



# NatEquity Knowledge Base

## Fair Value Measurement of Level 3 Longevity Dependent Assets

### 1 FAIR VALUE ACCOUNTING AND THE FINANCIAL CRISIS OF 2008

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U.S. and international GAAP have required longevity dependent, Level 3, assets be Marked-to-Fair Value for financial statements since January 1, 2014. As explained below this is very different from Mark-to-Market or cost-based valuation, neither of which are permissible valuation methodologies for Level 3 longevity dependent asset. I am repeatedly accused of wallowing in the intricacies of fair value accounting when I refer to the losses that will arise when Level 3 assets are incorrectly valued. This is usually by people who don't care about and wonder why it has any meaning or purpose. Many of those are people who skated through the financial crisis of 2008 with no threat to their income and only a superficial understanding of what caused the financial meltdown. The meltdown had two factors at its core:

1. Bad, often fraudulent, asset backed securities whose valuations were propped up by ill-conceived bond ratings, and
2. A lack of trust in a financial system where only liquidity and not reliance on purported value had meaning.

The valuation problems at the time were rooted in an accounting system that allowed considerable latitude in defining what the term "mark-to-market" actually meant. If a loss was thought to be temporary, it did not need to be booked. If an asset was going to be held to maturity, then it could be booked at cost. Mark-to-market fair value was what a willing buyer and a willing seller agreed it was worth. If a loss was taken, it often got categorized as "Other Comprehensive Income" (OCI), so that it did not affect a financial institution sponsor's capital and solvency ratios. This proved to be more subjective than objective and quantitative. When these values were questioned in 2008, traders ran for the liquidity door and left Bear Stearns, Lehman Brothers and AIG in their wake.

In August of 2018, the Financial Accounting Standards Board (FASB) issued clarification and strict requirements for GAAP financial statement disclosure of Level 3 mortality dependent assets. Accounting Standards Update 2018-13 changes the disclosure requirement for Fair Value Measurement for all financial statement for periods beginning after December 15, 2019. This is timed to coincide with the requirement that smaller banks, mortgage companies and private home equity access mortgage companies comply with these standards. Going forward they must clearly explain the statistical and mathematical basis for their consistent and repeatable valuation methodology. This methodology is intended to measure the discounted net present value of future portfolio cash flows.

## 2 ECONOMIC STABILIZATION ACT OF 2008

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The concept and principle of fair value has been around in the accounting world for decades. The choice to consider either cost or fair value for measurement diminished the need to consider how to measure fair value. The Economic Stabilization Act of 2008 charged the SEC with the task of studying fair value measurement (Section 133). In Section 132, it also allowed the SEC to, and it did, suspend mark-to-market/fair value measurement for financial statement purposes. Arguably, this suspension saved many financial firms with underwater mortgage or other non-Level 1 assets in their portfolios during the financial crisis of 2008. By way of clarification, below is the categorization of Level 1-3 assets and liabilities:

1. Level 1: assets such as stock and bonds where the commonly reported bid and ask prices can be averaged to determine a daily value,
2. Level 2: assets and liabilities where a value can be inferred from the financial statements balance sheet, profit and loss statement and sources and uses of cash, and
3. Level 3: assets and liabilities where the value is dependent upon an “unknowable” future event. These include derivatives and longevity-dependent assets such as life insurance, annuities, pension liabilities, life settlements and reverse mortgages.

Recently I reread the SEC’s 259-page *Report and Recommendations Pursuant to Section 133 of the Emergency Economic Stabilization Act of 2008: Study on Mark-to-Market Accounting*<sup>i</sup>. With the benefit of years of hindsight, the study does a good job of identifying the root causes of the economic crisis and calls for a complete revision of the mark-to-fair value accounting rules (not simply principles). I was invited to, and did, testify before the SEC in November of 2009 on the measurement of fair value for Level 3 securitized assets. These specific new rules have been codified in U.S. GAAP AUC 820 and International Financial Reporting Standards (IFRS) 13. The rules are identical and have been in force worldwide since January 1, 2014. Even after this implementation, misapplications of fair value accounting rules are still being applied at publicly traded companies, which are only now being challenged by the SEC. More recently on November 9, 2017, the Government Accountability Office (GAO), in its report GAO 18-92, evaluating the shortfall in the FHA’s Mutual Mortgage Insurance (MMI) pool, stressed that under commercial and government GAAP AUC 820, the Mark-to-Fair Value measurement of current value is the NPV of expected future portfolio/pool cash flows.<sup>ii</sup> The thrust of the accounting and actuarial analysis by the GAO was to point out that the combined conventional “agency” forward mortgage MMI reserves were inadequate because of the \$4± billion annual loss and expected \$14 billion near-term future losses from the government insured Home Equity Conversion Reverse Mortgage program (HECM).<sup>iii</sup> The authors suggest the separation of the reserves for conventional agency forward mortgages from the HECM reserves. They and other commentary acknowledge this would negatively highlight the historic and futures HECM losses and jeopardize the future of the program. Other government and non-government commentators over the past year have called for the abolishment of the government guarantees for HECM program. Without the specific exclusion in GAAP AUC 820, allowing contracts to be valued at cost provided by the guarantee, HECM reverse mortgages would be forced to apply a Mark-to-Fair Value methodology and compete with all other Level 3 longevity dependent products. This would be problematic and probably deadly to the HECM program because the lack of true mortality underwriting would only increase portfolio losses and eliminate Ginnie Mae or conventional Non-QM securitizations.

### 3 FAIR VALUE MEASUREMENT OF LEVEL 3 ASSETS

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Specific emphasis and stringent requirements apply to Level 3 assets which, without proper consistent repetitive measurement, are considered the most volatile because their value is measured as the Net Present Value (NPV) of a stream of future cash flows that are dependent upon “unknowable” future events. Drafts of these new standards existed well before 2008. These drafts served as the underpinnings used by my fellow authors Lynford Graham and Eric Stallard in the development of a consistent repetitive measurement methodology, which was eventually published in 2011<sup>iv</sup>. Lyn Graham was the Partner responsible for Audit Policy at Coopers & Lybrand and later at BDO. Lyn is a PhD mathematician who, for decades, sat on or chaired many of the AICPA and FASB committees on fair value accounting. Eric Stallard is a world recognized actuary and mathematician best known for his work in predicting morbidity and mortality in seniors. This valuation methodology paper has been referenced more than 50 times in professional journals and publications.

Our challenge was to apply internationally accepted statistical and mathematical principles to devise a simple system that could be applied on a consistent, repetitive basis to measure future cash flows of longevity-dependent assets. Lyn and Eric settled on using Thomas Bayes’ 1763 theorem in a protocol known as Bayesian Inference<sup>v</sup>. Bayesian Inference is simply applying a hypothesis and consistently updating results with new data points until a level of sufficient statistical confidence is reached.

### 4 STALLARD ASSESSMENT MODEL, NOW CALLED THE LONGEVITY COST CALCULATOR (LCC)

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Our peer-reviewed published methodology to predict longevity, and thus measure cash flows, proposed using three independent medical records-only life expectancy estimates for each individual case, plus a fourth (question based) life expectancy estimate. The fourth estimate comes from an assessment of that individual with an algorithm-based tool developed by Stallard that uses a set of 76 questions. Only about a third of the questions are items one would expect to find in a person’s medical records. The balance are questions to assess activities of daily living (ADLs), cognitive and other human characteristics.

This Stallard assessment tool had its origins in the outset of the National Long-term Care Survey in 1980. Stallard was part of an interdisciplinary team of physicians, actuaries, demographers and others tasked to develop a paper and pencil questionnaire that could be used to assess 32,000 seniors chosen at random across the country. Each senior still alive was reassessed every five years with a repeat of the same questions. Stallard took a data set of 20,000 seniors who were assessed a minimum of three consecutive times and began a 10-year process of developing the algorithms to identify and quantify patterns in the interdependent variables in the consecutive data sets. Ultimately, his work was able to classify, validate and calibrate the model which has been accepted as accurate by the actuarial community worldwide. By three different statistical and medical measures, the model is more than 96% accurate in predicting the trajectory of morbidity and mortality of an individual senior<sup>vi</sup>. With the same accuracy, the model predicts how long a senior will/should live independently and institutionally before death. This model was purchased from Stallard by an independent company in 2008 that owns the rights to commercialize the model for all but medical research. In 2005 the data sets were de-identified. This means that the data tags like name, social security number, etc. were removed from each record. To

replicate the model someone will have to collect new data on thousands of individuals over many years before they can attempt to recreate the algorithms. The LCC accuracy results have been replicated twice since 2010. The later time in a published paper cited below.

Stallard and a group of prominent medical school clinicians published papers in 2014 and 2017, in which they used the same algorithmic model to accurately predict morbidity and mortality in seniors suspected to have Alzheimer's disease<sup>vii</sup>. Commercially, the model is being used to identify and arbitrage candidates for life settlements of insurance policies, and to identify candidates for private reverse mortgage-type home equity sharing contracts and do longevity-dependent asset management. As important as the identification and pricing for individual candidates is, it is even more useful in fair valuing portfolios of longevity-dependent assets. Previously the model was used on the Social Security Administrations web site to price end of life cost of care. It has also been used to price sophisticated estate planning trusts by the AICPA and the American Bar Association.

## 5 LONGEVITY COST CALCULATOR (LCC) BRINGS STRONG VALUE ADD TO MEASURING FUTURE CASH FLOWS

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Consistently applying the Bayesian Inference valuation methodology published by Graham, Stallard and Mazonas allows, after approximately 100 maturities, the predicting of future portfolio cash flows with statistical confidence. This high level of predictable confidence attained using the LCC longevity assessment permits the valuation team to use a much lower risk premium factor in the discount rate used to NPV the future portfolio cash flows. This lower risk premium, say 5% or 6%, added to a 2.5% risk-free cost of capital, yields an NPV that accretes value to both the balance sheet asset and the corresponding addition of income to the book balance sheet. This is on a basis where a discount rate of approximately 12% produces a valuation at cost with no accreted or diminished value.

Without this predictability, auditors have been known to apply a 16% risk premium on top of a 2% risk free cost of capital. This yields a significant decrease in asset valuation and large reductions to book income and earnings per share value. This decrease in valuation is only earned back over time, not time that issuers of audited financial statements will tolerate.

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<sup>i</sup> <https://www.gpo.gov/fdsys/pkg/PLAW-110publ343/html/PLAW-110publ343.htm>

<sup>ii</sup> <https://www.gao.gov/assets/690/688285.pdf> , page 8

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iii <https://www.gao.gov/assets/690/688285.pdf>

iv <http://link.springer.com/article/10.1057/gpp.2011.25> *Longevity Risk in Fair Valuing Level-Three Assets in Securitized Portfolios*, Peter Macrae Mazonas, Patrick John Eric Stallard, Lynford Graham, the Geneva Papers (2011) 36, 516-543. Doi: 10.1057 / gpp 2011.25. <http://www.palgrave-journals.com/gpp/journal/v36/n4/abs/gpp201125a.html> Copies available upon request

v [https://en.wikipedia.org/wiki/Bayesian\\_inference](https://en.wikipedia.org/wiki/Bayesian_inference) For readers not familiar with Thomas Bayes' theorem from 1750s, I recommend the New York Times Article referenced below and two recent books: *The Signal and the Noise*, Nate Silver, Penguin Press, 2012; and *The Theory That Would Not Die: How Bayes' Rule Cracked the Enigma Code, Hunted Down Russian Submarines, and Emerged Triumphant from Two Centuries of Controversy*, Sharon Bertsch McGrayne, Yale University Press, 2011. Also: The Odds, Continually Updated, F. D. Flam, New York Times, September 29, 2014

[http://www.nytimes.com/2014/09/30/science/the-odds-continually-updated.html?\\_r=0](http://www.nytimes.com/2014/09/30/science/the-odds-continually-updated.html?_r=0)

vi <https://scholars.duke.edu/display/pub800091> Stallard, E., 2007. Trajectories of Morbidity, Disability, and Mortality among the U.S. Elderly Population: Evidence from the 1984-1999 NLTCs. *North American Actuarial Journal* 11(3):16-53.

<http://www.soa.org/library/journals/north-american-actuarial-journal/2007/july/naaj0703-2.pdf>

vii <https://www.ncbi.nlm.nih.gov/pubmed/24064468>

*A New Algorithm for Predicting Time to Disease Endpoints in Alzheimer's Disease Patients*, Qolamreza R. Razlighi, Eric Stallard, Jason Brandt, Deborah Blacker, Marilyn Albert, Nikolas Scarmeas, Bruce Kinoshian, Anatoliy I. Yashin and Yaakov Stern, *Journal of Alzheimer's Disease* 38 (2014) 661-668 DOI 10.3233/JAD-131142 IOS Press.

*Personalized predictive modeling for patients with Alzheimer's disease using an extension of Sullivan's life table model*, E. Stallard, B Kinoshian and Y Stern, *Alzheimer's Research & Therapy* (2017) 9:75.

Copies of all papers upon request.