September 8, 2014

The Federal Housing Finance Agency
Constitution Center
400 7th Street SW
Washington DC 20014
Attn: Mortgage Insurance Eligibility Project

RE: **Mortgage Insurer Eligibility**

Ladies and Gentlemen:

Thank you for the opportunity to respond to the FHFA request for information regarding Mortgage Insurer Eligibility. Andrew Davidson & Co., Inc. was established in 1992 and is a leading provider of analytical tools to the mortgage industry. These tools include models of borrower prepayment, default and loss, home-price and interest-rate simulation models as well as models of loan and securities risk. In June 2014, Oxford University Press published a book entitled, *Mortgage Valuation Models, Embedded Options, Risk and Uncertainty* by Andrew Davidson and our Director of Financial Engineering, Alexander Levin. This response to the RFI reflects the approach to risk-based capital in that book. Furthermore, we have submitted a response to the g-fee proposal RFI as well; we recommend that the same conceptual framework for risk-based capital be used for both purposes.

Capital Assessment for an MI Company

The Davidson-Levin approach seeks a concurrent solution for two generally unknown variables: insurance premium (or g-fee) and capital. This analysis utilized two conditions: a) achieving return on equity target and b) covering maximal loss using collected premium and allocated capital. For an assessment of eligibility, GSEs would not need to determine the premiums that the MI counter-party collects on its policies—they will be known at the time of assessment. Nor should FHFA be concerned with determining the target return on capital of the MI companies. Therefore, the focus would be on the adequacy of capital.

The capital requirement can be expressed as:

$$c = L_{ES}(r) - P$$

where $L_{ES}(r)$ is the "expected shortfall" (average lifetime loss for the MI company at a given confidence) discounted at the risk-free rate. We generally use a 95% confidence level for expected shortfall which would make the expected shortfall the average of losses over the worst 5% of scenarios.

Periodic premium rate p is related to P as $p = P/IOM(r)$, where $IOM(r)$ is the "Interest Only Multiplier" computed by discounting the IO cash flows at the risk-free rate.

The primary difference between the g-fee business and the MI business in terms of the above formula is that when losses are calculated for the MI policy (e.g. 90 LTV down to 70), a *truncated loss distribution* is used whereas, on a fully guaranteed loan, they are calculated for the full *untruncated* distribution of loan losses. Approaching the MI business with the same conceptual framework to evaluate capital and return as the g-fee business is essential for both intellectual coherence and the prevention of regulatory arbitrage.

In both cases, it is important to recognize that premium payments (whether MI or g-fee) offset capital requirements.

Selecting the Severely Adverse CCAR Scenario for Capital Determination

One important ingredient of the capital formula is expected shortfall. FHFA proposes to use the Severely Adverse CCAR scenario as the stress's borderline, for consistency with other Fed tests.

What is the probability that the Severely Adverse scenario would occur? Is it at the 95% confidence level? It would be difficult to answer this question using a purely empirical analysis. One reason is that the Fed's scenarios are *conditional* upon some starting point (November 1 of each year). Another reason is a myriad of economic factors (interest rates, home prices, unemployment) that are unlikely to ever be observed concurrently. However, this question can be addressed using Oldrich Vasicek's approach to default analysis that we have adapted to mortgage analysis. Within the Vasicek theory of defaults of loans, probability is assigned based on default rates, not on the factors that cause them. Thus, if we know the median default rate and the correlation parameter, we can assess the probabilities of exceeding any default-rate threshold. To facilitate this idea, we developed a "3-group" Vasicek model that excludes ever-defaulting and never-defaulting populations and thereby limits the standard Vasicek's CDF to the middle group. This approach is more accurate for actual loan cohorts found in non-agency MBS; we apply it even for single loans probabilistically viewing them as "infinite pools". Of course, it is still difficult to estimate the correlation parameter, but that problem is more tractable than the joint probability of many econometric variables.

AD&Co applies this framework to assign probability of certain defaults and losses using a grid of its own 20 credit scenarios, ranging from optimistic (0, 1, …) to pessimistic (…18, 19). The base-case scenario 7 delivers the median default rate, a key model's parameter whereas the minimum and the maximum rates define the "Vasicek group". From this information, we can estimate the probability of the default rate caused by any external, user-defined scenario. For example, Levin [2013] shows that the CCAR Base case scenario would fall not far from the AD&Co's base-case scenario 7, whereas the CCAR Severely Adverse scenario is slightly better or worse than AD&Co's scenario 17; the chance of getting worse losses were *less than 1%.* Based on this assessment, FHFA's selection of the CCAR Severely Adverse scenario for the purpose of capital determination is adequate, if not excessive. However, each year this must be reevaluated as the market conditions and scenarios change.

Overall, we believe that the benefits of having a scenario-grid-based approach vs. a single scenario approach are (1) that it makes it easier to assign probabilities within a loss distribution relative to assigning probabilities to the joint realization of house prices, interest rates, unemployment and currency exchange rates (2) model risk can be included in the grid approach and (3) there is more than one stress scenario (single-stress scenarios can hide risks that are brought to light by other stress scenarios).

Grid Results Using the AD&Co Standard Scenario Method

Using AD&Co models, we populate the FICO/LTV grid with key metric: $L_{ES}\ (r)$—expected shortfall (given confidence), discounted at a risk-free rate. In order to derive it, we use the 20 credit scenarios, and each scenario is probability weighted using the 3-group Vasicek methodology described above. We used the G2 loans in the CAS 2014-C02 transaction as an example; these results are illustrative only. The risk pattern is evident as FICOs decline and LTVs increase. Also, the MI coverage ranged from 12% to 35% depending on LTV and averaged 25.38% for the pool.

The two tables below contains the $L_{ES}\ (r)$ term presented relative to insurance coverage ("Risk in Force"). Table 1 is for scenario 17 that, as we mentioned, is close to the CCAR Severely Adverse scenario. The Table 2 is the average of 5% worst scenarios thereby delivering the 95% confidence.

Table 1. Expected MI Loss for CCAR Severely Adverse Scenario (Scenario 17 of AD&Co's Set)

MI Loss Scenario 17						
	FICO					
Original LTV	<=620	621 - 680	681 - 740	741 - 780	781 - 850	Grand Total
<=85	13.6%	5.6%	3.1%	1.6%	0.9%	1.9%
85<=90	17.0%	10.4%	6.0%	3.2%	2.0%	3.8%
90<=95	19.6%	13.6%	8.0%	4.4%	2.7%	5.4%
95<=100		13.5%	8.7%	4.9%	3.0%	5.9%
Grand Total	**18.9%**	**12.0%**	**7.1%**	**3.8%**	**2.3%**	**4.6%**

Table 2. Expected MI Loss for Worst 5% Scenarios of AD&Co's Set

MI Loss (Worst 5%)						
	FICO					
Original LTV	<=620	621 - 680	681 - 740	741 - 780	781 - 850	Grand Total
<=85	10.3%	4.2%	2.4%	1.2%	0.7%	1.5%
85<=90	13.0%	7.9%	4.5%	2.4%	1.5%	2.9%
90<=95	15.3%	10.5%	6.2%	3.4%	2.1%	4.2%
95<=100		10.4%	6.8%	3.8%	2.4%	4.6%
Grand Total	**14.7%**	**9.2%**	**5.5%**	**3.0%**	**1.8%**	**3.6%**

The MI losses shown in Tables 1 and 2 have to be offset by capital and premium ($c + P$). One can estimate what it would take to cover the losses solely by MI premium. Using an illustrative IO Multiple of 5.0 (the actual level will have to depend on loan's characteristics and has to account for the traditional

MI cutoff at 78% of scheduled LTV), we can convert the numbers in the tables above into an annual insurance premium. For example, dividing 0.7% in the top-right cell of Table 2 by the IO Multiple (5) and multiplying by the MI coverage (e.g. 12% in this case), we get less than 2 basis points. This is the premium that covers the worst 5% losses by itself, for a 781-850 FICO, under-85%-loan insurance. On the other hand, the fully-RIF-covering premium may easily exceed 100 basis points for low-FICO, high-LTV loans.

To the extent the actual premium available to cover losses is lower, the tables let us assess the required MI capital using any practical assumption for the premium rate. If the premium is 50 basis points, the MI capital will have to be set to the number from the table reduced by 2.5% scaled to the coverage, and so on.

While we can compare the thus compiled grid against the grid published by FHFA or against any other model, it is important to point out that mortgage loan and MI losses are influenced by a number of factors: the historical realization of house prices (and therefore the CLTV), geography, documentation, loan purpose (investor/second home vs. owner-occupied), etc. It can create considerable complications to incorporate grids and multipliers, taking all of these into account in a reasonable way. This could be done by applying the FHFA models to total MI positions on a regular basis, or by having the MIs run their internal models on a regular basis and having the FHFA review the models, or by having some other entity do so. *Therefore, overall, we favor the use of models over pre-determined grids.*

In summary, our main points are: (1) premium income offsets capital requirements, (2) a scenario grid approach has advantages over a single stress scenario approach, and (3) using models is better than having simple grids to assign capital, especially over time as CLTV deviates from OLTV.

References

A. Davidson and A. Levin, *Mortgage Valuation Models: Embedded Options, Risk and Uncertainty*, Oxford University Press, 2014.

A. Levin, Scenarios: CCAR 2014 versus the AD&Co Standard, *AD&Co's Pipeline*, Issue 120, December 2013 (https://www.ad-co.com/pubs_pipeline_article/372).

Answers to Specific Questions

Questions 2-4 are answered together.

2. Should the adequacy of each Approved Insurer's risk-adjusted rates of return be measured? If so, what would be the appropriate calculation method for this measure?

3. If the Enterprises, in the interest of establishing strong counterparty financial requirements, expect an Approved Insurer to maintain "adequate" risk-adjusted rates of return for New Insurance Written (NIW), what might be benchmarks for the Enterprises to establish a reasonable range of such expected returns? Should the benchmark also be inclusive of the Approved Insurer's entire portfolio of Insurance in Force (IIF), or only a defined portion?

4. What counterparty risks might be raised by an Approved Insurer maintaining inadequate risk-adjusted rates of return on capital across its expected business profile?

> In general, we believe that the risk-based capital level of MIs is the relevant quantity to supervise. The returns the MIs are earning on that capital is a matter for the MI shareholders and boards to specify. Some MIs may choose to focus on less risky, lower expected return sectors while others focus on somewhat higher risk segments with greater return volatility.
>
> FHFA may wish to track ROE levels to assess the viability of the MI industry and to evaluate market levels for GSE g-fees, but not to set eligibility requirements for proving MI.

16. What comments or suggestions are there related to the grid framework for performing loans in calculating the Financial Requirements?

> We believe that the grid approach combined with the CCAR Severely Adverse Scenario is an adequate start but leaves a lot to be desired.
>
> It is appropriate to compare the grid proposal with the methods required by the Fed and Basel. The Fed annually provides explicit scenarios to the banks, which conduct their asset/liability analysis and provide the results of this analysis to the Fed. The Fed then accepts or rejects the analysis, and it can place restrictions on capital allocations for dividends, stock buy-backs, etc., based on their assessment of capital adequacy. Basel adopts an approach whereby either the regulators or the institutions do the analysis, which is then used to evaluate capital adequacy, planning, and related actions. The use of models is central to both analyses.

17. What comments or suggestions are there related to including LTV and credit score as the primary factors in the grid framework for performing loans?

We would recommend incorporating geography into the analysis. Borrower default is an option driven by home-price volatility. Housing price volatility varies widely across the nation. CA is significantly greater than TX for example. Other factors such as documentation, source of credit scores, source of down payment as well as other underwriting input can all have significant impact on losses.

In general, it will be possible to take on excess risk versus any simple pre-specified capital requirement that uses a two-dimensional grid.

19. What comments or suggestions are there related to the treatment of non-performing loans in calculating the Financial Requirements?

A grid is not applicable for non-performing loans. There is less uncertainly with respect to loss. In effect, it is a severity issue. Tail risk is less relevant.

20. Is the segregation of books of business by vintages appropriate?

Although a unified methodology is called for, multiple grids by vintage is appropriate. The objective is consistency through the analytical process. The degree of granularity can be determined by the FHFA. Even more important than vintage over time would be CLTV evolution. This point highlights the shortcomings of grids vs. using models.

23. What comments or suggestions are there related to the use of multipliers for certain loans with certain risk features?

Simple multipliers may provide an overall risk assessment, but it is more useful to move to a full modeled approach as the interaction of variables may not be properly captured by multipliers. This is especially true given the non-linear aspects of credit losses.

24-25. How should compensating factors be incorporated? What are the merits or drawbacks of using several DTI risk multipliers?

Compensating factors can be incorporated into modeling, where the compensating factors are quantitative and verifiable. DTI risk multipliers may also be useful, but they require very strict definitions of DTI and should generally be used only to increase loss estimates for high front-end and back-end DTI levels.

Questions 26-28 are answered together.

26. What comments or suggestions are there related to using the house price, interest rate and unemployment rate projections from the CCAR Baseline scenario for calculating the grids for Pre-2009 and delinquent policies?

27. What comments or suggestions are there related to using the house price, interest rate and unemployment rate projections from the CCAR Severely Adverse scenario for calculating the grids for non-HARP Post-2008 policies?

28. What comments or suggestions are there related to using the house price, interest rate and unemployment rate projections from the CCAR Baseline scenario for calculating the grid values for loans refinanced through HARP?

We view these methodological variations as internally inconsistent.

From the Overview: "For most policies written before 2009, the draft PMIERs use the CCAR Baseline scenario because the associated loans have already been subjected to significant economic stress." While the use of the CCAR Severely Stressed scenario may not call for as much additional capital because the probability of loss is already high, it is better to let the analytical process make that determination. We do not know what FHFA gains by using different economic scenarios for different asset classes. Also, HARP-originated loans are not riskless or certain in their credit outcome. As HARP refinancing can only be used once, these high-LTV borrowers are at a higher risk going forward—even if they demonstrated payment history when qualified. For initial requirements, we recommend using the same scenarios for all loan types.

35. Should an alternative approach to determining Minimum Required Assets be considered in the future? If so, please describe the approach.

As noted in #16, we recommend using a credit-scenario grid. Our grid contains 20 progressively deteriorating scenarios that include both economic stresses (interest rates, home prices) and model stresses (scales of voluntary prepayments, defaults and loss's severity). FHFA could adopt a simplified version of this approach that uses a handful of scenarios that focus on identifying conditions that create stressed losses and then applying probabilities to those scenarios. Such an approach reduces the chance that the chosen stress scenario does not expose the risks of the portfolio, including model risk.

We also believe that mortgage performance models should be benchmarked against actual experience at least annually to determine if the actual performance of loans differs significantly from the model. In this regard, it is useful to look at the model forecasts of delinquency vs. actual delinquencies as it may be too late to make adjustments when actual losses exceed model losses.

Again, we appreciate the opportunity to respond to the FHFA request for information. Please feel free to contact us with any questions.

Sincerely,

Andrew Davidson
President

Andrew Davidson & Co., Inc. 65 Bleecker Street, Fifth Floor New York, NY 10012 Tel 212.274.9075 Fax 212.274.0545 www.ad-co.com