CENTRE FOR FINANCIAL MANAGEMENT®

CFM QUARTERLY IN FINANCE

JULY 2012

EDITOR: DR. PRASANNA CHANDRA

CONTENTS

SECTION A : ARTICLES AND CASES

1. MANAGING RISK IN PRIVATE INFRASTRUCTURE PROJECT

Dr. Prasanna Chandra

While all projects are risky, private infrastructure projects in developing countries seem to be characterised by a higher degree of risk. Investors perceive greater risk in these projects partly because these projects are undertaken by special purpose companies and not by established utility companies with strong balance sheets.

To ensure that such projects are financeable, the sponsors must carefully assess various risks and take appropriate risk mitigation measures. The major risks involved and the methods for managing them are described below:

Construction risk Due to unexpected developments during the construction period, there may be time and cost overruns or the completed project may have shortfall in performance parameters. Construction risk tends to be more in sectors such as transportation and power and less in sectors such as telecommunications and urban services.

Construction risk can be shifted to a certain extent to the EPC (engineering, procurement, and construction) contractor who is given turnkey responsibility with suitable penalties for delays and performance shortfall. However, since the penalties for non-performance are typically capped, the construction risk cannot be eliminated completely. The residual risk has to be borne by investors.

Operating risk The performance of the project may be below the projected level of performance. Operating risk tends to be lower when the project uses a tested technology (as in the case of a power project or a road project) and higher when the technology is changing rapidly (as in the case of a telecom project).

Operating risk can be mitigated by entrusting the operations to an experienced and competent O & M (operations and maintenance) contractor with provisions for liquidated damages and taking appropriate insurance covers.

Market risk The actual market and demand conditions may turn out to be very different from what was assumed in determining the viability of the project.

When the private producer sells to a monopoly purchaser (as in the case of an independent power producer selling to a monopoly distributor), market risk may be mitigated by entering into an agreement that guarantees a minimum level of purchase. When the private producer sells directly to individual users who have multiple options (as in the case of roads), the project sponsors may ask the government to guarantee a certain minimum payment if the traffic falls below a certain level. To ensure symmetry, such a guarantee may be balanced by sharing a portion of revenue when the traffic exceeds a certain level.

Interest rate risk The project company often borrows money at a floating interest rate. Hence, the changes in interest rate during the life of the project causes interest rate risk. This risk is particularly pronounced for infrastructure projects because of high capital intensity, long payback periods, and high levels of gearing.

Interest rate risk may be mitigated by transferring it to consumers through a tariff formula that treats interest cost as a pass-through cost. Alternatively, interest rate risk may be hedged through devices like interest rate swaps and interest rate caps and collars.

Foreign exchange risk When a project relies on foreign currency debt, unfavorable variation in the exchange rate results in a higher debt servicing burden in terms of domestic currency.

Foreign exchange risk may be managed by shifting it to consumers through a tariff formula that automatically provides adjustment for exchange rate changes. Alternatively, the project company may resort to currency swaps.

Payment risk An infrastructure project may face the risk of not being paid for services provided. This risk is more pronounced when the project company sells to a monopoly buyer as in the case of an independent power producer (IPP) supplying power to a monopoly public sector distributor; it is less severe when the project company sells to a multitude of customers as in the case of a telecom operator or a toll road.

Payment risk may be mitigated by mechanism such as letter of credit, government guarantee, and escrow arrangement.

Regulatory risk Infrastructure projects are subject to regulation that covers, among other things, tariff determination. Arbitrary changes in the regulatory framework are a source of risk.

The onus of mitigating regulatory risk seems to lie with the government. As Montek Ahluwalla put it: "In general, regulatory risk is best handled by establishing strong and independent regulatory authorities that operate with maximum transparency of procedures within a legal framework that provides investors with credible recourse against arbitrary action."

Political risk Infrastructure projects are highly visible and touch the lives of pubic in basic areas. This makes them vulnerable to populist political action that can jeopardise their financial viability – in the extreme case, political action can lead to cancellation of license or nationalisation.

Political risk can be partially mitigated through political risk insurance offered by multilateral organisations, such as the Multilateral Investment Guarantee Agency, or bilateral investment protection agreements. It can also be reduced by incorporating into the project agreement a suitable provision for compensation against arbitrary action, subject to international arbitration. Yet another instrument is the World Bank's new partial risk guarantee instrument which covers debt service payments if they are interrupted because the government does not fulfill its specific obligations.

2. SUPERIORITY OF FORMULAS, MODELS, OR ALGORITHEMS

Dr. Prasanna Chandra

In a remarkably insightful book, **Clinical vs. Statistical Prediction**: A **Theoretical Analysis and a Review of Evidence**, Paul Meehl reviewed twenty studies that anlaysed whether clinical predictions based on subjective judgments of trained professionals were more accurate than statistical predictions based on combining a few scores or ratings according to a formula. He found that statistical predictions were better than clinical predictions. This book provoked considerable controversy and engendered a stream of research that is still continuing, more than fifty years after its initial publication. Nearly two hundred such studies done over decades have shown that algorithms are significantly more accurate than humans.

Similar studies have been done in other domains such as medicine, economics, finance, public policy, and sports. Each of these domains is characterised by a high degree of uncertainty and unpredictability. They are referred to as "low-validity environments." Interestingly, in every case, the accuracy of experts has been matched or exceeded by a simple algorithm. As Meehl said with justifiable pride three decades after the publication of his book, "There is no controversy in social science, which shows such a large body of qualitatively diverse studies coming out so uniformly in the same direction as this one."

Why are experts inferior to algorithms? One reason is that experts try to consider complex combinations of features. While complexity may work in an odd case, more often than not it reduces validity. Another reason is that humans are incorrigibly inconsistent in drawing inferences from complex information. In his revolutionary book. **The Limits of Scientific Reasoning**, David Faust writes: "Human judgment is far more limited than we think. We have a surprisingly restricted capacity to manage or interpret complex information". Studying a wide range of professionals, Faust found that simple quantitative models consistently outperformed human judges.

As James P.O. Shaughnessy put it in his book **What Works on Wall Street:** "Models beat human forecasters because they reliably and consistently apply the same criteria time after time. In almost every instance, it is the total reliability of application of the model that accounts for its superior performance. Models never vary. They are always consistent. They are never moody, never fight with their spouse, are never hung over form a night on the town, and never get bored. They don't favour vivid, interesting stories over reams of statistical data. They never take anything personally. They don't have egos. They're not put out to prove anything. If they were people, they'd be the death of any party".

Robustness of A Simple Algorithm Since Meehl's original work, the most important development in the field has been Robyn Daves's famous article "The Robust Beauty of Improper Linear Models in Decision Making." The dominant practice in social sciences is to use an algorithm called multiple regressions for assigning weights to different predictors (factors). Multiple regressions has a sound logic and it determines the

optimal formula that puts together a weighted combination of the predictors. However, Daewes observed that a formula in which predictors is equally weighted is likely to be just as reliable in predicting new cases as the multiple regression formula derived from the original sample. More research goes a step further: equal-weighted formulas are superior to multiple regression formulas derived from the original sample, because they are not affected by sampling errors. As Daniel Kahneman, a Nobel Lawreate in Economics observes in his seminal work **Thinking, Fast and Slow** "The surprising success of equal-weighting schemes has an important practical implication: it is possible to develop useful algorithms without any prior statistical research. Simple equally weighted formulas based on excising statistics or on common sense are often very good predictors of significant outcomes."

In a memorable example, Dawes showed that marital stability can be predicted by a simple formula:

Frequency of lovemaking – Frequency of quarrels

3. FEW BETS, BIG BETS

Dr. Prasanna Chandra

Skillful, long-term investors like Warren Buffett make few, well-considered, big bets. As his business partner, Charlie Munger says: "The wise ones bet heavily when the world offers them that opportunity. They bet big whey they have the odds. And the rest of the time, they don't It is just that simple."

John Larry Kelly Jr., a researcher, came up with a useful formula for calculating the optimal fraction of bankroll to be put on a favourable bet. The formula is:
Optimal fraction to the bet = Edge/Odds

To understand, what edge and odds mean, let us consider an example. Suppose that the payoffs from the toss of a balanced coin are as follows:
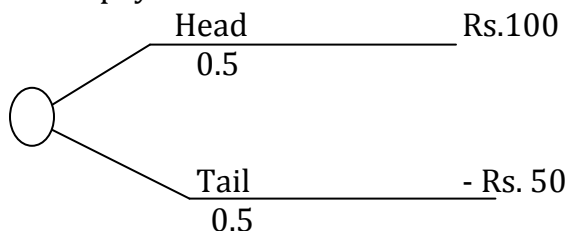
The edge is the expected payoff. In this case:
Edge=0.5 X 100- 0.5 X50= Rs 25
The odds are what you win, if you win. In this case, the odds are Rs. 100. So, the Kelly's formula suggest that optimal fraction of bankroll to be bet is :

$$\text{Edge/Odds} = \frac{\text{Rs.25}}{\text{Rs. 100}} = 0.25$$

Let us look at another example. The probability distribution of payoffs from a bet is as follows:

Probability	Payoff
0.80	21.0
0.10	7.5
0.1	-1.0

Given the above, we get

Edge (or expected value) = 0.8x21+0.1x7.5+0.1x-1.0=17.45

Odds=21

Optimal fraction to be Bankrolled $= \dfrac{17.45}{21.0} = 0.83$

Normalisation

We have looked at one bet at a time to calculate the optimal fraction. What happens if there are a number of bets and the sum of optimal fractions corresponding to these bets is more than 1 (or 100 percent). In such a case we have to resort to normalization which simply means linearly scaling down all the fractions (percentages) so that their sum adds up to 1 (100 percent). An example of such normalization is shown below:

Bet	Kelly Formula %	Normalised %
1	80	20
2	70	17.5
3	60	15.0
4	55	13.75
5	45	11.25
6	35	9.75
7	30	7
8	25	6.25
	400	400

SECTION B: SNIPPETS

1. WHAT INVESTORS REALLY WANT

In a fascinating book **What Investors Really Want** (published by McGraw-Hill in 2011), Meir Statman says: "We want high returns from our investments, but we want much more. We want to nurture hope for riches and banish fear of poverty. We want to be number 1 and beat the market. We want to feel pride when our investments bring gains and avoid the regret that comes with losses. We want the status and esteem of hedge funds, and the patriotism of investing in our own country. We want good advice from financial advisors, magazines, and the Internet. We want to be free from governmental regulations yet be protected by regulators. We want financial markets to be fair but search for an edge that would let us win, sometimes fair and at other times not. We want to leave a legacy for our children when we are gone. The sum of our wants and behaviors makes financial markets go up or down as we herd together or go our separate ways, sometimes inflating bubbles and at other times popping them."

Very broadly, investments (like jobs, products, and services) provide utilitarian benefits, expressive benefits, and emotional benefits. These benefits are the answers to the following questions.

Utilitarian Benefits :	What does the investment do to my pocketbook? Utilitarian benefits of investments are reflected mostly in wealth, augmented by high investment returns
Expressive Benefits :	What does the investment say about me to others and to me? For example a stock picker may say, "I am smart. I can identify winners," or an option trader may say, "I can assume risk and know how to control it."
Emotional Benefits :	How does it make me feel? An insurance policy may give one a sense of security, a speculative stock may provide hope, and stock trading offer excitement.

2. CREATING SUSTAINABLE PERFORMANCE

What creates sustainable individual and organisational performance? Employees who are thriving –these are employees who are not just satisfied and productive and also actively engaged in creating the future.

According to Gretchen Spreitzer and Christine Porath the following four mechanisms create the conditions for thriving: granting decision-making power, sharing information about the company and its strategy, treating people with civility, and providing performance feedback.

G. Spreitzer and C. Porath "Creating Sustainable Performance", *Harvard Business Review,* January-February 2012.

3. R & D AT BAJAJ AUTO

While Bajaj Auto had a technical collaboration with Kawasaki of Japan, it stepped up its own product development effort parallely in 1999. It made substantial investments to build in – house capability in design and R & D. These investments resulted in game changing innovation like DTS-i (Digital Twin Spark Ignition), DTS-Fi (Digital Twin Spark Fuel Ignition), Exhaust TEC (Exhaust Torque Expansion Chamber), SNS, Disk Breaking, Anti-Skid technology, and so on. These technical innovations enabled the company to launch block buster products like Pulsar, Avenger, and Discover and gain a cost advantage over imported technology without compromising on functions and features in the high performance segments.

4. CORPORATE GOVERNANCE

In an important judgement delivered in November 2011, the Supreme Court clarified in unambiguous terms that the director of a company cannot be held liable for all the wrongs committed by the company, unless it is proved that he was actually party to the irregularities. The Court said: "A bald statement that he or she was responsible to the company for the conduct of its business is not sufficient." This ruling will help in clearing the air on the responsibilities of directors and motivate talented people to accept board positions. In the past they were deterred because of lack of clarity on their obligations and harsh court rulings. Of course, it is true that many companies choose a pliant director rather than a competent director. However, this is a short-sighted choice because a strong and independent board can make a positive contribution to corporate a success.

<u>SECTION C: WIT & WISDOM</u>

Humour

- At a club, three American businessmen were discussing what 'fame' means. The first one said, "fame means that you are invited to the White House for a dinner with the President." The second one said, "fame means that you are invited to the White House for a dinner with the President and when during the dinner, the hot line rings the President doesn't answer." The third one said, "fame means that you are invited to the White House for a dinner with the President and when during the dinner, the hot line

rings the President takes the receiver, talks for few seconds, and turns it over to you saying, 'Sir it is for you'."

- A villager plans a visit to Mumbai to buy sarees for his daughter's wedding. His Mumbai- returned friend advises him to bargain hard by asking for half the rate quoted by the shop keeper. Armed with this precious advice, he goes to a saree shop in Zaveri Bazaar. He asks for the price of a saree and the shopkeeper says Rs. 1000. He replies "Can you give it for Rs. 500." The shopkeeper shows a less expensive saree and says "This is available for Rs. 500." The villager says, "Can you give it for Rs. 250." Disgusted, the shopkeeper shows a cheap, damaged saree and says "Take this for free." The villager says, "Surely I will do, provided you give me two."

Wise Saws

- To err is human; to blame it on the other guy is even more human.
- Our conduct is influenced not by our experience but our expectations.

Perspective

The stress on the "scientific method" becomes an obstacle to theoretical advance in several ways. First, the stress on teaching the scientific method and the design of experiment diverts attention from training in observation. Second, it discourages the budding investigator's interest and trust in his own hunches & speculation. Third, it makes the scientific method and design of experiment appear as a sure-fire way to produce research findings. Fourth, it leads to a publication policy such that publications confirm to the "scientific method" and cover up the actual tracks of investigation even if they're worth knowing.