Developing Financial Engineering Skills in the APEC Region
Kevin Davis
Commonwealth Bank Group Chair of Finance
The University of Melbourne

The “Discipline” of Financial Engineering

“Financial engineering involves the design, the development, and the implementation of innovative financial instruments and processes, and the formulation of creative solutions to problems in finance” (Finnerty, 1988). As such it involves such things as:

- Designing revolutionary new products – credit derivatives are a recent example as, once upon a time, were such things as swaps and Collateralized Mortgage Obligations.
- Coming up with a novel twist on an old idea – the development of Exchange Traded Funds (such as “Spiders”) which combine features of closed end and open ended funds to overcome problems associated with those more traditional structures, is an example.
- Putting together existing products and processes to solve a particular problem confronting participants in institutional, corporate or retail markets. The explosive growth in many markets in innovative types of equity warrant products aimed at retail investors is a case in point.

These examples highlight some key features of financial engineering crucial to the topic of this session.

First, financial engineering is typically something which draws on a wide skill base including finance theory, accounting, law, tax, mathematics, computing. Rarely will significant examples of financial engineering involve “one-person shows”. Rather, teams within financial institutions or consultancies are necessary to provide the range of expertise necessary.

Second, financial engineering utilizes existing financial products and techniques in the development of new innovative processes and products. Without well developed markets for financial instruments, it is rarely possible to determine appropriate prices for and manage the risks associated with innovations. The demand created by financial innovations in turn stimulates the further growth of those markets.

Third, financial engineering is not exclusively the domain of “rocket scientists”. They have an important role to play, but identifying market opportunities and identifying various possible solutions to a particular problem are skills that involve intuition and insight as much as they do quantitative techniques.

Fourth, financial engineering is, like any other market based activity, a reflection of supply and demand forces. It thus has a long history – far longer than the past couple of decades with which the term has come to be associated. Convertible bonds can be traced
to the sixteenth and seventeenth centuries, as can the concept of a “Lottery Bond” and the use of “time bargains” (options and futures) associated with tulip trading in Amsterdam. It is continually occurring, even in financially repressed markets, in response to the forces of supply and demand – although the form and level of sophistication involved will reflect the nature of the market in which it is occurring.

Finally, incentives are a key factor. Financial engineering can involve considerable investment of time and resources to create a new products or innovative technique. The ability to recoup those costs is clearly important, and creates complex issues in the world of finance where the ability to patent financial products is limited. Competitors can, relatively easily and quickly, duplicate an innovation, so that the ability to gain first mover advantage may be limited.

The Need for Financial Engineering Skill Development

Although financial engineering is an ongoing, ever present, activity, the technology of the discipline has advanced significantly in recent years. Advances in finance theory, information processing, and computational methods have seen the development of products and processes which are leading to major structural changes in financial markets. Those financial institutions unable to keep pace with the modern financial technology, and those products not drawing on the best of modern financial technology, face ongoing loss of market share because of cost disadvantages.

Credit Risk is a topical case in point. Modern credit risk measurement and management techniques draw on technical advances in finance theory and modeling and the use of large data bases of credit history to develop and calibrate models. Financial institutions with better models are better able to separate potential borrowers into appropriate risk categories and price loans accordingly. Those institutions unable to do so (and offering good and bad borrowers equal terms – based on average default experience) should expect to end up with a disproportionate share of bad borrowers – and credit losses.

More generally, financial engineering adds value to society through the implementation of least cost techniques in financial markets as well as through finding solutions which reduce or overcome imperfections in markets. Even where those activities might be prompted by attempts to arbitrage tax or regulatory arrangements, social value can be created by the new opportunities created.

Developing Financial Engineering Skills

How then can the development of financial engineering skills best be promoted in the APEC region? Are they something best learnt “on the job” by experience, or by separate structured educational activities?

The answer is, most likely, by both methods, although particular components of the portfolio of required skills can be better gained in one or other way. For example, there has been an explosion of post-graduate courses offered by Universities focusing on the
“rocket science” aspects of financial engineering. These courses, focused primarily on quantitative techniques as applied to financial markets, provide a good mechanism for assisting the transition of graduates from quantitative disciplines into financial markets activities. Whether they provide the graduates with the insights and intuition to identify opportunities and a range of solutions to financial problems – as opposed to being able to implement a particular solution is a moot point.

The availability of such courses, other less specialized, but relevant, finance courses, and training programs offered by consultants suggests that accessible supply of education is not of itself an impediment. If cost is perceived as an impediment, then it presumably reflects one or other of the following factors. First, it may be that the pay-off is not viewed as adequate to warrant the investment in human capital (or, equally of concern for countries in the region, the pay-off from developing those skills to use in emerging markets is less than developing them and using them in developed markets). Second, there may be impediments to individuals financing the required investment in their human capital.

There is relatively little incentive for financial institutions to subsidise quality staff to attend training programs in financial engineering, since the skills so gained are highly marketable and the institution is unlikely to be able to capture an adequate return on the investment. Within institutions, innovative human resource management policies (involving financial engineering) may be worth examining. For example, loans to staff pursuing such training need to have repayment characteristics structured such that (a) there is an incentive for the staff member to undertake the activity (b) there is an incentive to return to the institution for some significant time and (c) the NPV to the institution is positive. In essence, some form of remuneration structure is required such that higher post training salary (net of loan repayment costs) encourages training, and the additional costs of loan repayments arising from leaving the institution post training exceed the additional salary on offer elsewhere.

A more significant problem however would appear to be the overall returns to be had in emerging markets from investment in advanced financial engineering techniques. The ability to successfully apply such techniques generally requires the existence of markets for the transfer and pricing of risk. The development of both tend to go hand in hand – such that the best impetus which could be given to the incentive for development of “high tech” financial engineering skills is the continued development of financial markets and an emphasis on accompanying training in more general financial knowledge to improve opportunities for applications of such skills.

Discussion Points

- Is the key issue a shortage of supply of financial engineering skills or a lack of effective demand for such skills?
- If demand is lacking, is it because of underdeveloped financial markets for risk pricing and transfer, lack of appreciation of potential benefits, inability to “train and retain” key staff, or for other reasons?
If a shortage of supply exists, can it be best resolved by “importing” educational courses to the region or temporarily “exporting” staff as students to such courses?

What type training is of most value at the current stage of market development in the region—“high tech” quantitative skills or more broad-based financial skills?

References