Project	**Cross-cutting issues—measuring uncertain future cash flows**
Topic	**Additional comments on expected cash flows**

INTRODUCTION

1. IFRSs and recent exposure drafts include several references to *probability-weighted* or *expected* cash flows. IASB constituents often object to expected cash flow measurements. This paper is a conversation about some of the development of this measurement technique, why standard setters have adopted it, and some of the continuing controversies surrounding it.

A TECHNIQUE

2. The staff draft of the upcoming IFRS *Fair Value Measurement* includes the following definition of *expected cash flow*:

> The sum of probability-weighted amounts within a range of possible estimated amounts; the estimated mean or average.

3. That definition is correct, but perhaps not sufficient. Expected cash flow computations are a technique; a means for accomplishing some other objective. The technique is not an end in itself. More specifically, it is one of building blocks used to compute a current value of an asset or liability when that amount is not directly observable.

4. A statistician would describe expected cash flows as a descriptive statistic. It is the mean of a distribution; one of the three basic measures of central tendency. In the familiar bell-shaped distribution of possible outcomes, these three measures equal one another. But when the distribution is not symmetrical, the mean, the mode (the most-likely possibility) and the median (the midpoint in the range) diverge from one another. More importantly, though, the statistician would warn that any single descriptive statistic provides a very limited picture.

5. Why, then, does the IASB refer to this technique so frequently? If the financial reporting objective was merely to predict future cash flows, it might not. The single most-likely outcome might be viewed as a better predictor of future cash flows from an individual asset or liability. A better predictor, perhaps, but not very useful in comparing different sets of cash flows. We can imagine many situations that have the same most-likely cash flow but very different ranges of possibility. Moreover, the possibilities may be distributed both in amounts (different possibilities happening on the same date) or time (different possibilities happening on different dates) or both. One could argue that the most-likely outcome is still a better predictor of future cash flows, but the uncertainties and risks embodied in the underlying assets or liabilities would be very different.

6. Of course, we could build scenarios in which the expected cash flows are the same, but the uncertainties and risks are different. The statistician's warning comes back. One statistic isn't enough. We need to do better.

7. The usual tool for capturing the differences between sets of cash flows is present value. Note the word *value*. The objective has moved sharply away from prediction to valuation. The result will no longer be a prediction of cash flows. At best, it will be a valuation of a prediction.

8. For many years, the usual expression of present value in accounting applications was "contractual cash flows discounted at an interest rate commensurate with the risk." That formulation developed in a world of assets with contractual cash flows. It didn't work well, though. Even in that limited world there were endless arguments over just what "commensurate with the risk" meant. The formulation did not work at all as the measurement questions moved to liabilities for which there was a range of possible outcomes, both in the timing and the amount of cash flows. Consider the following problem:

> A liability will result in a single cash outflow that may be as low as CU 5,000 or as high as CU 20,000. The cash outflow may occur 1 year, or 5 years, or 10 years in the future, but the timing does not affect the amount. Management estimates the most likely cash flow to be CU 12,500 and the most likely timing to be 5 years. The risk-free rate of interest is 6 percent and the yield curve is flat. When applied to the most likely cash flow, what is the interest rate "commensurate with the risk" for this liability? When applied to the most likely cash flow, is that rate higher or lower than 6 percent?

9. The answer to both questions is, "We don't know." Standard setters have found that there is no way to describe how one would capture the uncertainties inherent in the case as an adjustment to the interest rate. Confronted with uncertainties in timing, there was no way to know over what period to discount, regardless of rate. That left a choice. Either use the most-likely cash flow and specify a (perhaps arbitrary) discount rate, or look elsewhere for measurement tools.

10. The answer came in a mathematical truism. In a present value computation, uncertainties about future cash flows can be captured in either cash flow estimates or in interest rates. As long as one doesn't include the same uncertainties in both, the resulting measurement should be the same. The liability just described can be measured by assigning probabilities to different amounts and timing and then computing the present value of each probability-weighted amount. Because the uncertainty is already captured in the cash flows, there is no need (yet) to adjust the risk-free rate of interest.

11. So the first answer to the question, "Why use expected cash flows?" is "Because it works for situations in which the mode or the median do not."

RISK AND UNCERTAINTY

12. Now the statistician speaks up again. "That's all very clever," she might say, "but you haven't done anything about different distributions with the same timing and expected cash flows. Consider two sets of expected cash flows. One has a mean of 50, a minimum of 45 and a maximum of 55. The other has the same mean, but a minimum of 40 and a maximum of 100. They are not the same thing."

13. A business manager joining the conversation might observe, "She's right. If I was offered the two liabilities, I would want a different price for the second one. I might lose a lot on that one, and we don't take that kind of chance for free. We don't run our business that way."

14. Both are right, and they have touched on the next and most difficult building block of a present-value measurement – the risk adjustment. So far, the building blocks can be developed from management's estimates and observable information. But where does one find the amount to assign to the risk adjustment?

15. There is a lively debate between finance economists, actuaries, and others about how much to assign to a risk adjustment. Some suggest that it really doesn't exist in market prices at all. In paragraph 62 of Concepts Statement No. 7, *Using Cash Flow Information and Present Value in Accounting Measurements*, the FASB observed:

> An estimate of fair value should include the price that marketplace participants are able to receive for bearing the uncertainties in cash flows—the adjustment for risk—if the amount is identifiable, measurable, and significant. An arbitrary adjustment for risk, or one that cannot be evaluated by comparison to marketplace information, introduces an unjustified bias into the measurement. On the other hand, excluding a risk adjustment (if it is apparent that marketplace participants include one) would not produce a measurement that faithfully represents fair value.

16. Paragraph 38 of the IASB staff draft of the upcoming IFRS *Fair Value Measurement* describes the same process this way:

> When using a present value technique (see paragraph 33(c)(i)), an entity shall, among other things, estimate the future cash outflows that market participants would expect to incur in fulfilling the obligation. Those future cash outflows shall include the direct and indirect costs of fulfilling the obligation and *the compensation that a market participant would require for taking on the obligation*. Such compensation includes the return that a market participant would require for undertaking the activity (ie the value of fulfilling the obligation; for example, by using resources that could be used otherwise) and *for assuming the risk associated with the obligation (ie the risk that the actual cash outflows ultimately might differ from the expected cash outflows).* [Emphasis added.]

17. In paragraph 35 of its Exposure Draft, *Insurance Contracts*, the IASB said:

> The risk adjustment shall be the maximum amount the insurer would rationally pay to be relieved of the risk that the ultimate fulfilment cash flows exceed those expected.

18. All three documents describe the objective of the risk adjustment, two in the context of fair value and the third in the context of a measurement based on the expectation that the insurer will fulfil the insurance contract. The insurance document goes on to require companies to select one of three possible approaches to measure the risk adjustment. It is worth noting that the risk adjustment, and the difficulties in its computation, was one of the most controversial elements in the Insurance Contracts Exposure Draft.

PRACTICALITIES AND CONTROVERSIES

19. "This is all very well for you ivory tower theorists," says the manager. "It might be alright for insurance companies who employ actuaries by the battalion. But we are a manufacturer with a limited accounting staff. All this is going to be very expensive."

20. This is the most common objection to expected value measurements. The manager might envision room-sized supercomputers processing millions of possible outcomes. He might reasonably wonder whether the significant costs he might incur will result in a more useful measurement of his company's liability.

21. He is right to be concerned, but no accounting standard setter envisioned that kind of effort. Indeed, the statistician might observe that increasing the number of estimates and probabilities does not necessarily improve the quality of the estimate (by reducing what statisticians call the standard error of the mean). Rather, standard setters are asking companies to:

a. Understand the mean, when there are several possible outcomes;

b. Understand the distribution of those possible outcomes around the mean;

c. Understand how that distribution would affect the valuation of the asset or liability, and,

d. Apply that understanding to the measurement.

22. Our conversation has now attracted an actuary and an accountant. The actuary might say, "I have a lot of techniques that I use to estimate the mean, and many of them are not based on expected cash flows." Here we need to look back to the objectives just stated. If the actuary's techniques provide an unbiased estimate of the mean and an understanding of the distribution, there seems no reason why he shouldn't use them.

23. "I'm still worried about one thing," says the accountant. "If we use expected cash flows, the result may not represent any of the amounts that my company will actually pay. Suppose there are only three possibilities – 10, 12, and 20 – and each has equal probability. The expected value is 14, and my company will never write a cheque for that amount. Shouldn't the financial statements represent something that we actually expect to happen?"

24. He has a point. A measurement of 14 will be "wrong" 100 percent of the time. The conversation has come full circle to the objective of the measurement, prediction or valuation, with a complication. If the objective is to measure based on a prediction, then which amount should we use? All three have the same probability. We could choose the minimum amount, reasoning that the liability will never be less than 10. Doing so, however, makes this liability look the same as a liability with a single contractual cash flow of 10. That would not be a faithful representation of the underlying uncertainty in this liability.

25. The accountant has one more question. "What about the law of large numbers? Isn't this technique limited to situations in which there are a lot of assets or liabilities? I can't see how it applies to a single item."

26. Here the statistician observes that the law of large numbers is a theorem that holds that if an experiment is performed a large number of times, the average of the results will converge on the expected value. If our accountant's company has 1000 liabilities like the one observed, then the average amount of the cheques written will be closer to 14 than would be the case if the company has only 5 liabilities. The difference between the expected value and actual outcome would be reduced, but that tells us nothing about whether the expected value does a better job of distinguishing between things that would otherwise appear to be the same.