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## **Appendix to the Decision and Order on Massachusetts Property Insurance Underwriting Association Rate Filings R2007-02**

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We disapproved the MPIUA's 2007 filings because the MPIUA failed to meet its burden to demonstrate that its proposed rates would fall within a range of reasonableness. Our *Decision on the 2007 Rate Filing* addresses the issues that are germane to that finding. The parties raised additional issues which our *Decision* did not address because they were not relevant to our finding, although they are relevant to the review of MPIUA rate filings, in general. To address some of our concerns, we are issuing this Appendix to the *Decision on the 2007 Filing* to guide the parties in future filings. This Appendix is not an exhaustive discussion of each controverted aspect of the MPIUA's 2007 filings, and the omission of a topic does not imply either acceptance or disapproval of the methodologies recommended by the parties.<sup>1</sup> Our analyses and conclusions apply to the MPIUA's filings for all coverages that it offers.<sup>2</sup>

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<sup>1</sup> For example, the MPIUA this year adopted suggestions made by the State Rating Bureau in its advisory filing in the *Decision on the 2005 Filing*. No party objected to these methodological changes.

<sup>2</sup> The parties' arguments in this proceeding focused on the MPIUA's proposed rates for homeowners' policy form HO-3, the bulk of the MPIUA's business. (The MPIUA filing also offers homeowner's coverage for owners of condominium units (HO-6) and tenants (HO-4)). The MPIUA's ratemaking approach and methodologies are, however, consistent throughout the filings, and the controverted issues are common to all. We therefore consider issues couched in the context of rates for the HO-3 policies as applicable equally to all the MPIUA 2007 rate filings.

The MPIUA argues that the Commissioner should approve its 2007 filings because they are consistent with its 2005 filings which, ultimately, were approved by the Commissioner. The MPIUA's reliance on the *Decision on the 2005 Filing* as precedent for approving the 2007 Filings is misplaced. It misstates the conclusions in that decision, imputes broad meaning to tailored language, and disregards cautionary statements about the use of models. This proceeding raises issues about reinsurance and the mathematical models used to estimate potential hurricane losses in Massachusetts that were not addressed in the 2005 proceeding or the *Decision on the 2005 Filing*.<sup>3</sup>

The MPIUA's burden of proof is to demonstrate by a preponderance of the evidence that its proposed rates satisfy the statutory requirements that they are neither excessive nor inadequate and that they fall within a range of reasonableness. The MPIUA argues that its current rates are inadequate because they are lower than those in the voluntary market, in part because the MPIUA chose not to implement the "indicated" rates in its 2005 filing. It intends through these filings, to bring its rates to, or close to, a level that exceeds those of voluntary insurers.

Neither Massachusetts law nor the concept of actuarial soundness requires residual market rates to be higher or lower than rates in the voluntary market. The MPIUA's exhibit of rates charged by companies that write homeowners' coverage in Massachusetts shows that rates that actuaries develop for the voluntary market vary widely. Because ratemaking allows actuaries to exercise judgment, it is not surprising that their analyses of ratemaking data produce different results.<sup>4</sup> The MPIUA's rate filings, like those of companies writing in the voluntary market, should reflect its actual experience. If some rate components, such as the MPIUA's expense ratio, are lower than those in the voluntary market, it is not unreasonable to expect that its rates also may be lower.

The MPIUA states that a second goal is to minimize the risk of assessment on member companies. If this goal is achieved, the MPIUA asserts that voluntary market insurers will no longer include in their voluntary rates a factor to cover such assessments. The testimony does not support the premise that voluntary rates now include such a

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<sup>3</sup> For example, as Mr. Brannon, a witness for the State Rating Bureau observed, although the results for the HO-3 policy form in the 2007 filing are comparable to those in the 2005 filing, unexplained differences exist in the model output relating to dwelling forms and forms HO-4 and HO-6.

<sup>4</sup> Ms. Gotham testified that actuaries do not always agree on the methodologies for setting rates or trending.

factor.<sup>5</sup> It is not the MPIUA's task to regulate the voluntary market. The MPIUA's goal is neither consistent with the reality of the marketplace nor reflective of the goals of the residual market for property insurance. An increase in FAIR Plan rates to reduce the likelihood of assessments on members for residual market losses is inconsistent with the legislative purpose to make basic property insurance available at a reasonable cost to eligible applicants in large share territories. FAIR Plans were legislatively created because insurers chose not to cover risks voluntarily in urban areas, even though the risks met reasonable underwriting standards, because the insurers feared losses resulting from social upheavals. FAIR Plan deficits would pass through to FAIR Plan member companies through assessments, thereby ensuring that insurers who declined to write directly in certain territories did not avoid all responsibility for ensuring the availability of property insurance in such territories.

Voluntary market insurers wrote a majority of properties located in coastal areas for many years. Their recent reluctance to continue to do so arises from the perception that such areas are vulnerable to substantial losses from hurricanes. Withdrawal from these areas is unfair to consumers whose properties continue to meet reasonable underwriting standards. Public policy supports the principle that insurers who choose not to write risks that meet reasonable underwriting standards because of potential losses from unavoidable natural disasters should not be entirely immunized from the responsibility of sharing some of the losses resulting from those events.

**Reinsurance Issues.** The SRB and the Attorney General do not object to the MPIUA's decision to purchase reinsurance or the inclusion in the rates of an appropriate value for the net cost of that reinsurance. Both oppose the net cost that the MPIUA included in its rate calculation, contending that the MPIUA's methodology produces a value that results in excessive rates.

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<sup>5</sup> Mr. Golembeski testified that companies would have a right to cover such potential costs in their rates, but that companies choose whether to include voluntary market assessments in their rate calculations. He stated that he knew that some companies do and some do not. He stated also that some members include FAIR Plan exposure in their reinsurance programs, but was not sure that the inclusion of FAIR Plan exposure affected the cost of their reinsurance. Mr. Leimkuhler, an insurance consultant who testified for the MPIUA, did not know if reinsurers charged voluntary insurers additional premium for reinsuring potential MPIUA assessments in addition to the insurers' direct losses. He did not believe that reinsurers were charging both the FAIR Plan and its members for reinsurance covering the same FAIR Plan losses.

Mr. Ericksen, a witness for the MPIUA, developed a net cost ratio for the MPIUA's 2006-2007 reinsurance program, which was in effect at the time of the filings, and applied the same formula to its \$80 million budget item for purchase of the 2007-2008 program; he estimated that the net cost ratio would be 88.2 percent of premium. The MPIUA's insurance consultant, Mr. Leimkuhler, defined the net cost of reinsurance as the difference between the premiums and the expected losses that would be recovered as claim payments under that contract. The MPIUA valued the expected losses as the average annual hurricane losses, as estimated by Guy Carpenter, its reinsurance broker, rather than in terms of the potential claim payments it would be entitled to receive under the reinsurance contract.

The SRB argues that the MPIUA incorrectly focused on the modeled average annual loss recovery, a "fictitious number," rather than on its potential actual recoveries under the reinsurance contracts. It asserts that the modeled average annual losses are already included in the rates, as the hurricane loss component. The correct foci, the SRB argues, are the reinsurers' expected loss payments to the MPIUA and the reinsurers' profits and expenses. Because the MPIUA receives a benefit from transferring some of its risk of loss to reinsurers, the expected loss payments represent a return of that benefit and should not be passed on to policyholders. The appropriate reinsurance net cost in the rates, the SRB contends, is the transaction costs, expressed as what the MPIUA's reinsurers require to cover expenses and earn a profit.

The SRB estimates a value for profits and expenses by analyzing the financial results published by the Reinsurance Association of America ("RAA"), and concludes that approximately 37 percent of a reinsurer's net earned premium represents its profits and expenses. The SRB, as an alternative, subtracts from the MPIUA's reinsurance premium the estimated recovery it would receive should a hurricane occur, using the RMS value for that recovery. This approach generates a net cost of 36.9 percent of the reinsurance premium. The Attorney General argues that because the MPIUA did not quantify the portion of its reinsurance premium that represents the reinsurers' profit and expense, it failed to meet its burden to show that the reinsurance component of its rates is reasonable.

That the SRB and the Attorney General do not contest the MPIUA's purchase of reinsurance or the structure of its reinsurance program does not establish that the MPIUA

has a perennial need for the same program structure or for coverage at any particular level. Annual examination of its reinsurance programs in light of its current circumstances and those of the market as a whole, including issues of availability and price and an analysis of reinsurance in the voluntary market, will enable the MPIUA to make decisions based on current information.<sup>6</sup> A methodology that estimates the value for the reinsurance rate component as the portion of the net earned premium that represents the reinsurers' profits and expenses is a reasonable approach. The MPIUA's witnesses were unable to explain how the reinsurers price their coverage or to estimate a value for their profits and expenses.<sup>7</sup> The FAIR Plan did not demonstrate that the reinsurance component in its rates is reasonable.<sup>8</sup>

**Hurricane Models.** The *Decision on the 2005 Filing* stated that statistical models may be used to estimate potential losses from low frequency catastrophic events, such as hurricanes, rather than estimate such losses solely from limited historical data. It also found that it is not *per se* unreasonable to utilize multiple models to develop rates. The *Decision on the 2005 Filing* concluded that it was reasonable for the MPIUA to rely on both the AIR and RMS models because they are widely accepted throughout the insurance industry, even though the record included limited information on them. It reached no conclusions on the merits of either model, and did not approve indicated rates that the MPIUA developed utilizing the models' output.<sup>9</sup>

The *Decision on the 2005 Filing* did not relieve the MPIUA of its task of ensuring that the models used to develop the hurricane loss component of its 2007 rate filings are appropriately calibrated to Massachusetts conditions and are consistent with the record of

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<sup>6</sup> Among the issues the MPIUA might want to review is whether it is reasonable to purchase 100 percent reinsurance at the highest layers.

<sup>7</sup> Mr. Leimkuhler did not know how the National Indemnity Company calculated the price for the MPIUA's reinsurance or the separate components of the premium (losses that it would expect to pay, profit, or expenses). He commented that reinsurers consider pricing information to be proprietary, but agreed that a company has a right to know how its reinsurance is priced. Mr. Wackerman commented that reinsurers partially price their product based on the length of time they have had a relationship with the purchaser.

<sup>8</sup> The MPIUA also needs to examine whether the model used to estimate the potential returns to the MPIUA for reinsurance purposes is consistent with that used to estimate the average annual losses included in the rates. Mr. Wackerman testified that Guy Carpenter used a different RMS model that looked at short-term losses.

<sup>9</sup> The *Decision on the 2005 Filing* did not approve the MPIUA's proposed rates either, but indicated that the Commissioner would approve those rates if the filing were amended to resolve concerns expressed in that decision. The MPIUA amended its filings to satisfy these concerns and the amended proposed rates were approved.

storms that have affected Massachusetts. The MPIUA engaged three modelers in this proceeding, RMS, AIR and EQECAT, to estimate potential hurricane losses. It averaged the results of the RMS and the AIR models to develop its rates, adopting its approach from 2005. The MPIUA declined to incorporate the EQECAT model into its calculations.<sup>10</sup> It did not consider alternative approaches to a straight average of the model outputs.<sup>11</sup> It also conducted no analysis to explain the differences among the model results or to determine which most accurately represented potential hurricane losses in Massachusetts.<sup>12</sup>

The RMS and AIR models share the same underlying structure.<sup>13</sup> They first develop estimates of hurricane frequency and intensity, then measure the vulnerability of structures in a geographical area to wind damage, and finally consider the economic effects of a hurricane on an insurer's book of business. The MPIUA's task is to demonstrate that the model outputs: 1) reflect only hurricanes that make landfall in Massachusetts or pass by so closely that hurricane winds damage insured property in Massachusetts; 2) consider the vulnerability to wind damage of insured structures in Massachusetts; and 3) develop reasonable estimates of the economic loss that a hurricane would cause the MPIUA.<sup>14</sup> Because each modeler develops its own methodologies and formulas for measuring these functions, model outputs differ. Martin Simons, an actuary appearing as a witness for the MPIUA, testified that the range of model outputs is greater when hurricane events are infrequent, because less data is available. The expectation of differences among modeled results does not release the MPIUA from demonstrating that

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<sup>10</sup> The EQECAT model produced output that was between AIR and RMS, but closer to RMS than AIR. The MPIUA commented that averaging the output of the three models would have produced a higher hurricane loss estimate.

<sup>11</sup> For example, Mr. Simons testified that the Florida Hurricane Catastrophe Fund looks at four models and averages 10 percent of the highest and lowest values and 40 percent of each of the two middles.

<sup>12</sup> Mr. Golembeski testified that the MPIUA, because of questions about the RMS model, engaged EQECAT early in 2006 for the purpose of evaluating whether the RMS and AIR results were high or low, and as an alternative if the Commissioner rejected the use of the RMS model. It ultimately did not perform this analysis, and chose not to use the results of a model that is less widely used in New England.

<sup>13</sup> The record contains no information on the specific components of the EQECAT model.

<sup>14</sup> G.L. c. 175C, §5 (c) both incorporates a capping mechanism on MPIUA rates in large share territories and instructs the Commissioner, in reviewing the MPIUA rate filings, to consider the MPIUA's cost of reinsurance and its predicted hurricane losses. The *Decision on the 2005 Filing* concluded that any rate increases in excess of the cap must be based on those two factors. The MPIUA must show that the models on which it bases its proposed rates reflect wind damages to property in Massachusetts caused by hurricanes rather than wind damages from storms that no longer are hurricanes when they enter or pass by Massachusetts.

each model it uses is consistent with historical events and reasonably reflects current conditions relating to Massachusetts and that the model's output is a reasonable estimate of the potential effect of hurricanes on the MPIUA's book of business.<sup>15</sup>

The MPIUA argues that the AIR and RMS models are appropriate for use in Massachusetts because both have been extensively reviewed and approved by the Florida Commission on Hurricane Loss Methodology ("Florida Commission") for use in developing insurance rates in Florida and, that its work is relied on, at least in part, by other states and other organizations. Mr. Simons testified that parts of the modeling process are applicable in all geographic areas.<sup>16</sup> He stated that an analysis of hurricanes relative to Massachusetts cannot be performed without using Florida data.<sup>17</sup>

No party criticizes the work of the Florida Commission or the standards it sets for modelers. Those standards, however, require the model components, including frequency and intensity distributions, to be consistent with historical data for Florida. The Florida Commission does not review data associated with Massachusetts. The MPIUA's task is to demonstrate that the models that the Florida Commission approves for use in Florida are appropriate for use in estimating hurricanes and hurricane damages *in Massachusetts*.<sup>18</sup> Acceptance of the models by the Florida Commission does not mean, moreover, that rate regulators in that state allow insurers to include the model output in their rate filings automatically. Mr. Schwartz clarified that the Florida Office of Insurance Regulation independently evaluates the models in the course of reviewing rates, including requiring insurers to answer a series of questions. The MPIUA must present evidence that its filings do not simply adopt the model outputs but that the outputs have been evaluated to

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<sup>15</sup> The Attorney General focuses her criticism on the RMS model. Her witness, Alan I. Schwartz, FCAS, MAAA, utilized the results produced by the AIR model to make his rate calculations, but testified that he had done no technical analysis of that model.

<sup>16</sup> Mark Brannon, an actuary who testified for the SRB, was also a member of the Professional Team for the Florida Commission. He confirmed that the role of the Commission is to look at the way modelers produce results and verify that their methodology is scientifically reasonable and that the output is reasonable. He affirmed statements he made at the hearing on the MPIUA's 2005 rate filing that models demonstrated to be sound in Florida are not necessarily appropriate for estimating hurricane losses in other states.

<sup>17</sup> Mr. Simons testified that he considers Massachusetts to be "minimally" hurricane prone.

<sup>18</sup> The SRB notes that Massachusetts has no comparable commission, and has undertaken no review of the models similar to that done by the Florida Commission. It argues that much of the work of that commission would be duplicative. It is reasonable to expect that the principles and modeling methodologies that might be used to develop a model for Massachusetts are not completely dissimilar from those used to develop the models for Florida and that HURDAT data, collected for the entire Atlantic basin, would underlie the model. The validity would be tested, however, by comparison to Massachusetts experience.

determine that they are appropriate for ratemaking and produce rates that fall within a range of reasonableness.

Hurricane frequency is expressed in terms of the estimated annual rate of occurrence. Because hurricanes are random events, modelers use historical data to develop stochastic models that project storm tracks over long periods. The model is validated by comparing its results to historical frequencies for the period from 1900 to the present. Both modelers use as a starting point the HURDAT data base compiled and maintained by the National Hurricane Center, augmented with additional information from other sources.<sup>19</sup> RMS and AIR define “hurricane” differently; RMS looks at central pressure during the “time-history” of the event, while AIR defines a hurricane in terms of the maximum sustained 10-meter surface wind. The frequency of hurricanes is measured in terms of annual rate, by dividing the historical period, in this proceeding the years 1900-2006, by the number of occurrences. Frequency rates generated by models may differ, therefore, because the modelers do not agree on the definition of hurricanes and utilize different measures of occurrence.<sup>20</sup>

The significant question for Massachusetts ratemaking is validating the accuracy of the model at estimating the frequency of hurricanes that cause wind damage to properties in Massachusetts. Because differences in quantifying the number of storms in that record have a significant effect on the calculation of hurricane losses, it is important to analyze the methodology and rationale underlying the models and to reject parameters that either may artificially inflate or underestimate hurricane frequency. A rate filer should ensure that, for purposes of estimating hurricane losses in Massachusetts, frequency is validated by demonstrating that it correctly matches the record of storms that caused wind damage in Massachusetts at a time when they are correctly classified as hurricanes.<sup>21</sup> The MPIUA did not quantify the hurricane frequency generated by either

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<sup>19</sup> The National Hurricane Center is a part of the National Oceanic and Atmospheric Administration (“NOAA”).

<sup>20</sup> “Landfall,” generally defined as the passage of the eye of a hurricane over land, is one measure of occurrence, but may be applied in different ways. A single hurricane system that makes landfall in more than one jurisdiction may be considered a single storm or multiple storms. Mr. Simons testified that he expected the frequencies generated by the models to differ, particularly if the modelers use different measures of frequency, asserting that there is no right or wrong way to count storms.

<sup>21</sup> Both RMS and AIR look at hurricanes that make landfall along the Atlantic Coast from New Jersey through Maine. A storm that is correctly classified as a hurricane when it makes landfall in New Jersey may not remain a hurricane as it moves into other jurisdictions. Testimony in this proceeding considered, in

RMS or AIR, explain the reasons for any differences, or consider which model more accurately reflected Massachusetts experience.

The analysis of the reasonableness of hurricane loss estimates requires careful study not only of event frequency but also of the strength of those events.<sup>22</sup> The Saffir Simpson scale measures the intensity of hurricanes by wind speed ranges and assigns them to categories one through five.<sup>23</sup> Modeled estimates of intensity differ, in part, because of disparate bases for measurement, *e.g.*, wind speed or central pressure, and on the reliability of the data available for measurement. Intensity also will differ depending on the location where it is measured. Modeling the intensity of hurricanes affecting Massachusetts using a methodology used to develop a model for hurricanes affecting Florida or the Gulf of Mexico raises issues of relevance.

Dr. James O'Brien, a meteorologist testifying on behalf of the Attorney General, and Mr. Simons agreed that the hurricanes in Massachusetts differ from those in Florida because the characteristics of hurricanes change as they move into the North Atlantic.<sup>24</sup> The relatively new concept of transitioning storms has been the subject of recent meteorological research. Mr. Simons testified that he had done a partial analysis of the effect of transitioning on storms, and determined that the RMS approach was within accepted scientific literature.<sup>25</sup> Dr. O'Brien, however, compared the damage estimates produced by the RMS transitioning storm model to damage maps of damages caused by the 1938 Hurricane, and concluded that the RMS estimates were inconsistent with the historical data on the storm. The MPIUA has not shown that, for purposes of estimating

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particular, the status of Hurricane Floyd. Mr. Simons testified that the RMS plot of stochastic storm tracks did not identify the number of storms that cross Massachusetts, and that the RMS model includes in its damage function damages from storms that are no longer hurricanes when they affect Massachusetts property. He thought it would be possible to isolate damages from such storms.

<sup>22</sup> Higher wind speeds correlate with more extensive damage. Dr. O'Brien, the only meteorologist testifying in this proceeding, stated that damages generally tend to increase as a cube of wind speed. Mr. Simons testified that, all else being equal, faster moving storms produce less damage, noting that New England hurricanes in general move faster than Southern storms.

<sup>23</sup> The scale categorizes hurricanes based on maximum one minute sustained 10-meter wind speeds.

<sup>24</sup> Meteorologists use the term "transitioning" to describe these changes, which occur as storms move over colder water. The winds weaken and the windfield becomes asymmetrical. This means that transitioning storms in the Northeast generally have lower wind speeds than Southern storms of the same central pressure and a somewhat wider windfield.

<sup>25</sup> Mr. Simons concluded that both the AIR and RMS models appropriately consider extra-tropical transition in modeling MPIUA loss costs. According to Dr. O'Brien, the Florida Commission has no specific standards for modeling transitioning behavior, because such behavior is generally of little significance in Florida.

its hurricane losses, the models have been carefully calibrated to reflect the transitioning behavior of hurricanes in the Northeast and the effect of transitioning on damage estimates.

Damage estimates in the models are validated against loss data from actual events. The MPIUA's hurricane loss estimates were developed using models that project the occurrence of hurricanes at magnitudes of intensity that the historical record does not support. Incorporating into rates estimated losses from events that have virtually no likelihood of occurrence calls into question the reasonableness of the resulting rates. The frequency functions in the RMS and AIR models that the MPIUA used to estimate hurricane damages to its book of business include hurricanes in Saffir-Simpson Categories 4 and 5. A histogram of the AIR model compares historical and simulated hurricanes along the Atlantic coast from New Jersey to Maine measured by central pressure. It shows more historical than modeled Category 4 hurricanes and no Category 5 historical hurricanes. A similar document from RMS shows modeled, but no historical, storms in Categories 4 or 5.

The Florida Commission standards require that modeled loss costs "not exhibit an illogical relation to risk" or "exhibit a significant change when the underlying risk does not change significantly."<sup>26</sup> The historical record does not support the occurrence in New England of Category 5 hurricanes. Dr. O'Brien testified that, because of meteorological conditions, Category 5 hurricanes cannot occur north of Georgia, and the probability of a Category 4 storm north of South Carolina is very slight. The MPIUA argues that even though the RMS model shows no Category 4 storms in the historical record, such an event is possible and should be considered.<sup>27</sup>

Because the evidence shows no reasonable expectation of a Category 5 hurricane striking Massachusetts, it is inappropriate to factor into hurricane loss estimates damages

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<sup>26</sup> The ultimate risk underlying the MPIUA rates is the occurrence of hurricanes of particular degrees of magnitude. Ratemaking does not attempt to predict the actual occurrence of such events, but relies on estimates from a stochastic model. If the ultimate risk does not change from year to year, any significant changes to the MPIUA's economic risk will reflect only changes to its book of business.

<sup>27</sup> The MPIUA submitted into evidence several articles relating to the relatively new field of paleometeorology, which analyses soil samples taken from coastal areas as evidence of storms in prehistory. While interesting, they do not support the reasonableness of including in estimated hurricane losses damages from Category 4 hurricanes.

that might result if such a storm were ever to occur.<sup>28</sup> Given the almost equally remote potential for a Category 4 hurricane striking Massachusetts, damage estimates from such storms should either be eliminated from rate calculations or given only nominal weight. The MPIUA has not shown that it derived the estimates of potential hurricane losses in its filings from an analysis of events that, have some probability of occurrence.<sup>29</sup>

The MPIUA also must demonstrate that historical New England storm data validates its process for assigning potential hurricane losses to individual territories. This showing is necessary to justify the MPIUA's proposed rate increases in Territory 37. Evidence in the record relating to the pattern of damage caused by the 1938 New England hurricane undermines the use of a methodology that focuses hurricane loss distribution on coastal territories.<sup>30</sup> The maps comparing historical storms to samples from the stochastic sets generated by AIR and RMS that are attached to Mr. Simons's prefiled testimony confirm that hurricanes follow paths away from coastal areas. A comparison of the stochastic samples and the historical map suggests that both modelers underrepresent the number of hurricanes crossing the central part of Massachusetts.

The *Decision on the 2005 Filing* specifically expressed concerns about the RMS model's vulnerability function as it relates to Massachusetts properties.<sup>31</sup> That function is developed in part from an analysis of the construction characteristics of insured exposures and review of insurance claims for hurricane damage.<sup>32</sup> Mr. Simons testified that RMS and AIR calculate vulnerability functions differently but that he determined that both modelers were using reasonable methodologies that satisfied the standards *for Florida*.<sup>33</sup>

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<sup>28</sup> Because of the relationship between wind speed and damage, Category 4 and 5 storms can dominate loss cost projections.

<sup>29</sup> The testimony indicates that hurricane research is an active field of inquiry. The HURDAT data base itself is not static, but is being reviewed and revised as a result of additional research.

<sup>30</sup> There was considerable testimony on the damage caused by the 1938 Hurricane, and the pattern of that damage. A model of the storm using the RMS model for a transitioning storm produced damage estimates for Cape Cod that were not consistent with damage analyses that showed damages principally affecting central Massachusetts. The RMS model produced an estimate of damages from the 1938 hurricane that was four to five times the AIR estimate. Mr. Simons did not know the specific reasons for that difference.

<sup>31</sup> In the proceeding on the MPIUA's 2005 filings, both the SRB and the Attorney General questioned RMS's approach to developing the vulnerability function in its model. This year, as in the proceeding on the 2005 rate filings, the Attorney General's criticism of the models is focused on RMS.

<sup>32</sup> Mr. Simons testified that vulnerability functions are validated through analysis of newer insurance claims data, and that the 2004 and 2005 hurricane seasons have provided a great deal of new data.

<sup>33</sup> He stated that AIR uses a duration of wind speed, while RMS looks at wind gusts. He stated as well that meteorologists are discovering how those differences relate to transitioning issues. Mr. Simons did not

He stated that the modelers develop vulnerability functions based on claims data from throughout the US, and reports from engineers sent to damaged areas.<sup>34</sup> The record does not show that the vulnerability functions were based on any data specific to Massachusetts.<sup>35</sup> Mr. Simons testified that there have been no engineering studies or reviews by modeling engineers after a hurricane in New England.

Mr. Simons asked both AIR and RMS to describe the studies, data and methods used to determine that the construction characteristics in the models appropriately reflect Massachusetts construction characteristics.<sup>36</sup> RMS responded that in its hurricane model for the United States, the vulnerability curve is based on the year of construction and geographical location, building code design wind speed maps, and regional performance in past hurricanes. RMS has separate vulnerability curves for pre- and post-1995 construction in Massachusetts and, for post-1995 construction, varies vulnerability by region, with lower vulnerability for the coastal region. The RMS response is silent on the model's capacity to construct a specific vulnerability curve for Massachusetts.<sup>37</sup> The record offers no explanation for the selection of a 1995 dividing line for construction in Massachusetts, or any indication of the role historical experience in this state played in developing the vulnerability curve used to estimate hurricane losses for the MPIUA.<sup>38</sup> The MPIUA has not shown that either the RMS or AIR model has been adequately calibrated to reflect the vulnerability of structures in Massachusetts.<sup>39</sup>

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perform any calculations to determine the impact of the transitional formulas on damages or vulnerability functions.

<sup>34</sup> Mr. Simons testified that there is little claim data from Massachusetts.

<sup>35</sup> The last hurricane to affect Massachusetts occurred in 1991. The modelers had no more recent Massachusetts claims data relating to hurricane losses.

<sup>36</sup> His questions asked for specific information about the age of insured structures, building codes, building code enforcement, and quality of construction. Although the AIR and RMS responses were characterized as confidential material and redacted from the MPIUA filing, the RMS response was ultimately redesignated as non-confidential and entered into evidence.

<sup>37</sup> Noting a building as "frame" construction conveys no information about building standards, whether expressed in a code or local building practices.

<sup>38</sup> Mr. Brannon further testified that he had conducted no independent studies on whether the vulnerability curves in the models accurately reflected the data.

<sup>39</sup> Mr. Simons opined that buildings in Massachusetts did not differ greatly from those in other coastal states. His opinion was formed after driving along the southeastern coast of Massachusetts and Cape Cod. His testimony is best characterized as anecdotal; furthermore, Mr. Simons is not an engineer. Mere observations of building exteriors provide little information about the quality of the underlying structure.

### **Non-Modeled Hurricane Losses.**

**1. The Demand Surge Factor.** The MPIUA's utilization of model damage estimates that include an unquantified demand surge factor also raises a question about the reasonability of its proposed rates.<sup>40</sup> The MPIUA, in its 2005 rate filings, added a demand surge factor to its modeled losses because the hurricane models that it used did not include such a factor. The *Decision on the 2005 Filing* noted, in particular, that the RMS model, when run with the demand surge function on, produced a factor of 3.2 percent, which was considerably lower than the MPIUA's requested 10 percent estimate. The *Decision on the 2005 Filing* also commented that estimates of demand surge that relied on Florida data from Hurricane Andrew and from multiple hurricanes in the past two years were not a reliable basis on which to estimate demand surge in Massachusetts.

Both RMS and AIR included a demand surge factor in their models that the MPIUA used in the 2007 Filings. The MPIUA, however, provided no evidence quantifying the calculation of either modeler's demand surge factor or its effect on the loss estimates produced by the model, concerns that were explicitly articulated in the *Decision on the 2005 Filing*. The record raises a number of questions about the demand surge factor included in the MPIUA's proposed rates. The RMS and AIR models now incorporate approaches to demand surge that were developed for use in Florida. Mr. Simons testified that the Florida Commission adopted a demand surge standard as a result of extensive data from the 2004 and 2005 hurricane seasons in Florida and the southern United States.<sup>41</sup> Mr. Simons concluded that the demand surge functions used for the MPIUA were consistent with the process reviewed by the Florida Professional Team.

Because the foundation for the models' demand surge factors is an analysis of loss data from Florida and other Southern states during unusual hurricane seasons, it is suspect as a basis for estimating demand surge in Massachusetts. The testimony of Mr. Simons and Mr. Ericksen raises questions about specific aspects of the models' demand surge

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<sup>40</sup> Demand surge has no uniform definition. ASOP 39 defines it as relating to a "sudden, unusual temporary increase in the cost of material, services and labor." Mr. Simons testified that some of those increases are now viewed as not temporary, and that modelers look at what they view as additional costs to insurance companies after a major event.

<sup>41</sup> Mr. Simons stated that he did not believe the modelers reviewed by the Florida Commission used loss data from Hurricane Katrina because it was so unusual; much of the damage resulted from storm surges rather than wind damage.

functions and their application to Massachusetts.<sup>42</sup> AIR and RMS take somewhat different approaches to developing this factor. Mr. Ericksen testified that AIR has a single component demand surge factor, while RMS, which labels its factor “loss amplification,” reflects increased costs of materials and labor and an estimate of the time value of money when repairs are delayed.<sup>43</sup> Mr. Simons testified that RMS includes additional costs relative to increased claims activity and increased pressure after a major event to settle claims more quickly and an “extreme event type factor that’s really not applicable to Massachusetts.” Mr. Simons also testified that, because of slowdowns in construction following a hurricane, demand surge often has the most impact on insurance coverage for additional living expenses. He stated that payments for additional living expenses could be paid less frequently on a second home. Modelers do not, however, make adjustments relative to second homes.

Particularly because of the differences in the way the modelers define demand surge, the MPIUA must consider whether the demand surge factor in the model is appropriate for use in Massachusetts. It is questionable whether it is appropriate to apply in Massachusetts, where hurricanes are rare, a demand surge factor developed from data reflecting the occurrence of multiple events in a short period. The effect of demand surge on the MPIUA’s hurricane losses also should be calibrated to ensure that it does not reflect claim payments for a type of losses that the MPIUA is unlikely to incur.

**2. The Undervaluation Factor.** The MPIUA includes in its 2007 filing, as it did in 2005, a five percent factor to reflect undervaluation of its exposures. The *Decision on the 2005 Filing* approved that value. Mr. Golembeski testified in June 2007 that the MPIUA was approximately six months into a program of updating its renewal business and anticipated completing the project in approximately one a year. He stated that the five percent factor in the 2007 Filings was selected because it was allowed in the *Decision on the 2005 Filing*, and because of the number of increases to the insured value of property

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<sup>42</sup> Mr. Simons asked the modelers to describe the techniques and data used to develop estimates of demand surge that were incorporated in the loss costs produced for the MPIUA, including a description of the implicit inclusion of demand surge in the historical data used in the development, validation or verification of model results as well as any explicit inclusion of demand surge. Their responses were redacted from the MPIUA’s filing.

<sup>43</sup> Mr. Ericksen did not review the technical aspects of the demand surge components, which were provided in the form of a confidential document. He did not know how the modelers validated the results.

made as a result of the revaluation program.<sup>44</sup> The MPIUA must support the validity of this wholesale addition to modeled losses. Allowance of a five percent value in the *Decision on the 2005 Filing* does not justify automatic inclusion of the same factor in the future, particularly for residential property.<sup>45</sup> The MPIUA should provide, for each class of business, evidence of the need for a rate factor to address undervaluation of its exposures, and support for the quantification of any such factor.<sup>46</sup>

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<sup>44</sup> Mr. Golembeski testified that the revaluation was necessary because many of its policies are written on a guaranteed replacement basis. The filing does not indicate whether the MPIUA considers guaranteed replacement a standard benefit, or whether it is provided by endorsement and requires a higher premium.

<sup>45</sup> Mr. Simons's testimony observed that property undervaluation is more prevalent with commercial property than personal lines policies. The MPIUA seeks no rate increase for its commercial exposures.

<sup>46</sup> The MPIUA should address the relationship among automatic increases in the value of insured property intended to address inflation, its procedures for obtaining current information from insureds, and its program of property reevaluation.