Presentation to PortfolioConstruction Conference 2008

Measuring credit portfolio risk

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Imagine...you run a supermarket

You buy stock, put it on the shelves and sell it.

- What controls do you put in place to manage the process?
- What operational risks would you identify?
- How would you manage them?

What losses do you expect?

- You expect a certain amount of wastage:
  - fruit goes off before sale
  - the butcher leaves too much meat on the cutting room floor
  - bread goes stale

- You expect some stock to disappear:
  - a little shoplifting
  - a little ‘staff usage’
  - a little customer tasting

This is operational risk

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How do you manage expected loss?

To control wastage:

- You introduce leading edge inventory control
- You monitor stock levels
- You climate control your fruit & vegetable section
- You train your butchers to cut to industry best standards

To control theft:

- You employ store detectives
- You check bags
- You train and educate your staff

This is operational risk management

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But stuff happens

- Your freezers breakdown
- The power fails
- Industrial action stops the supply of fresh chickens
- Harris Farm opens a store next door

This is unexpected loss

You manage it by...

- Having backup freezers available
- Ensuring you can hire generators
- Stocking frozen chicken
- Offering loyalty programs or cut prices

This is risk management

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Then something really bad happens...

- A truck crashes through the back of your store
- The resulting explosion and fireball totally destroys your stock and shop, but
- Fortunately it is at 2 am in the morning and no one is hurt!! (The truck driver escaped)

What risk is this?
(Apart from 'bad'?)

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This is tail risk

- This is not a variation in the risk you normally see running a supermarket.
- This is an extreme event – what is known as a ‘tail event’
- While the probability of this extreme loss is very small, it’s effects would be catastrophic

Credit Portfolio Management

- When you lend money there is always the chance that the borrower will not repay you.
- So when managing a credit portfolio you expect a certain amount of loss (depending on the risk of the credit).
- Lower quality borrowers (<BB) default on their loans more than higher quality borrowers (>BBB).
- Comprehensive default data from the rating agencies allows us to accurately estimate expected loss

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Managing expected loss

Credit investors try to minimise expected loss by:

- Implementing industry best credit monitoring systems
- Employing quality credit analysts
- Understanding the legal structure of the investments

In short, you use best practice processes to minimise your expected loss.

This is operational risk management

Unexpected loss

- While we expect defaults in credit, we don't expect 'exactly' 2.3453876 defaults per year
- Some years there are no defaults. In other years, there are many.
- This variability of losses, around the average expected loss, can be significant

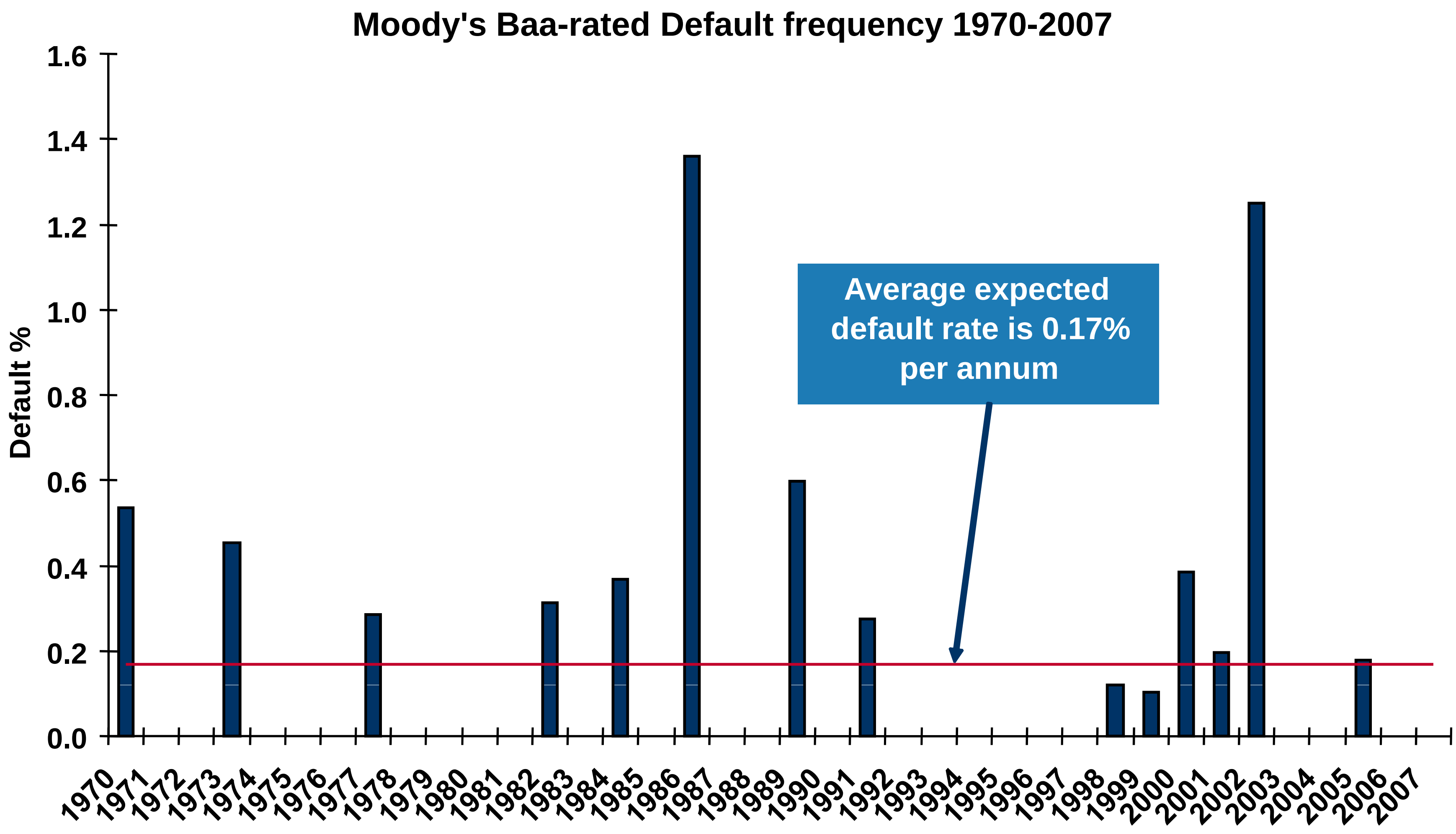
This is unexpected loss

Managing unexpected loss

- Ensuring you have multiple exposures in your portfolio by:
  - Selling a wide range of vegetables (or credit exposures) across many industries, countries, issuers and asset types
  - Ensuring that your returns are not heavily reliant on any one asset (i.e. you don't want 50% of your income to come from spinach).

This is risk management of unexpected loss

You can have REALLY bad days in credit...



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How do you manage those?

- Understand correlation risk so that defaults are not likely to cluster
  - Investing in four businesses in one shopping centre could pose greater risk than investing in four businesses in separate locations

- Other important factors are:
  - Diversifying across issuer, industry and country
  - Managing concentration risks so that no one issuer is a significant part of your portfolio

- It is imperative to measure your risks, know what is driving them, and minimise them wherever possible

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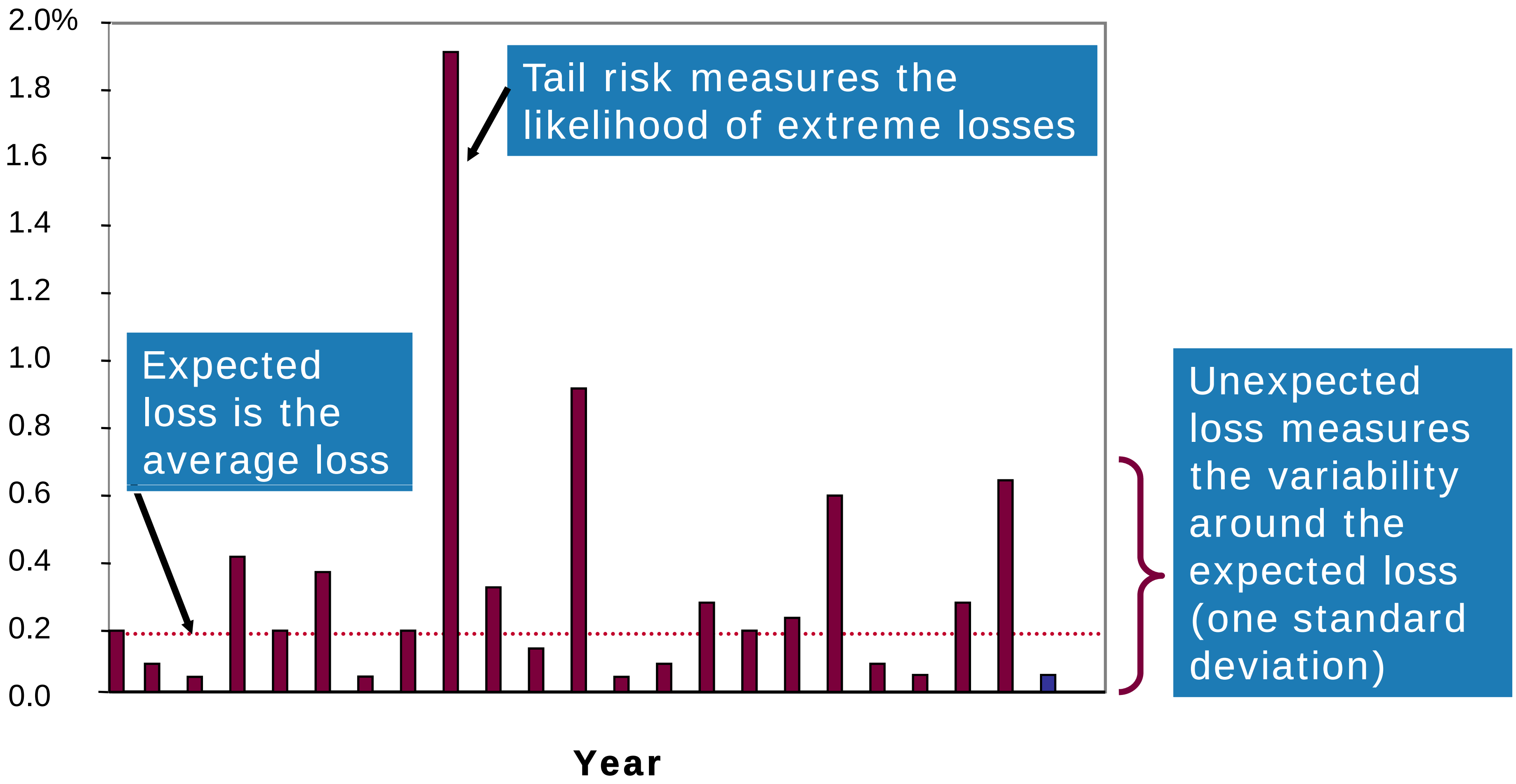
Many ways of looking at credit loss



What do standard market measures tell us about credit risk?

- Average credit rating
- Credit duration
- Tracking error
- Value at risk

The answer: not much

Average credit rating

"My portfolio has an average credit rating of AA"

Q: What does this tell you about credit risk in the portfolio?

A: Nothing

- It tells you how much you expect to lose because of defaults over time.
- It does not tell you anything about your store: how many product lines you have, how many departments, what backup generators are there nor how much insurance you have.

Credit duration

"My portfolio has a credit duration of 3.2 years"

Q: What does this tell you about credit risk in the portfolio?

A: Nothing

- It tells you how much you expect to lose if your average spread widens by one basis point (or your average inventory hold period extends by a day)
- It assumes your losses will increase by the same amount (tomatoes and toilet paper)

Tracking error

"My portfolio has a tracking error of 50 bps per month"

Q: What does this tell you about credit risk in the portfolio?

A: Nothing

- It tells you how volatile your actual losses were compared to expected losses
- It does not tell you how likely this pattern is to repeat
- It says nothing about whether this was due to skill (good risk management) or luck. And it implicitly assumes, incorrectly, a normal distribution for credit portfolios

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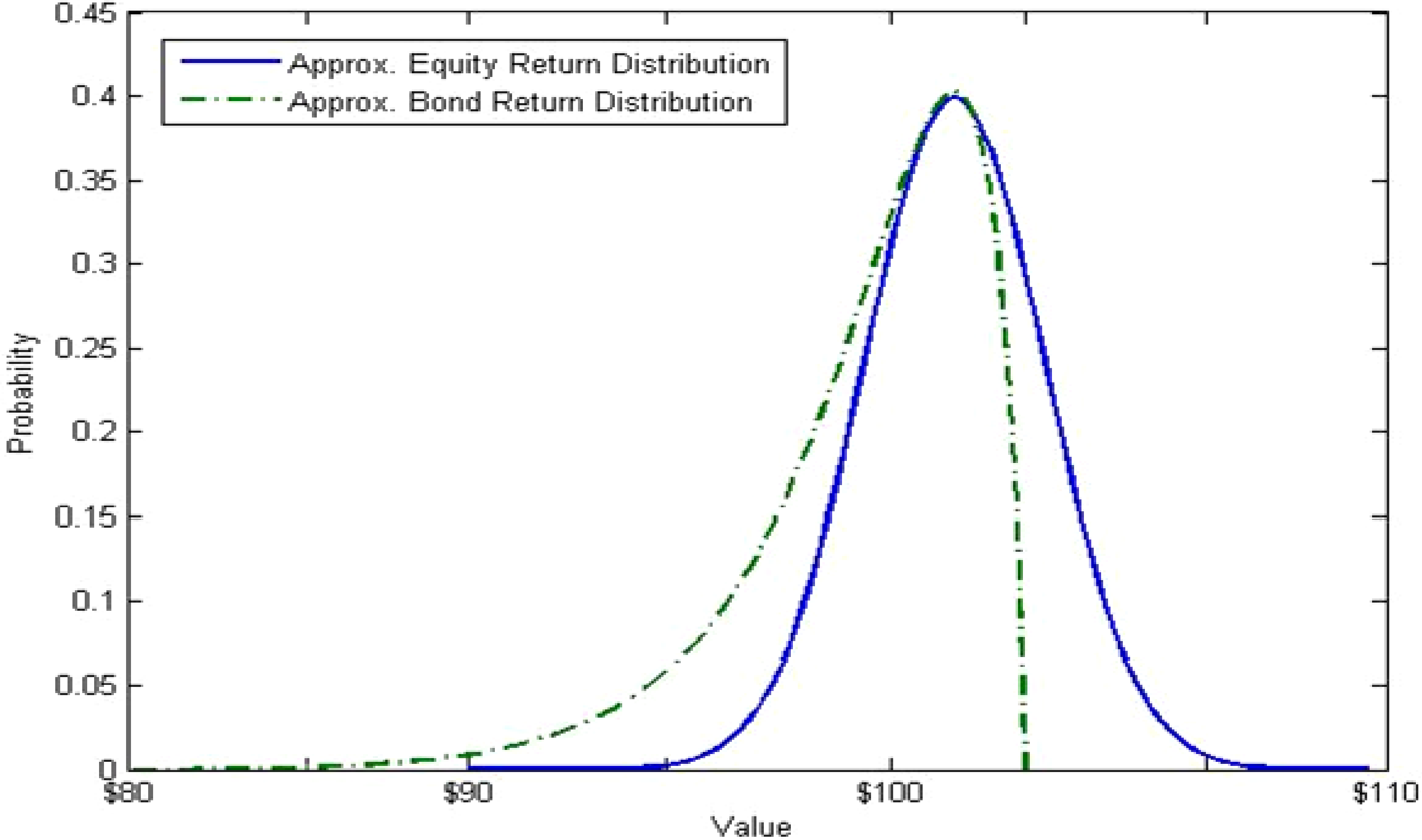
What's a "normal distribution"?

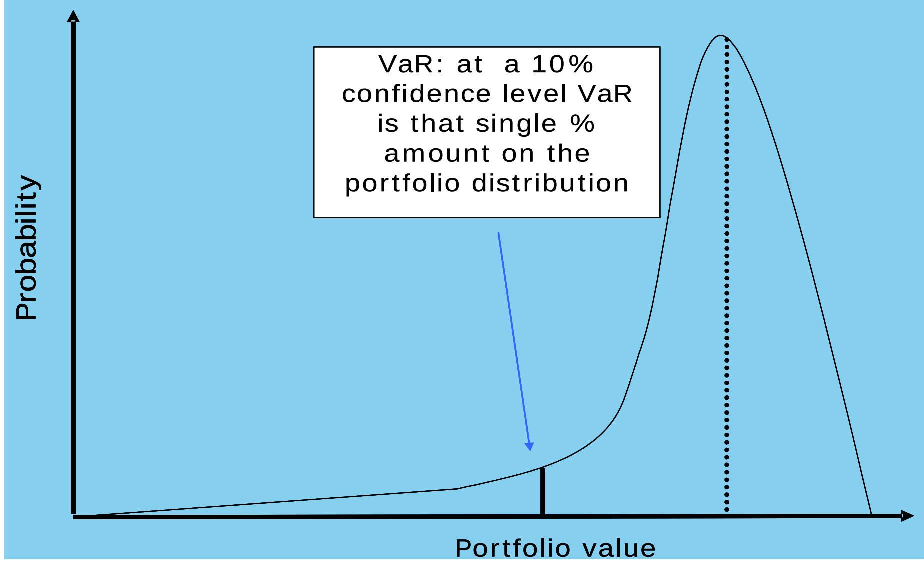


Value at risk

"My portfolio has a VaR of AUD 30 million"

Q: What does this tell you about credit risk in the portfolio?

A: More, BUT still not enough



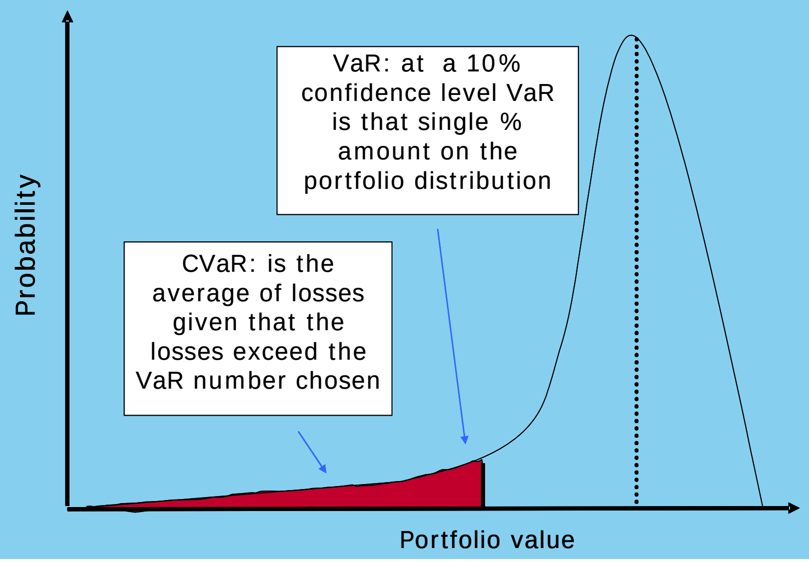
- It tells you at a certain confidence level over a certain time period that you would not expect to lose more than $30 million
- It does not say, in situations where we might lose more than $30 million, how much more might we lose? And how often we might lose close to $30 million but less than it?

Conditional value at risk (CVaR or tail)

“My portfolio has a CVaR of AUD 30 million”

Q: What does this tell you about credit risk in the portfolio?

A: Lots, but you need to know more



- Again, we need to know what confidence level and what time period are being measured.
- However it does tell us what shape the tail risk is and how long it is, i.e. HOW BAD IT CAN GET

What you should know

- How big is the tail?
- Is it too big?
- Which names are contributing the most?
- Why are they contributing the most?
- How significant are these big contributors?

- Focus on risk management as well as operational processes
- Understand that if a position performs it may mean significant risk was taken to generate it
- Know that upside in credit is limited and returns asymmetrical. ‘Bets’ don’t make sense in an investment grade portfolio

Only then can relative performance be accurately measured

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Did you get them all?

Running in the rain	Expected Loss
Boulders in the snow	Unexpected Loss
Eating ice cream	Tail Risk
Bikes up the sand bank	Expected Loss
Bike racing	Unexpected Loss
Family photo	Tail Risk
Playing soccer	Tail Risk
Hanging snow	Unexpected Loss
Party's over	Unexpected Loss
Polishing the rink	Unexpected Loss
Jumping rope	Expected Loss

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Question and answer