

# Underwriting “Art vs. Science”

*by Tad Montross, President and Chief Underwriting Officer*

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Several years ago as the industry was re-underwriting its way out of the 1997-2001 soft market, I quipped that underwriting is 83% science and 17% art. Obviously, the precision of the percentages was in jest, but the relationship was and remains important. As an industry, we had been through a period of hand-wringing and rationalization that fueled the soft market, surpassing anything like it in the past 30 years – maybe ever. The technical pricing and underwriting disciplines (the science) were largely ignored. Optimistic judgments (the art) and wishful thinking had taken over. Today, underwriting judgment remains a critical part of the underwriting equation, but judgment must be exercised in the context of a disciplined analytical framework.

It is worth taking another look at the interplay between the science and the art of underwriting as competition increases, as underwriting and rating tools become more automated, and as rates and conditions soften. While calendar year results still indicate a hard market, rates have been in decline for over two years in many segments. The global airline premium which was over \$5bn in 2002 may drop below \$1.5bn in 2007, and rates in the US commercial market have been in decline for 13 quarters.

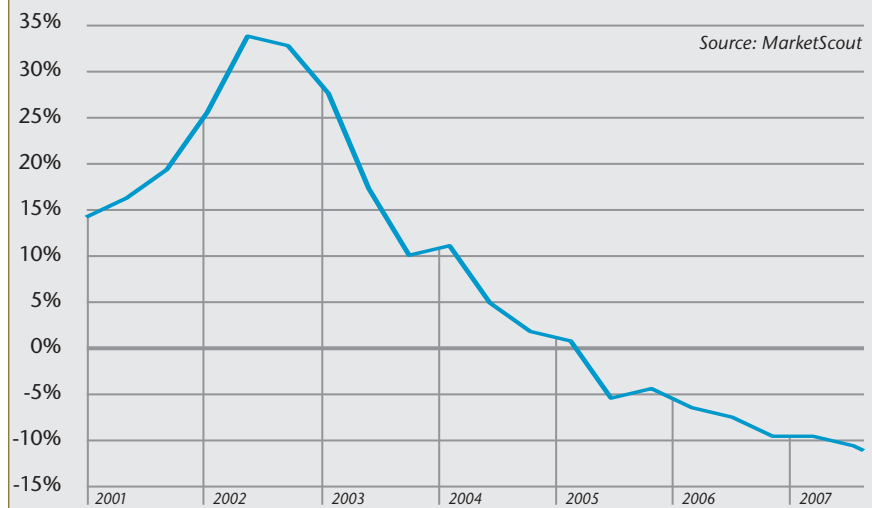
So we see that the rate reduction cycle is already here. The question is, are the rate reductions based on sound technical indications driven by exposure changes and revised frequency and severity trends, or are they driven by competitive market conditions and a desire to retain or write new business?

Also, while CEOs are preaching “underwriting discipline,” we don’t know how, or if, this soft cycle will impact the rate changes. In large part, I think the answer will hinge on the “art vs. science” question.

The long-standing conflict to achieve both premium growth and underwriting profits will once again be the major challenge. In this softening market I predict the relationship between the “art” and the “science” of underwriting, and management’s appreciation for and talent to manage it, will be a huge determinant of success or failure. Some have said that automated underwriting (the use of cat models, data mining/ predictive models) eliminates or reduces the art (the underwriter judgment), and thus turns underwriting into a pure(r) science. I suggest models do not eliminate the art in underwriting but rather move some of the art from the point of sale back earlier into the decision chain. For decades it has been said that insurance is the only business where the “clerks” – the underwriters – set the prices of the products sold at the check out counter. While automated underwriting may eliminate or reduce the number of judgments at the point of sale, the art/judgments are even more critical in the construction of the product: in the choice of model, its parameters and the assumption selection.

Some of the art component of underwriting has been shifted from the point of sale to the senior management of the firm. Senior management’s understanding of input selections and interpretation of results – their collective judgments (the “art”) – will

## Rate Increases



determine success and profitability in the future. Underwriting may still be 83% science and 17% art, but a part of the 17% is now in the hands of the senior managers, not the line underwriters – a sea change that has significant implications for accountability and incentives.

There are several emerging issues and trends that will impact the art vs. science equation. Understanding the effect each has on the relationship between the art and science elements of underwriting, and how to rebalance these elements is critical to producing good underwriting results in the future.

Here’s my list of five critical elements:

- Model dependency
- Diversification theory
- Next generation pricing tools
- Specialized products
- Fat tails

## Model Dependency

How dependent has the industry become on models? And do we really understand the model risk that we are taking? The most obvious area of model dependence is in the area of stochastic or probabilistic cat models that did not exist 20 years ago. While they have brought a huge improvement in tracking and measuring property aggregates and accumulation potential, they have also introduced a new subset of risks. (It is interesting to note, as an aside, that without cat models, cat securitization, cat bonds, and the sidecar phenomena would probably not have been possible.)

The cat models have created an almost uniform measure for natural catastrophe exposure analysis that has dramatically reduced the barriers to entry and increased supply to the market. This is a good development if the capacity is durable (long term) and the models are understood and used with care, i.e., if the limitations of the science are understood and good judgments (the art) are made.

Over-reliance on models can produce model risk which can be reduced, but not eliminated, by developing a more in-depth understanding of exactly how a model works. Is the model transparent or a black box? How sensitive is the model to changes in assumptions? Are the algorithms available? Is the data reliable and credible? Are all the variables and output alternatives adequately understood? Was the model calibrated to known events – what impact did this have? Data errors or misunderstandings are common and can dramatically alter outputs. Moreover, while models evolve, they always lag reality.

Model risk can be further managed with improved interpretation of the output. For instance, should we use occurrence or aggregate exceeding probability curves, PML (probable maximum loss) or TVAR (tail value at risk), near term or multi-decadal storm frequencies? Should we model demand surge and fire following earthquake? Does the model account for all sources of loss uncertainty, or for just a few specific causes?

### Diversification Theory

The growing focus on diversification theory and its portfolio as well as capital implications is based largely on modeled outputs and assumptions. Spread of risk is intuitively a good thing, but there is a trade-off between the benefits of diversification (territorial and/or product) and the risks of accepting exposures in unknown territories and unfamiliar product lines. Said another way, process risk can be diversified, but parameter and model risk most likely increase with diversification strategies. The ultimate objective of diversification is to “optimize” the relationship between risk and return. The model and parameter risks cannot always be easily modeled but indeed are at the very heart of every underwriter and underwriting manager’s judgments. A model’s appropriateness, the quality of data and assumptions, the parameter and process uncertainties, as well as being honest about one’s circle of competency, are all critical in judging the risks and rewards of a particular diversification strategy.

Diversification for diversification’s sake is not a panacea and can lead to uninformed and poor economic decisions. It can lead to “deworsification”. Models (the science) will almost always argue for the adoption of diversification strategies – but only sound management and underwriter judgments (the art) will guard against “deworsification”.

### Next Generation Pricing Tools

Next generation pricing tools is the 2007 catch-phrase for predictive modeling and data mining.

Data mining and multivariate models that can assess exposure differentials, and more accurately price or select better risks, were first applied to personal automobile insurance. These tools also are often referred to as pricing segmentation tools and are increasingly common for workers’ compensation and other commercial lines of business. Predictive models, based on statistical analyses across a broad data set, price the risk. This reduces or eliminates the underwriter’s ability to assess the risks through the use of credits and debits to average class rates. The use of computing power to assess greater pricing variables leads to a highly-differentiated pricing approach that takes or will take a lot of the subjectivity out of the account pricing and underwriting process.

This approach does not eliminate the “art” in underwriting but rather shifts it back earlier in the decision chain to the manager responsible for selecting the pricing tool, choosing relevant risk factors to model, assessing data credibility and setting parameters – a significant shift in responsibilities and ultimately accountability for results.

***Underwriting insurance risk in a world of constant change has never been more challenging.***

In a softening market, insurers need to be able to offer specialized products or expanded coverages. To do so successfully requires improved data collection and underwriting analysis. If data is lacking, the role of underwriting judgment will be greater. Shortly after the fact, there needs to be a feedback loop that reviews the underwriting data and decisions against the claims experience to evaluate the strength of the underwriting decisions.

### **Fat Tails**

Understanding tail risk is definitely an art. Relying on science where the shape of the loss distributions are not known, and the data is sparse, is the perfect example of becoming too model driven – too reliant on science and not recognizing that judgment must come into play. In extreme events (man-made or natural perils) presumed diversification fails and everything is correlated. Better medicine and chemistry (nanotechnology) may have long latency effects that we cannot predict today. Political risk, contract remediation and changes in tort law all have profound tail risk implications. Underwriting tails, particularly fat tails, is an art that trumps my usual 83%/17% rule. The more reliant we become on models, and the more we automate the underwriting process, the more important understanding tail risk becomes.

### **Specialized Products**

Customization to attract the better risk, or to attract a specific sub class of business, is an increasingly popular strategy as markets soften. Just as the automobile parts “after market” is booming – 20 inch rims, specialty tires, oversized exhaust systems and rear spoilers – the insurance buyer wants a product that is less generic and more tailored to his/her exposures and needs.

Product specialization and development is more than just a broadening of coverage. It too is a process that is part “art” and part “science”. The process is both qualitative and quantitative, and requires data. In many cases product changes are going to be based on coverage expansions in areas in which there is no data, or where the data is thin. The industry tends to fill in a zero when there is no data, which essentially provides the additional coverage for free. The cost or investment to capture statistics beyond ISO class data is significant and difficult absent scale – a classic chicken and egg dilemma.

## Summary

Underwriting insurance risk in a world of constant change has never been more challenging. Understanding the art vs. science elements of the underwriting equation is critical as we face the challenges of the future.

How do we strike the right balance between the art and science on each and every risk we underwrite and at the portfolio level? I believe there are five important operational issues to consider:

### 1. Culture

A culture that is based on underwriting discipline and rational economic decisions is critical. A forward-looking mindset and a willingness to experiment but done in a disciplined, analytical fashion. Recognition that judgment (the art of underwriting) is still an important part of the process but its role in the process has and will continue to change. The communication of these changes and any resultant change in responsibilities is very important.

### 2. Technical Rate

An underwriting process that is grounded on offering the “right” technical rate. Not a rate credited arbitrarily for past experience and/or subjective risk characteristics. Data mining and predictive modeling will continue to change the distribution and underwriting processes significantly, pulling the judgment away from the point of sale back to the product development portion of the process. Shifting some of the art from front line underwriters to senior management.

### 3. Feedback mechanisms

Because we sell a product whose cost we won’t know for many years and in some cases decades, it is critical that we have feedback loops to understand profitability and product performance as early as possible. Effective Rate Change, Benchmark Pricing, and Actual vs. Expected Tools are critical to identifying pricing issues and addressing them early. They become a part of an overall approach to risk management.

### 4. Enterprise Risk Management

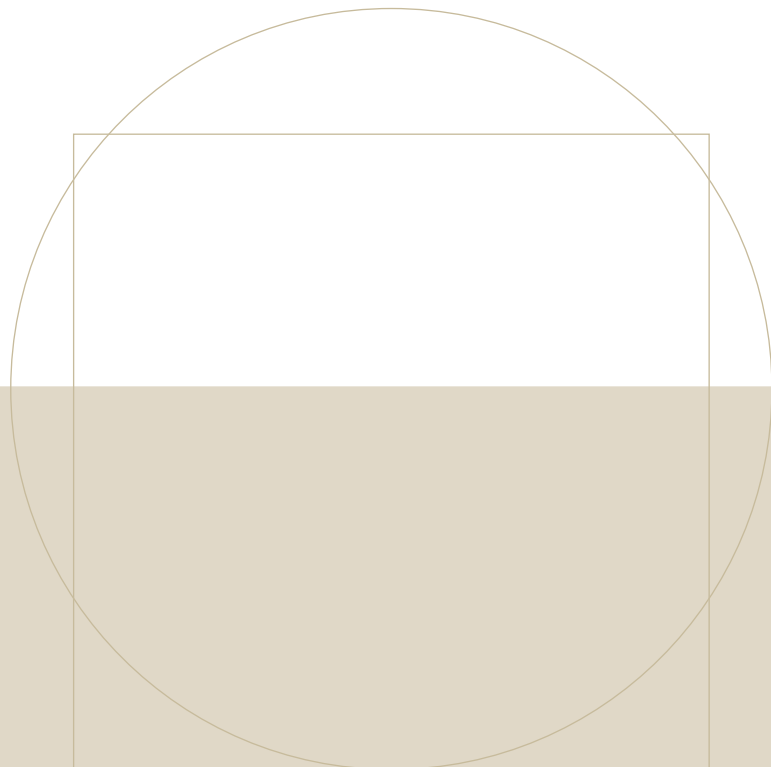
Since we are in a unique business of assuming risk instead of shedding it as most industries do, our business requires an intense management focus on exposures, risks and the management of those exposures. This is why ERM (Enterprise Risk Management) is such an important discipline for the industry. But it is a discipline that should be integrated into the organization and culture, not the subject of an annual consultancy engagement.

### 5. Incentives

Setting appropriate incentives in a “delayed gratification” business is also very important. Since results are only known with certainty after a long, sometimes very long lag, it is important that incentives are carefully aligned. History has demonstrated the pitfalls of premium or volume-based incentives. Calendar year-based incentives may not be indicative of current accident or underwriting year results.

In the last soft market, the “art” of underwriting got the property/casualty insurance industry in trouble. It would be ironic if the “science” were to blame this time. Wouldn’t it be better not to have to “re-underwrite” a book of business at the end of this soft market? Think about it: We could capitalize on the opportunities instead of fixing the problems of the past. With discipline and courage, it is possible.

In short, with a disciplined culture (the attitude), a passion for analytics and statistically relevant insights (the science), a willingness and aptitude to make good judgments (the art), and flawless execution ... it’s possible.





***The people behind the promise.***

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