The Moral Responsibility of the Analyst: The Cautionary Tale of David Li

After-Dinner Remarks by Paul Chouinard, Ph.D.

This essay is a personal view on the moral responsibility of the analyst to not only stand by the quality of his or her work but also to speak out against inappropriate uses of that work.

The cautionary tale is a real one about a real analyst, David X. Li. The following is taken from a story about Dr. Li published in Wired Magazine [1].

Dr. Li was born in China in the 1960s. His academic record is respectable:

Master's in Economics from Nankai University
M.B.A., Laval University, Quebec, Canada.
Ph.D. in Statistis, University of Waterloo, Canada.

Upon graduating he joined the Canadian Imperial Bank of Commerce. By 2000 he was working for JP Morgan Chase. He moved over to Barclay's in 2004; and, as of 2008 he headed the China International Capital Corporation in Beijing.

Dr. Li's claim to fame is a paper he wrote while at JP Morgan Chase in 2000. The paper was entitled *On default correlation: a cupola function approach.* In order to understand the importance of this paper you have to understand bond markets.

In comparison to the bond markets, equity markets are puny. All manner of debt obligations flow through bond markets. These include governmental, corporate and even pooled private debt obligations such as mortgages, credit card debt, and so forth. Pricing bonds depends upon two things, (1) the cash flow, that is any expected interest payments and the eventual repayment of principle, from each debt obligation and (2) the risk of default on the cash flow. If you can measure the risk of default, a bond can be priced. If it cannot be measured then it cannot be priced. Before Dr. Li, mortgage pools were very unpredictable due to unpredictable cash flows. In addition, one had to know the correlation of default amongst all the mortgages in a pool; and that meant collecting historical data on the correlation of defaults for similar mortgages. It was all too complex.

Enter Dr. Li's cupola function. Instead of the nearly impossible task of estimating correlations from historical data, the cupola function instead used risk as measured by the Credit Default Swap (CDS) market. The approach allowed all manner of complex risks, such as the risk of default of mortgage pools, to be modeled. It was considered a breakthrough and immediately had a big effect. The number that came out of the formula became the standard measure across the financial industry. New types of bonds, called Credit Default Obligations (CDO), were created from mortgage pools but also from all manner of debt obligations. Surprisingly, obligations, which previously could not be rated, even got AAA ratings, the highest rating possible. The financial impact was huge and the possibility of a Nobel Prize in economics for Dr. Li loomed. The size of this effect can be easily seen in the exploding CDO and the related CDS markets. In 2000 the CDO market was $275 billion, but by 2006 it was $4.7 trillion. The rise in the CDS market was even more spectacular, going

from $920 billion in 2001 to $62 trillion in 2007. The industry's words used in association with Dr. Li's formula were "beautiful," "simple," and "tractable."

However, even prior to Dr. Li's paper, there were warnings. The financial expert, Paul Wilmott, said that the correlations were unstable and that no theory should be built upon such unpredictable parameters. Dr. Li's formula made no allowance for the instability and unpredictability. The correlations were assumed to be constants, not variables. The data used were statistics from the CDS market, which was less than ten years old.

It's worth making an aside comment in the tale with respect to my own domain of analysis. In hindsight I can shake my head at the use of Dr. Li's formula and the inadequacy of the data, but, as a military operational analyst, I'd be ecstatic if I had ten years worth of data to use in a model. I can't say I've seen much analysis across the community based on more data either. So, I'm willing to bet I'm not the only one with such an attitude.

Let's return to our tale and the debate over Dr. Li's formula amongst financial risk analysts. The decision makers, those responsible for making capital allocation decisions such as bankers and fund managers, didn't understand the technical debate. Dr. Li's formula seemed to work and everyone was making a lot of money. The belief was that there was nearly no risk, but in reality there as nearly no risk only "99%"[1] of the time. In the case of the other "1%" of the time, everything blew up and you lost all your gains and more. This latter, rare case has been called a "Black Swan"[2] economic event by Nassim Nicholas Taleb.

The rest of the story is familiar to us. Mortgage default correlations, which had been nearly zero or low during the boom time of rising home prices, soared dramatically when prices peaked and even declined. Financial managers didn't know what to do as Dr. Li's formula to them was a "black box." With rising correlated defaults, CDO ratings plummeted. Managers trusted nothing, major investment banks defaulted, financial markets froze. Companies couldn't even raise short term debt to cover short term liabilities. No one understood their own CDO assets, never mind those of other financial institutions. Merchant trade threatened to come to a standstill since it was highly dependent on trust amongst financial institutions. The graph of nearly every financial indicator one started to resemble a "singularity," that is, the curves looked like everything fell off a cliff. The entire financial system was on the precipice of an abyss.

Analysts, who understood or should have understood the limitations of the model, were separated from capital allocation decisions and had no role in the use or, more correctly the abuse of their analysis. Even Dr. Li warned, "The most dangerous part is when people believe everything coming out of it" (i.e., the formula)." It's very easy to criticize Dr. Li and his fellow financial risk analysts, as well as the decision makers, but if I'm honest it's very easy to see, except for the fact that I'm not as brilliant as Dr. Li, my own self in this as well as decision makers I've advised. I've just been luckier in not having any "Black Swans" visit me.

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1 "99%" and "1%" are used metaphorically here and not as precise measures.

2 Since the time of Aristotle and Plato, the "black swan" was a philosophical reference to an improbable or impossible event. However, in the 18th century, Europeans discovered Australia and a species of black swans. Since then it has come to refer to an event, which was previously thought to be improbable, occurring.

Let's consider the advice from the statistician, Nassim Nicholas Taleb's book, *The Black Swan* [2]. Taleb calls his idea of the "Black Swan" an anti-theory. Taleb claims that "Black Swan" events occur far more often than we think and when they do they often have history changing effects. Taleb has many critics amongst his peers, but they've had difficulty proving his claim to be wrong.

In *The Black Swan*, Taleb says we live most of the time in "Mediocristan" where things are predictable and we can use statistics based on normal or Gaussian probabilities. However, every so often we move into "Extremistan", where rare events have a much higher probability of occurrence than thought. The probability of these rare events are hard to predict since they can be low, such as once in 10,000 years, and there may be only a few years of data upon which to base probability estimates.

The consequence is that all manner of folk, scientists, economists, historians, businessmen, policy makers and so forth become victims to illusions of pattern. They over-estimate the value of the partial data and underestimate unexplainable randomness. If one isn't skeptical of one's own theory, model, analysis, assessment or framework, it's very easy to fall into fallacy. These fallacies can be:

- Narrative fallacies by which a story post-hoc to an event has an identifiable but fallacious cause;
- Ludic fallacies by which unstructured real-life randomness is incorrectly assumed to resemble structured randomness in models or games; and
- Statistical regress by which one unquestioningly believes that structured probability can be delivered from a given set of data.

There is also the Triplet of Opacity, which are:

- The illusion that we can understand current events;
- The retrospective distortion of historical events; and
- The overestimation of factual information combined with an overvaluing of the intellectual elite (note: that includes us – the analysts).

Taleb says that, for phenomenon susceptible to "Black Swan" events, we need less theory and more fact collection and experimentation.

Some might believe that our moral obligation ends with the presentation of our analysis to the decision maker, since the decision is literally theirs and not ours to make. However, my personal belief is that it never ends. We not only work in a politico-, socio-economic domain, but we live in that same domain. As poltico-, socio-economic beings we belong to that domain. We have no more special right to be wrong than any other being in that shared domain. Every bit as much as anyone else we must deal with the consequences when we are wrong.

We can mitigate our risk if we remember to follow the highest standards of ethical analysis, such as:

- Being wary of our need to promote our own disciplines, professions and analysis. This need is practical since we need clients who provide funding.

Unfortunately, the need is also egotistic and can blind us to our own limitations; and

- Above all being the harshest critic of our own theory, assessment, framework or analysis. After all, who else but our own selves should be the most aware of the limitations of our work.

I'll give the last word to Taleb,

My major hobby is teasing people who take themselves and the quality of their knowledge too seriously and those who don't have the guts to sometimes say, I don't know.

REFERENCES

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2. Taleb, Nassim Nicholas, 2007. *The Black Swan: The Impact of the Highly Improbable*, Random House.