the right (Aegon, Generali, ING) reported under the more stable European EV principles which depend on management's long-term expectations as opposed to the actual market conditions. The average decline in EEV (-13,3%) was more flattering than the change in NAV (-28,6%) and substantially more flattering than the average share price decline (-57,7%) and decline in SoP valuation (-64,4%) and for the companies in this group.

This casual analysis supports the hypothesis that markets generally "look through" more stable disclosure measures such as IFRS NAV and EEV as well as attempts to stabilize MCEV (e.g. through the inclusion of the illiquidity premium); furthermore, it supports the hypothesis that firms disclosing more volatile MCEV information have not "shot themselves in the foot", e.g. creating higher volatility in their share prices relative to those firms disclosing more stable EEV.

…but a more rigorous analysis is needed

While leading to strong hypothesis, the results from 2008-09 financial crisis are not conclusive and require a more rigorous analysis and statistical test.

Using cross sectional / time series data from European insurers during the turbulent period 2008-2013, this paper extends the literature in three important areas: First, we investigate the value relevance of both MCEV and the "dampening mechanisms" associated with MCEV. Second, we do so during a period characterized by high market volatility, allowing us to form an opinion about whether MCEV volatility is "artificial" or whether it better reflects share

values. Finally, we develop a new, intuitive and direct test of value relevance compared to the regression tests generally used in the literature.

We find that *adjusted MCEV* (e.g. without "dampening mechanisms") is not only value relevant but is a more accurate measure of share value than either MCEV or the less volatile TNAV and EV; in other words, MCEV volatility is not "artificial" and attempts to dampen the volatility of MCEV diminish its ability to explain share price developments. Second, and not surprisingly, that MCEV sensitivities (e.g. to equity indices and interest rate levels) provide valuable information in predicting share price developments and explain the majority of actual share price volatility during this period.

The remainder of the paper is structured as follows: Section 2 briefly reviews the existing literature. Section 3 describes the data and research approach. Section 4 presents the results and Section 5 discusses the implications and questions for further research.

2. The existing literature

The value relevance of financial disclosures is often tested by analyzing whether disclosures help to "explain" share price developments[6]. Two concepts of information value are used: "relative" information, which tests if one disclosure regime has "more" explanatory power than the other, and "incremental" information, which tests whether information from a second regime is incrementally useful after normalizing for the first (Barth, 2001; Holthausen and Watts, 2001). These hypotheses are often tested by regressing share price against GAAP or IFRS accounting and EV variables, separately and jointly, as illustrated in the equations 1a-1c below from Gerstner, et al., 2015.

$$1a|y_{it} = \beta_0 + \sum_{j=1}^{l} \beta_j X_{IFRS} + \eta_i + \delta_t + \varepsilon_{it}$$

$$1b|y_{it} = \gamma_0 + \sum_{k=1}^{m} \gamma_j Z_{EV} + \eta_i + \delta_t + \varepsilon_{it}$$

$$1c|y_{it} = \theta_0 + \sum_{j=1}^{l} \beta_j X_{IFRS} + \sum_{k=1}^{m} \gamma_j Z_{EV} + \eta_i + \delta_t + \varepsilon_{it}$$

Various statistical tests described in Gerstner are used to establish the relative information content by comparing the results of equations 1a and 1b while other tests are used to determine incremental information value based on the results from equation 1c.

The general results in the literature are that EV disclosure is relatively more value relevant than accounting information (Klumpes, 2002; Horton, 2007; Prefontaine, et al., 2009, 2011; Forte et al, 2011; Serafeim, 2011; Hail, 2011; Amezweg and Liu, 2012; El-Gazzar, et al, 2013) with only Gerstner, et al., 2015, coming to the opposite conclusion. Furthermore, and not surprisingly, that EV information is also incrementally relevant (Klumpes, 2002; Horton, 2007; Forte et al, 2011; Amezweg and Liu, 2012; Gerstner, et al, 2015). Most of these studies investigate whether aggregate EV is relevant; only Gerstner, et al (2015) investigates the value relevance of disaggregated EV information, finding incremental value in information on options and guarantees as well as the split between new and inforce business.

[6] Alternative approaches test whether the introduction of EV reporting leads to lower bid-offer spreads (Serafeim, 2011; Hail, 2011) or increased trading volumes around the date of publication or a one-time benefit relative to peers from first reporting the information (El-Gazzar, et al, 2013).

The existing literature focuses on the relevance of EV. No study has yet investigated the value relevance of MCEV, which is far more sensitive to financial market conditions, and none has investigated whether the "dampening mechanisms" associated with MCEV and Solvency II are value relevant.

In addition, most studies focus predominantly on pre-crisis data, a period marked by relative stability in financial markets. The combination (e.g. relatively stable EV and stable, pre-financial crisis data) is not useful in distinguishing whether MCEV introduces "artificial volatility" as suggested by the EU Commission and many in the industry, and whether dampening this "artificial volatility" improves the ability to explain actual share price movements.

3. Approach and Data

In contrast to the existing literature relying on regression tests, we take a more direct and intuitive approach. In principle, TNAV, EV, MCEV and *adjusted* MCEV (e.g. without dampening mechanisms) all purport to measure the same thing: the value of shareholders' interest in the inforce business.

Using this observation, we conduct two tests to see which of these reported values is "closer" to the actual market capitalization of the firm: a *level comparison test* and a *sensitivity roll-forward movement test*, described below.

I. Data

We conduct these tests using cross-sectional, time series panel data from the highly volatile period 2008-2013 (including the global financial crisis of 2008 and the 2011/12 sovereign debt crisis in Europe) for a sample of European insurers which reported MCEV figures.

The sample includes seven of Europe's largest insurers – Allianz, Aviva, Axa, CNP, Generali, Prudential plc and Zurich Financial Services – and is thus broadly representative of the industry. All of these firms complied with the CFO Forum's MCEV Principles and reported an illiquidity premium (if used) and MCEV sensitivities, necessary for the calculation of adjusted MCEV and the roll-forward sensitivity comparison.

For the purpose of the analysis, the company's Market Capitalization, Share Price, Total Equity and Intangible Assets at the end of each quarter are sourced from Bloomberg; Tangible Net Asset Value (TNAV) is calculated as Total Equity less Intangible Assets.

The MCEVs and the sensitivities required for the calculation of adjusted or "clean" MCEV values are collected manually from the respective annual MCEV disclosures. Adjusted MCEVs are calculated from the disclosed Group MCEV, reported illiquidity premium and the relevant Interest Rate sensitivities (IR_{sensi}) from the insurers' Embedded Value Reports:

$$adjusted\ MCEV = Group\ MCEV + Liquidity\ Premium * IR_{sensi}$$

II. The level comparison test

The level comparison test is straight forward: we consider two reported value measures at a time (TNAV against MCEV or adjusted MCEV); one of the measures "wins" in that period

for an individual firm if it is the *closest in absolute value to the actual market capitalization of the firm*.

More specifically, for each reporting period we compare (adjusted) MCEV and TNAV against the actual market capitalization of the firm. Similar to pulling the "right" colored ball from an urn containing balls of two colors, we define the experiment a "success" if the reported MCEV is closer to the market capitalization than TNAV, e.g.

$$\begin{array}{llll} \textit{"Success"} & \textit{if} & \left|\text{MCEV}_{j,t} - \text{MC}_{j,t}\right| < \left|\text{TNAV}_{j,t} - \text{MC}_{j,t}\right| & \text{w/ prob = p} \\ \textit{"Failure"} & \textit{if} & \left|\text{MCEV}_{j,t} - \text{MC}_{j,t}\right| > \left|\text{TNAV}_{j,t} - \text{MC}_{j,t}\right| & \text{w/ prob = 1-p} \end{array}$$

for the j^{th} firm, $j \in \{1,..,J\}$, at the t^{th} reporting period, $t \in \{1,..,T\}$. In total, there are JxT draws to this experiment where J is the total number of firms in the sample and T is the total number of reporting periods considered.

We define (adjusted) MCEV as more informative if $p > 0.5$ and TNAV as more informative if $p < 0.5$. The statistical test based on the sample estimate $\hat{p}$ is described below.

There are two potential criticisms of the level test. First, TNAV, MCEV and EV are measures of inforce value only and not of total firm value; in theory, the total firm value includes the franchise value of future new business (see Wilson, 2015). It is an apocryphal belief that the European insurance industry was trading ex-growth and based only on inforce value during this period due to the recessionary macro-economic environment. In any case, the sensitivity roll-forward movement test described next addresses this issue if the franchise value remained constant over time.

Second, it may be incorrect to assume that the probability of "success" is independent over time and firms; for example, we know that significant revisions to MCEV principles took place during this period, for example the inclusion of the illiquidity premium and yield curve extrapolation to a constant Ultimate Forward Rate (UFR). While this criticism opens up significant avenues for further research, it is similarly addressed in the sensitivity roll-forward movement test which resets the test in-between reporting periods.

III. The Sensitivity Roll-forward Movement Test

The level comparison test compares the level of TNAV, MCEV and adjusted MCEV against the actual market capitalization for a firm at each point in time; it implicitly assumes that the company traded on inforce value only and that the measurement approaches were stable.

The sensitivity movement test does not compare absolute levels but rather the changes in value over the reporting period using a roll-forward[7] approach *based on publically disclosed MCEV sensitivities*. Resetting every reporting period and looking at changes rather than absolute values mitigates to some extent the potential bias from ignoring franchise value (as long as the franchise value is reasonably stable) and from changing measurement approaches. By basing the roll-forward on disclosed MCEV sensitivities, it has the added benefit of testing whether MCEV sensitivities are value relevant.

The roll-forward methodology

[7] *In accounting, a Roll-Forward is the systematic establishment of new accounting period's balances by using (rolling forward) prior accounting period data*. Definition from VentureLine: https://www.ventureline.com/accounting-glossary/R/roll-forward-definition/ (Accessed 15.06.2014).

The normalized MCEV Roll-Forward is calculated using the following formula:

$$\boldsymbol{Normalized\ MCEV\ RF_t = 1 + \frac{ABS(EQ_{sensi}) * \Delta EuroStoxx50_t}{MCEV_{t-1} * 10\%} + \frac{IR_{sensi} * \mathbf{ABS}(\Delta EurSwap_t)}{MCEV_{t-1} * 100bps}}$$

where ABS is the absolute value. Normalized MCEV Roll-Forward is based on the reported sensitivities to equity changes ($\boldsymbol{EQ_{sensi}}$) and interest rate changes ($\boldsymbol{IR_{sensi}}$). The reported EQ sensitivities give the Euro change in MCEV for a -10% fall in all equity prices and are converted into a sensitivity for a 1% change in equity prices by dividing by 10%. Two different interest rate sensitivities are disclosed: one for the Euro value of a +100 bps (basis points) parallel increase in interest rates and one for a -100bps parallel decrease. They are converted into basis point sensitivities by dividing by 100bps. When the change in the Euro Swap rate is positive, the +100 bps sensitivity is used and when the change is negative, the -100 bps sensitivity is applied. The use of the up- and down-sensitivities helps to reflect the negative interest rate convexity often associated with long-dated guarantees. As no sensitivity to a rise in equity values is disclosed, and because in general there is limited convexity for general account businesses, the absolute value of the EQ_{sensi} is applied to all changes in the EuroStoxx50 index.

The end of quarter EuroStoxx50 index values and 10 year Euro Swap interest rates for the period 31.12.2008 - 31.12.2013 are used as proxies for equity market and interest rate developments.

Many insurance companies report embedded value sensitivities only annually. In such cases, the sensitivities are held constant for the Roll-Forward over four consecutive quarters (Q1–Q4). After each annual MCEV disclosure, the sensitivities are updated and applied for the next year's Roll-Forward. Finally, $MCEV_{t-1}$ represents last period's Group market consistent embedded value. For example, in Q1, the disclosed MCEV at the end of the previous year is used. For quarters where no MCEV is published, the estimated change in the respective period is multiplied with the most recent available embedded value, e.g. $MCEV_t = MCEV\ RF_t * MCEV_{t-1}$. Three of the companies in the sample (Aviva, Prudential and Zurich) also report semi-annually, in which case the reported values are used in the Roll-Forward of the following quarter (Q3).

The sensitivity-based comparison test

In the following, quarterly changes in MCEV and TNAV are compared against company's share price development. In order to ensure consistency, the market capitalization and TNAV movements are defined as changes from one period/quarter to the next:

$$\Delta MC_t = MC_t / MC_{t-1} \qquad \text{and} \qquad \Delta TNAV_t = TNAV_t / TNAV_{t-1}$$

where "t" indicates the current period/quarter and "t-1" the respectively previous period.

More specifically, for each reporting period we compare the change in (adjusted) MCEV and TNAV against the actual change in market capitalization of the firm. Similar to pulling the "right" colored ball from an urn containing balls of two colors, we define the experiment a "success" if the roll-forward MCEV is closer to the market capitalization than TNAV, e.g.

"Success" *if* $\left|\Delta MCEV_{j,t} - \Delta MC_{j,t}\right| < \left|\Delta TNAV_{j,t} - \Delta MC_{j,t}\right|$ w/ prob = p
"Failure" *if* $\left|\Delta MCEV_{j,t} - \Delta MC_{j,t}\right| > \left|\Delta TNAV_{j,t} - \Delta MC_{j,t}\right|$ w/ prob = 1-p

for the j^{th} firm, $j \in \{1,..,J\}$, at the t^{th} reporting period, $t \in \{1,..,T\}$. In total, there are JxT draws to this experiment where J is the total number of firms in the sample and T is the total number of reporting periods considered.

Analogously to the level comparison test, we define (adjusted) MCEV as more informative if $p > 0.5$ and TNAV as more informative if $p < 0.5$.

IV. Test of statistical significance

The probability of success for each draw is defined as p, assumed to be an unknown constant for all firms and reporting periods. We define MCEV as more informative if $p > 0.5$ for each test and TNAV as more informative if $p < 0.5$; and MCEV and TNAV equally as informative if $p = 0.5$.

The population parameter p is unobservable and estimated from the panel data. Under these assumptions, the best estimate of p is calculated as the number of successes in the experiment (n_s) divided by the number of draws (JxT), e.g.

$$\hat{p} = \frac{n_s}{JxT}$$

An α-confidence interval around this estimate can be approximated by Wald method (see Wallace (2013)) as

$$\text{α-confidence interval} = \hat{p} \pm z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

where $z_{\frac{\alpha}{2}}$ is the $100\left(1-\frac{\alpha}{2}\right)^{th}$ percentile of the standard normal distribution. For example, for a 95% confidence level, the error is 5% so $\left(1-\frac{\alpha}{2}\right) = 97.5\%$ and $\alpha = 1.96$. We conclude that MCEV is more informative at an α-confidence level if $\hat{p} - z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} > 0{,}5$.

The Wald test is based on a normal approximation which becomes more problematic if the population parameter approaches 1 or 0. A frequently cited rule of thumb is that the approximation is reasonable if $np > 5$ and $n(1-p) > 5$ (Brown et al. (2001)), a condition which is met for our experiment based on the estimated population probability.

4. The results

V. The Level Comparison Test

The Table below compares the absolute differences between the company's Market Capitalization versus MCEV and TNAV on an annual basis. A "check" in the Table indicates that MCEV "wins" in that particular draw, e.g. MCEV is closer to the Market Capitalization than TNAV at year end. The estimated probability for "success" based on the population data is $\hat{p} = 0.77$. Using the Wald test, $\hat{p}$ is greater than 0.5 at a 99.9% confidence level. We therefore conclude that MCEV is more value relevant than TNAV.

Table 1: Comparison, MCEV vs. TNAV and Market Capitalization

Company	2009	2010	2011	2012	2013
1. Allianz	✓	✓			✓
2. Aviva	✓			✓	✓
3. Axa	✓	✓	✓	✓	✓
4. CNP			✓	✓	
5. Generali	✓	✓	✓	✓	✓
6. Prudential	✓	✓	✓	✓	✓
7. Zurich	✓	✓	✓	✓	✓

✓ MCEV closer than TNAV to the Market Capitalization of the firm at year-end.

Next, in order to examine the relevance of the illiquidity premium, a comparison between the reported and the adjusted or "clean" MCEV values, is undertaken. Analogous to the previous analysis, in Table 3 we compare the absolute differences between the two metrics and Market Capitalization for each year. The estimated probability for "success" based on the population data is $\hat{p} = 0.63$. Using the Wald test, $\hat{p}$ is greater than 0.5 at an approximate 90.0% confidence level. We therefore conclude that adjusted MCEV is more value relevant than MCEV.

Table 2: Comparison, adjusted MCEV vs. reported MCEV and Market Capitalization

Company	2009	2010	2011	2012	2013
1. Allianz	✓	✓	✓	✓	
2. Aviva	✓	✓	✓	✓	
3. Axa	✓		✓		✓
4. CNP	✓	✓	✓	✓	✓
5. Generali		✓			
6. Prudential	✓				✓
7. Zurich	✓			✓	✓

✓ "Clean" MCEV closer than unadjusted MCEV to Market Capitalization.

One interesting observation is that in 2009 the adjusted MCEV of almost all companies (except Generali) was closer to the Market Capitalization than the unadjusted value. This was the year in which the illiquidity premium was introduced by most companies in order to offset the dramatic increase in bond spreads observed during 2008 (with AXA and Aviva having already introduced it in 2008). The large number "checks" in 2009 may indicate that, while the illiquidity premium was effective in dampening the impact of financial markets on reported MCEV values, it did so at the expense of driving MCEV further away from the actual Market Capitalization of the firms.

VI. Results of MCEV roll-forward analysis

The results for the individual companies are summarized in the following Table. In each year the cumulative absolute difference between the quarterly share price changes and the adjusted ΔMCEV Roll-Forward is compared against the cumulative absolute difference between the quarterly stock returns and the ΔTNAV movements. A "check" indicates that the adjusted ΔMCEV Roll-Forward is closer to the share price movements than is ΔTNAV. The estimated probability for "success" based on the population data is $\hat{p} = 0.86$. Using the Wald test, $\hat{p}$ is greater than 0.5 at above a 99.9% confidence level. We therefore conclude that adjusted

ΔMCEV is more value relevant than ΔTNAV and that disclosed MCEV sensitivities are value relevant.

Table 3: Comparison, adjusted ΔMCEV Roll-Forward vs. ΔTNAV and ΔShare Price

Company	2009	2010	2011	2012	2013
1. Allianz		✓	✓		✓
2. Aviva	✓	✓	✓	✓	✓
3. Axa	✓	✓	✓	✓	✓
4. CNP	✓	✓	✓	✓	✓
5. Generali		✓		✓	
6. Prudential	✓	✓	✓	✓	✓
7. Zurich	✓	✓	✓	✓	✓

✓ Adjusted MCEV Roll-Forward closer to ΔShare Price than ΔTNAV.

Using a similar analysis, we can also test whether adjusted or unadjusted MCEV is a better reflection of share price developments. A "check" in Table 5 indicates that the adjusted ΔMCEV Roll-Forward is closer to the share price movements than is ΔMCEV. The estimated probability for "success" based on the population data is $\hat{p} = 0.74$. Using the Wald test, $\hat{p}$ is greater than 0.5 at an approximate 99.9% confidence level. We therefore conclude that adjusted ΔMCEV is more value relevant than ΔMCEV and that disclosed MCEV sensitivities are value relevant.

Table 4: Adjusted ΔMCEV Roll-Forward vs. ΔMCEV Roll-Forward

Company	2009	2010	2011	2012	2013
1. Allianz	✓	✓	✓		✓
2. Aviva	✓	✓	✓	✓	✓
3. Axa	✓			✓	✓
4. CNP	✓	✓		✓	✓
5. Generali	✓	✓		✓	✓
6. Prudential	✓	✓		✓	
7. Zurich	✓		✓	✓	

✓ Adjusted MCEV Roll-Forward closer to ΔShare Price than the unadjusted MCEV Roll-Forward.

The difference between the "clean" MCEV and the reported MCEV is that the "clean" measure removes the reported illiquidity premium used to discount the insurers' liabilities. The illiquidity premium introduced in 2008-09 was designed to "dampen" the impact on market value surplus from bond spread movements – as bond spreads increase, the illiquidity premium increases, thereby allowing some of decline in asset values to be "absorbed" by lower liability values.

What is interesting from the Table is that the "clean" MCEV dominates MCEV in 93% of the cases during 2009 and 2012, the two years when the illiquidity premium was at its highest due to two separate financial crisis in Europe. This might imply that the illiquidity premium, designed to dampen MCEV volatility, dampened it so much that it no longer tracked share values. Or, put another way, the markets seem to "look through" the illiquidity premium when valuing insurer's shares.

Additional insights

In order to gain further insights, the Pearson correlation coefficients between the insurer's share price developments and each of the two alternative valuation metrics are calculated and presented in the following Table.

Table 5: Correlations ΔadjMCEV, ΔTNAV and ΔSP

		Correlation (ΔadjMCEV, ΔSP)	Correlation (ΔTNAV, ΔSP)
1.	Allianz	0,64	0,63
2.	Aviva	0,88	0,24
3.	Axa	0,86	0,49
4.	CNP	0,74	0,06
5.	Generali	0,76	0,55
6.	Prudential	0,83	-0,27
7.	Zurich	0,69	0,02
	Index:	**0,77**	**0,25**

The correlation results are a further indicator for the relevance of adjusted MCEVs relative to IFRS measures, with the correlation between the adjusted ΔMCEV Roll-Forward and the index return distinctly higher (0,77) than the corresponding correlation with the ΔTNAV (0,25).

5. Implications and concluding remarks

There is a strong case to be made that market consistent approaches better reflect actual share price developments in the life insurance sector. More specifically, the empirical evidence supports the claim that

1. Market consistent approaches are better at reflecting the ***absolute level*** of market capitalization and the ***changes*** in market capitalization for European life insurers when compared with the more stable IFRS net asset values;
2. Reported market consistent ***sensitivities*** to, e.g., equity indices and interest rate levels provide valuable information in explaining (and predicting) future share price changes. In fact, much of the actual volatility in market capitalization can be explained by the company's market risk position measured by market consistent sensitivities; and, finally,
3. Attempts to dampen the volatility of market consistent measures, for example using long-term assumptions under traditional EV approaches or including illiquidity premium under market consistent approaches, are less powerful in explaining market capitalization developments.

The results are important not only for the valuation of life insurance businesses but also for value managers in the industry. More specifically, the implications for shareholder value management are that:

1. Value managers should focus on managing market consistent value, and not on managing the more stable statutory or GAAP earnings or on changing MCEV models so that the results are higher and less volatile;

2. If share price volatility is not desirable, managers should redesign products so that they can more easily be hedged and implement more conservative asset/liability strategies to limit the company's MCEV sensitivities;
3. If the industry suffers from an opacity discount, better and more consistent market consistent disclosures may help the situation because the information is value relevant.

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