Rulemaking (R.) 20-07-013: Phase 3 Workshop #4: October 4, 2023

Risk Scaling

California Public Utilities Commission

Emergency Alert System (EAS) and Wireless Emergency Alert (WEA)

FEMA

- Nationwide Test
  - TV and Radio Test Broadcast
  - Cellphone Test Alert
  - 11:20 PT
- Provide effective means of warning the public about emergencies
- Seventh Nationwide Test

Workshop #4 Agenda

Introductions & Purpose and Expected Outcomes of Workshop 4	10:00 – 10:05 am
Opening Remarks: Commissioner Reynold's Office	10:05 - 10:10 am
Risk Scaling: TURN Presentation	10:10 – 10:40 am
Risk Scaling: PG&E Presentation	10:40 – 11:20 am
Break	11:20 – 11:25 am
General Discussion	11:25 am – 12:25 pm
CPUC Close	12:25 – 12:30 pm

Review of Phase 4 Timeline

Phase 3 Timeline

Workshop #1 Post-Test Year & Transparency Pilot	July 12th
Tail Risk: Consequence Modeling	July 26th
Climate Change	Sept. 13th
Risk Scaling	Oct. 4th
Discount Rates and & RAMP Reporting Templates	Oct. 25th
Optional Workshop	Dec. 6th
Proposed Decision	Spring 2024

PURPOSE & EXPECTED OUTCOMES OF THE WORKSHOP

Purpose & Outcomes for Workshop #4

- Discuss the issue of risk scaling (previous known as “risk attitude) and how it operates within the Risk-Based Decision-Making Framework (RDF).
- A risk scaling function can be either linear or non-linear and, if non-linear, can be described as either convex or concave.
- The RDF describes how the utilities must apply a chosen risk scaling function when developing their RAMP filings.
- The RDF is not explicit about whose perceptions of risks should be reflected in the chosen risk scaling function—the utilities, ratepayers, or some subset of ratepayers.
- Attendees will provide feedback on the benefits, costs and any additional revisions related to the identification of best practices for risk scaling and/or the adoption of minimum requirements regarding the risk scaling function for use in the RDF.

Party Proposal for Risk Scaling

Presenter: TURN

10:10 am – 10:40 am

TURN Risk Scaling Presentation

October 4, 2023

Risk Scaling

- The risk attitude informs the scaling function chosen; three attitudes: Risk averse, risk neutral and risk seeking.
- Scaling Functions (from SPD Ph 3 Roadmap):
  - A linear scaling is where an increase in risk is proportional to the natural units. For example, 10 fatalities would be considered 10 times worse than 1 fatality.
  - A convex scaling is where the risk increases faster than the increase in natural units. A convex scaling function, for example, might indicate that 10 fatalities would be considered 100 times worse than 1 fatality. A convex scaling assumption, then, can help justify higher mitigation costs to reduce what has been calculated to be a higher risk situation.
  - And a concave scaling is where the risk increases slower than the increase in natural units. A concave scaling function, for example, might indicate that 10 fatalities is five times worse than 1 fatality.
- TURN argues that risk seeking/concave would be inappropriate for a utility to adopt, and to TURN's knowledge no utility has suggested a risk seeking scaling function. TURN's comments do not address a concave scaling function but TURN would be opposed to its adoption.

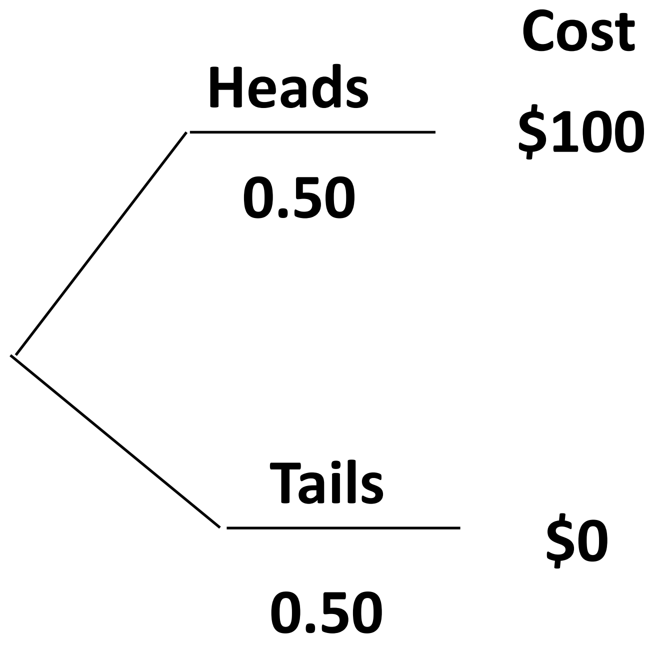
Risk Scaling

- Risk-Based Decision-Making Framework (RDF) (p.4) defines the risk attitude as “[a] function or formula applied to Monetized Levels of an Attribute to express the attitude toward uncertainty” (RDF, p. A-4)
- SPD Roadmap (p.2): “Risk Scaling represents a stakeholder’s willingness to accept or avoid risks when making decisions, and can be described as linear, convex, or concave.”

- Risk aversion should not be confused with aversion to bad outcomes.
- The risk scaling function can be used to measure the willingness to accept uncertainty.

Demonstration of attitudes toward risk

- Gamble Scenario: one must toss a coin, equally likely to land on heads or tails, if the coin lands on heads, you have to pay $100; if it lands on tails, you pay nothing



Demonstration of attitudes toward risk

- Someone offers the chance to avoid the gamble (and the chance that you lose $100)
- $50 is the expected value of the gamble.
- How much you would pay to avoid the gamble
  - Risk Neutral/Linear- pay $50 to avoid the uncertainty and potential loss of $100
  - Risk Averse/Convex- pay more than $50 to avoid the uncertainty and potential loss of $100
  - Risk Seeking/Concave-pay less than $50 to avoid the uncertainty and potential loss of $100.
- Risk aversion reflects unwillingness to accept a fair bet

Considerations and Principles (Planning Q 8, 9)

- Given the affordability crisis in this state, we have to make difficult decisions about capital investment.
- The RDF outlines the information that is required to justify utility spending.
- This information required by the RDF should be presented
  - Without bias.
  - Transparently.
- If the utility seeks to provide additional data points (tail risk, alternative risk scaling results) TURN proposes that those be provided in addition to required EV and linear risk scale analysis (see later slide with proposed modifications to RDF).
- The Commission can then rely on these data points to identify the most appropriate mitigation strategy and level of capital investments.

Risk attitude should reflect ratepayer interest

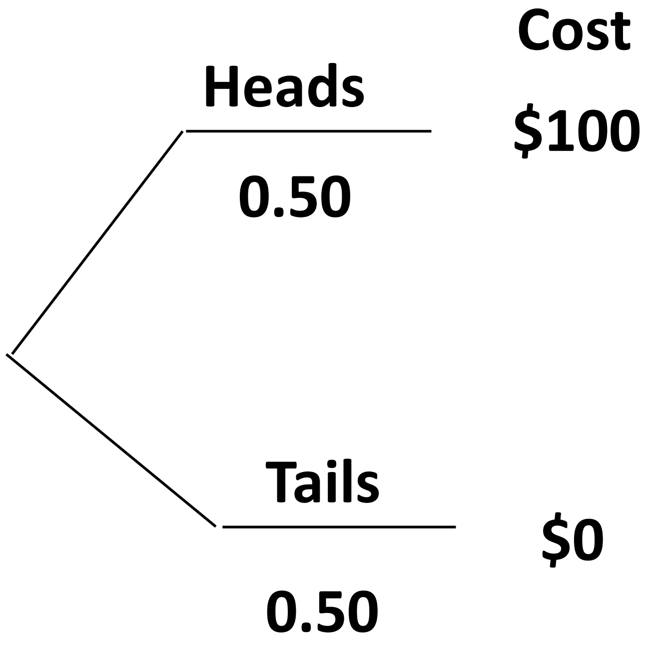
- Central question (Planning Q 6): whose risk attitude should be represented by the Risk Scaling Function?
- Level4 Report on RSE, p. 41
  - "A key best practice among practitioners using MAVF and MAUF methods is to clearly identify whose preferences they represent. A MAVF can express the preferences, tradeoffs, and risk attitude of an individual, a group of stakeholders, an organization, or a society, such as the people of California. The S-MAP process is not explicit about whose preferences the MAVFs should represent -- although by assigning MAVF construction to the utilities, it might be taken to imply that each MAVF should represent the preferences of the utility that developed it."
- TURN argues that the risk attitude should reflect the people of California or the ratepayers of the utility
  - Paying for the work of the utility
  - Most impacted by the work of the utility

Identifying the ratepayer perception

- Important to remember the question is about the approach to uncertainty.
  - We can assume that ratepayers will agree that it is worthwhile to spend money to avoid bad outcomes, but will ratepayers be willing to spend beyond what is dictated by the Expected Value to avoid a bad impact?
- Admittedly difficult to determine the ratepayer's attitude towards uncertainty
  - Large and diverse group with differing risk attitudes
- Adopting a risk neutral approach likely to best balance the variety of risk attitudes

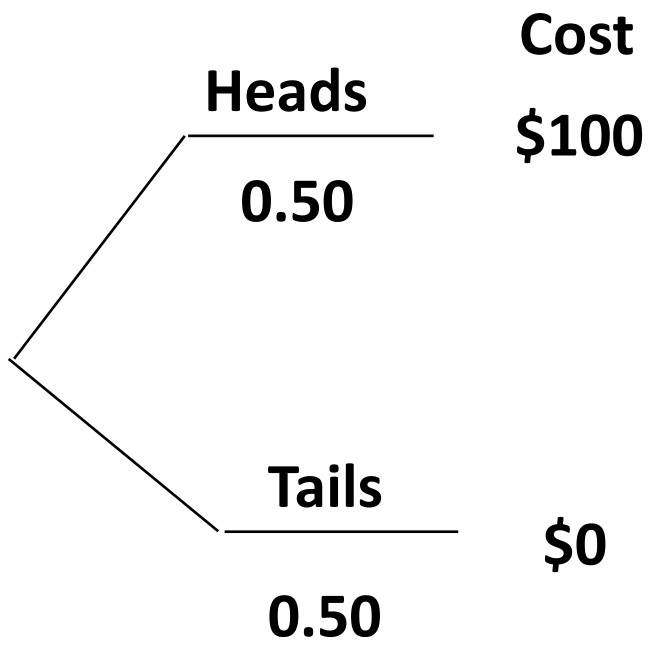
Risk Aversion can lead to bias (Planning Q 3)

- Risk aversion means that a utility will spend more than the expected cost to avoid an uncertain situation.
  - SPD Phase III Roadmap: A convex scaling assumption, then, can help justify higher mitigation costs to reduce what has been calculated to be a higher risk situation.
- Recall earlier example:



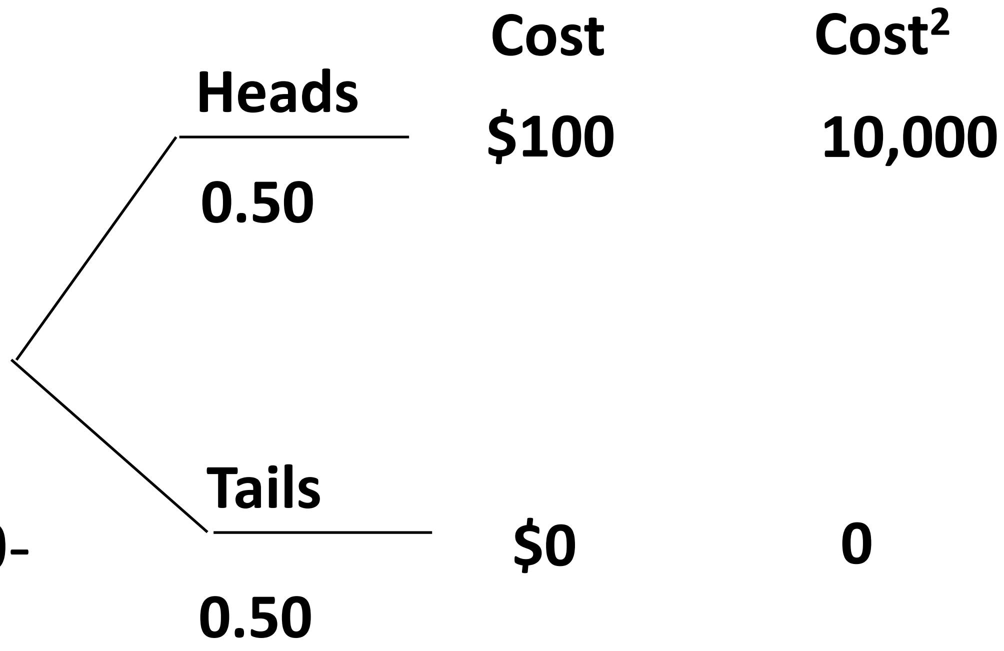
Risk Aversion can lead to bias (Planning Q 3) (cont'd)

- The expected value of this risky situation is \$50 = risk neutral certain equivalent.
- Risk mitigation alternative: P{Heads} = 0.49
- Risk reduction = (0.50-0.49) x \$100 = \$1
- Now consider risk averse scaling function, u(cost) = $cost^2$



Risk Aversion can lead to bias (Planning Q 3) (cont'd)

- The expected value of the risky situation, using the risk averse scaling function, u(cost) = cost^2, is 0.50 x 10,000 + 0.50 x 0 = 5,000, with certainty equivalent = $5{,}000^{1/2}$= \$70.71.
- Under risk aversion, the justified payment is greater than \$50.
- The justified value of the mitigation (dollar value of risk reduction) is (0.50-0.49) x 10,000 = 100 with certainty equivalent = $100^{1/2}$ = \$10.



Risk aversion can lead to illogical results (Planning Q 5)

- For example, if you are risk averse and rely on a convex scaling function, fatalities may not be treated equally or each dollar may not equal a dollar.
- A convex scaling functions will decrease the value of mitigating the risk of less consequential but more frequently occurring events, compared with the value of mitigating the risk of more consequential but less frequently occurring events.
  - Reducing the fatality in a higher consequence event would be more valuable than reducing a fatality in a lower consequence event
  - Every human life should be equally valuable.

Risk aversion can lead to illogical results

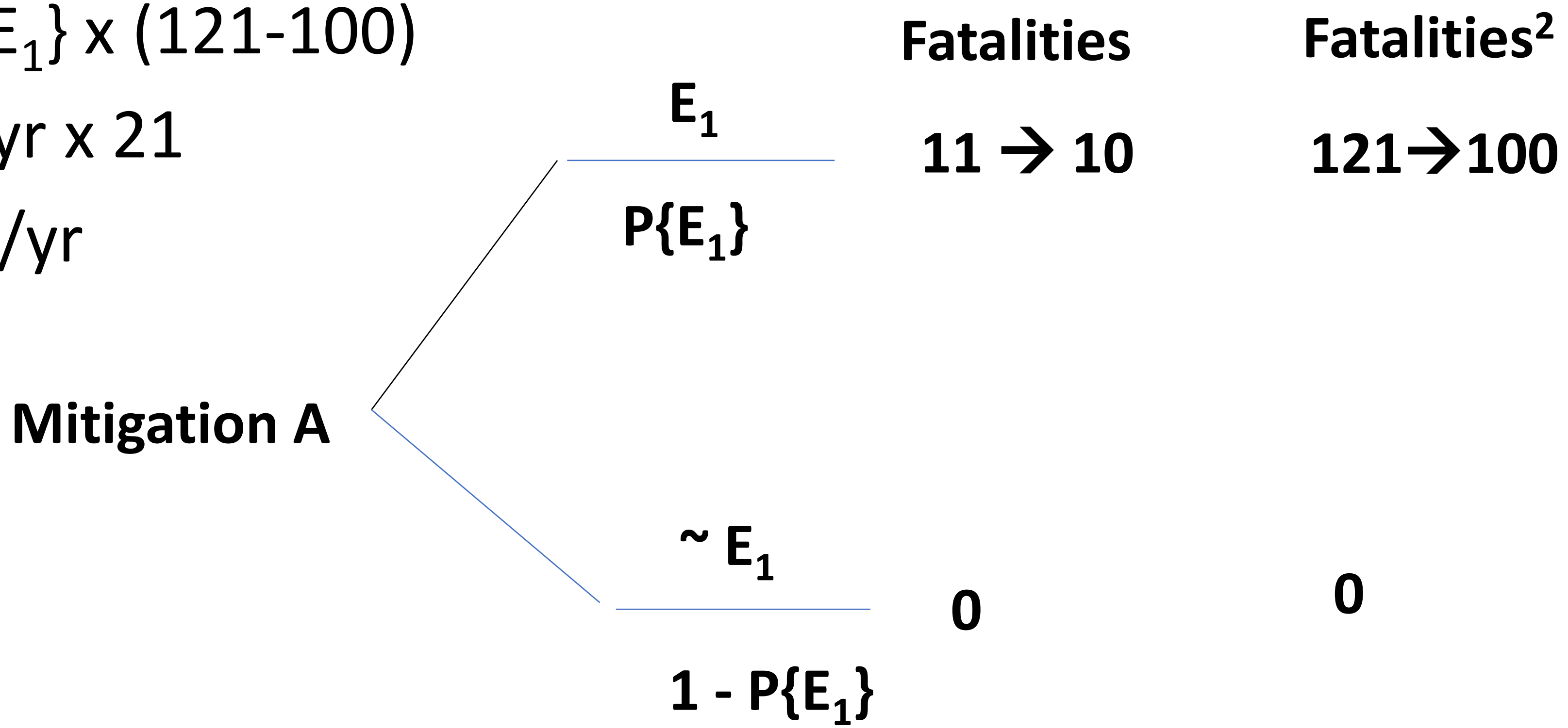
- Two events:
  - Event 1: 1x/yr, 11 fatalities if the risk event occurs; 0 fatalities if it does not
  - Event 2: 10x/yr, 1 fatality if the risk event occurs, 0 fatalities if it does not.
- Two mitigations:
  - Mitigation A: reduces Event 1 fatalities by 1, from 11 to 10.
  - Mitigation B: reduces Event 2 fatalities by 1, from 1 to 0.
- A convex/risk averse scaling function would potentially treat Mitigation A as more valuable than Mitigation B despite the fact that Mitigation A only reduces expected fatalities by 1 per year and Mitigation B reduces expected fatalities by 10 per year.

Risk aversion can lead to illogical results

- Illustrate using the risk averse scaling function $u(\text{fatalities}) = \text{fatalities}^2$
- Risk Reduction $= p\{E_1\} \times (121-100)$

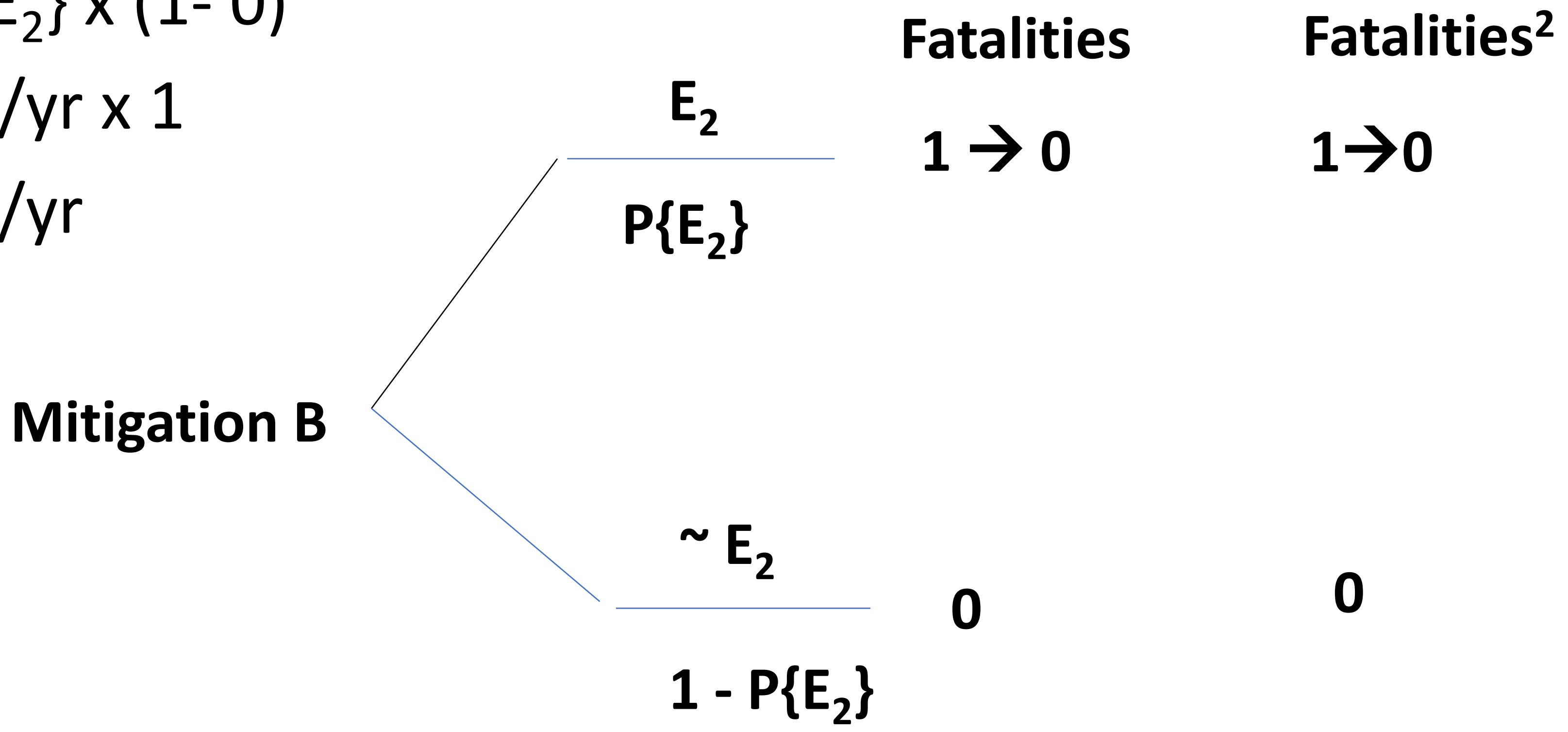
  $= 1/\text{yr} \times 21$

  $= 21/\text{yr}$



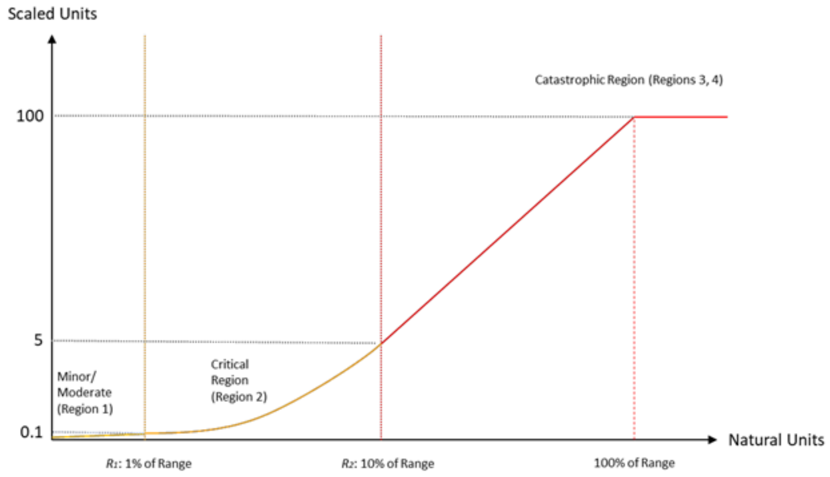
Risk aversion can lead to illogical results

- Illustrate using the risk averse scaling function $u(\text{fatalities}) = \text{fatalities}^2$
- Risk Reduction $= p\{E_2\} \times (1-0)$
  $= 10/\text{yr} \times 1$
  $= 10/\text{yr}$



Risk aversion can lead to illogical results

- Ex. PG&E 2020 RAMP



- TURN comments demonstrated that the illogical result described on the previous slides occurred.
- “In other words, PG&E would prefer to avoid one death associated with an event that would otherwise be expected to cause 11 deaths, compared with avoiding 10 deaths associated with avoiding 10 separate events, each expected to lead to one death.”

The Commission should require linear scaling functions(Planning Q 2)

- The linear scaling function is:
  - more transparent,
  - easier to modify,
  - easier to check,
  - easier to explain,
  - easier to defend.
- TURN recommends that the Commission adopt a minimum requirement for the utilities to rely on a linear scaling function/risk neutral risk attitude.
  - Provided that the utility offers the linear/risk neutral results, TURN is not opposed to the utility also providing results from convex/averse scaling function.
  - Similar to how Line 24 operates (required to present EV, can present an alternative)

Changes to RDF Language

No.	Element Name	Element Description and Requirements
7.	Cost-Benefit Approach Principle 6 – Risk-Adjusted Levels	Apply a ~~Risk Attitude~~ Scaling Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Levels. The ~~Risk Attitude~~ Scaling Function specifies attitude towards ~~different kinds of Outcomes~~ uncertainty including capturing aversion ~~to extreme Outcomes~~ or ~~indifference over a range of Outcomes~~ neutrality. The ~~Risk Attitude~~ Scaling Function can be linear or non-linear. For example, the ~~Risk Attitude~~ Scaling Function is linear to express a risk-neutral attitude if avoiding a given change in the Monetized Attribute Level does not depend on the Attribute Level. Alternatively, the ~~Risk Attitude~~ Scaling Function is non-linear to express a risk-averse or risk-seeking attitude if avoiding a given change in the Monetized Attribute Level differs by the Attribute Level. The utility will use a linear risk scaling function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Levels. A utility may also choose to present alternative Risk-Adjusted Levels relying on a convex scaling function. It does so without prejudice to the right of parties to the RAMP or GRC to challenge such convex scaling function.

Scaling Functions are not a substitute for identifying all attributes (Planning Q 7)

- Adopting a certain scaling function is not the most transparent and straightforward way to incorporate all aspects of utility decision making
- If the goal is to incorporate ESJ concerns, the more accurate way would be to adopt an additional attribute, for example, Disadvantaged Communities.
- An issue for further discussion by the Commission and parties would be attributes beyond financial, safety, reliability.

Other planning question responses

- Planning Q 4: Adoption of the CBA does not change or shift TURN's thinking about the proper risk scaling function.
- Planning Q 10: A linear risk scaling function will not impact whether low probability, high consequence events are properly valued. A linear risk scaling function will apply equally well to all events including low probability, high consequence events. See discussion of Planning Q 2 above.

Party Proposal for Risk Scaling

Presenter: PG&E

10:40 am – 11:20 am

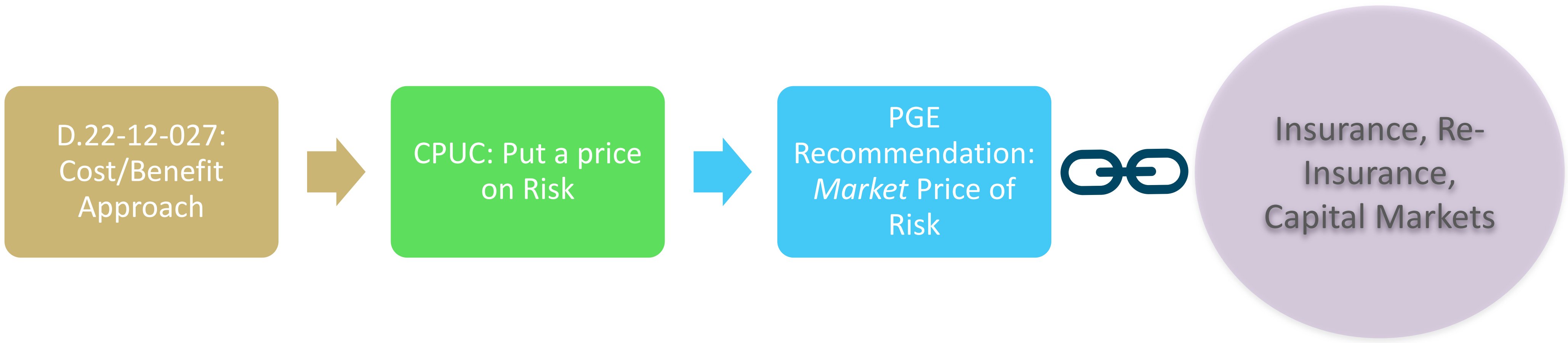
Risk Scaling – A Market-based Approach

Vincent Loh, Yumi Oum

R.20-07-013 Phase 3, Workshop #4

Oct 4th, 2023

Summary



- Calibrate the Risk Scaling Function so that the prices obtained are informed by Insurance and Capital Markets.

PG&E Proposal

Step 1A, No 7 of the RDF can be modified to recognize a market-based approach

7.	Cost-Benefit Approach Principle 6 – Risk-Adjusted Levels	Apply a Risk Attitude Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Levels. The Risk Attitude Function specifies attitude towards different kinds of Outcomes including capturing aversion to extreme Outcomes or indifference over a range of Outcomes. The Risk Attitude Function can be linear or non-linear. For example, the Risk Attitude Function is linear to express a risk-neutral attitude if avoiding a given change in the Monetized Attribute Level does not depend on the Attribute Level. Alternatively, the Risk Attitude Function is non-linear to express a risk-averse or risk-seeking attitude if avoiding a given change in the Monetized Attribute Level differs by the Attribute Level. Evidence-based approaches can also be considered, such as, but not limited to, a market-based approach, where applicable, that: 1. Does not result in Risk-Adjusted expected Values lower than the expected monetized value of the Attribute levels. 2. Notwithstanding the above, results in values consistent with prices and/or estimates from risk transfer markets, and/or public policy towards risk transfer, to the extent such pricing is applicable and available.

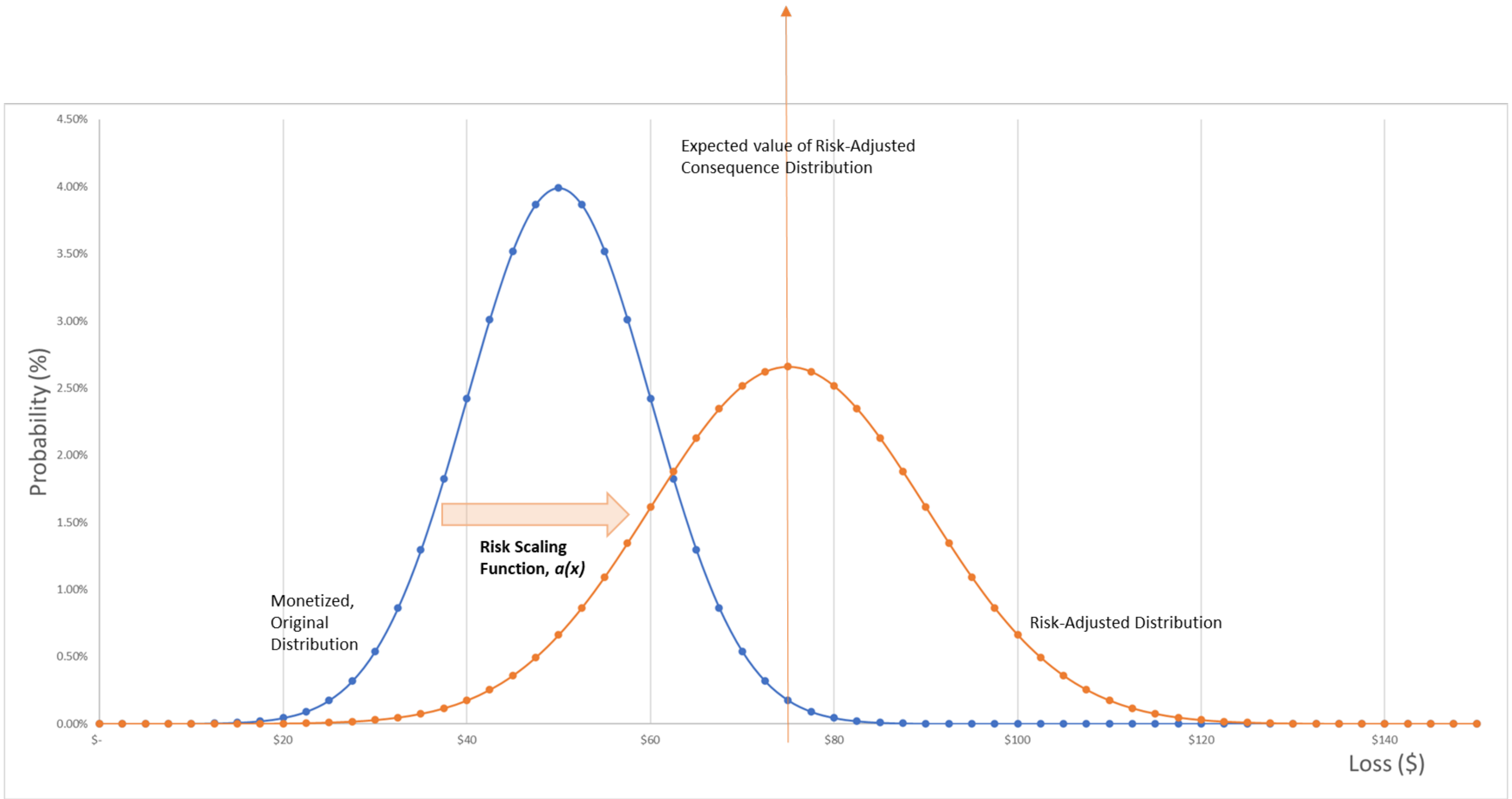
Market-based Approach – Advantages / Disadvantages

Advantages	Disadvantages
Objective & Transparent • Based on available data, and/or independent assessments.	Availability of market data • Adopt published prices from existing sources. • Employ price discovery services (broker quotes, market assessment).
Consistency & Alignment • Risk scores comparable to other industries. Risk reduction benefits are measured consistently. • Consistent policies – are other industries (e.g., insurance) using a risk-neutral preference?	Methods might not be familiar as they are finance-based • Extensively studied field (option pricing), with numerous reference sources available. • IOUs already required to "specify all information and assumptions that are used …", and that "(t)he methodologies used … should be mathematically correct and logically sound. The mathematical structure should be transparent."
Represents Societal Values	Market mispricing, inefficiencies, distortions might lead to underpricing Risks (implying Risk-seeking preferences) • Policy Safeguard: Risk-Adjusted expected Values should not be lower than the expected monetized value of the Attribute levels

Risk Scaling Function – An Alternative Treatment

Risk Scaling Function Transforms the Original Loss Distribution

Risk ($) = LoRE x CoRE



Q: What should it be Transformed to?

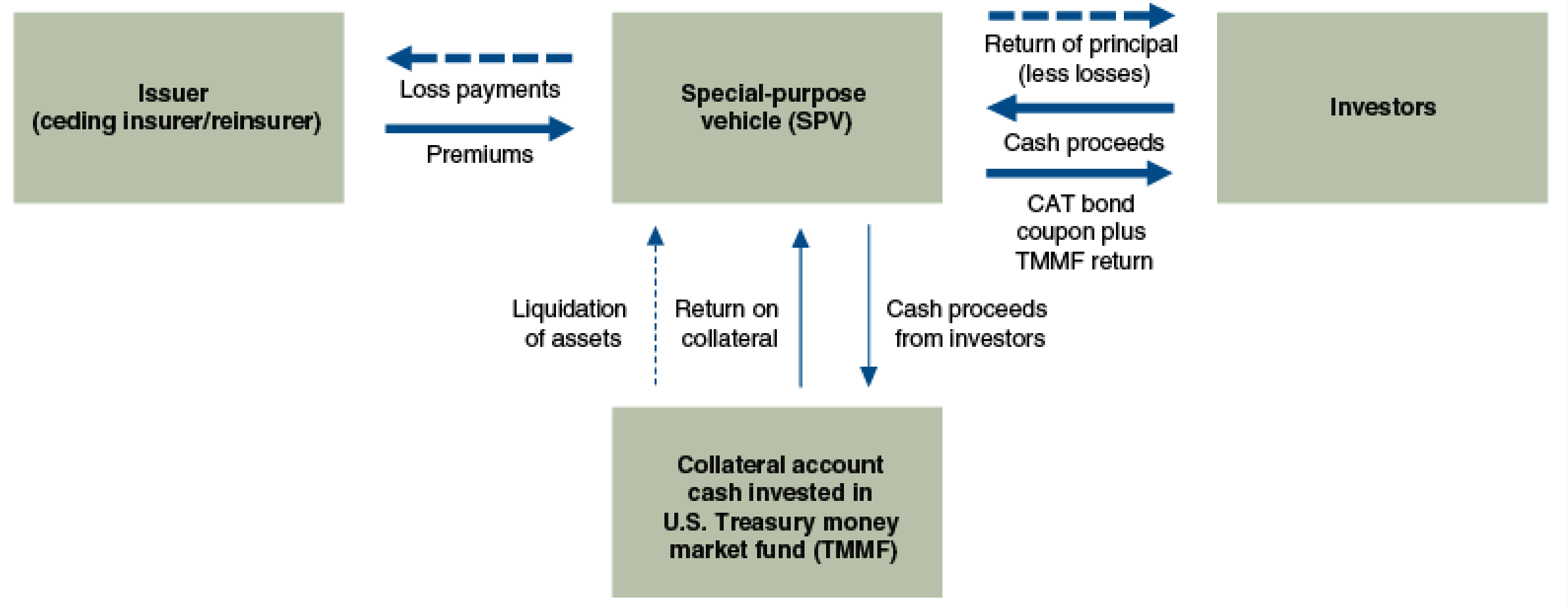
A: Distribution consistent with Market Prices

Catastrophe (CAT) Bonds

Chicago Fed Letter, No. 405, 2018. Catastrophe Bonds: A Primer and Retrospective:

"A CAT bond is a security that pays the issuer when a predefined disaster risk is realized, such as a hurricane causing $500 million in insured losses or an earthquake reaching a magnitude of 7.0 (on the Richter scale)."

1. Catastrophe bond structure



Sample Market Data

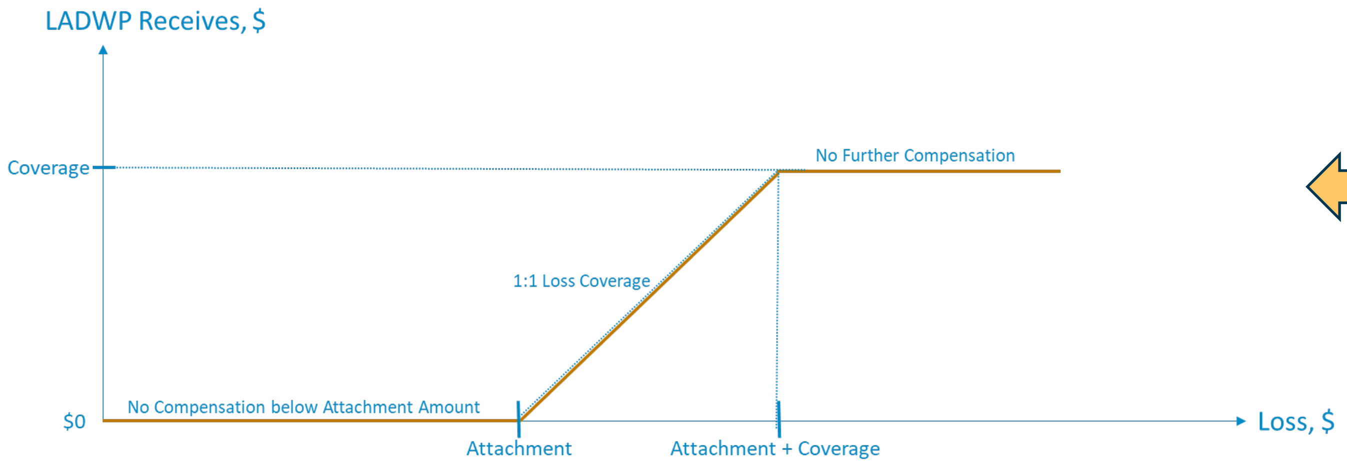
Representative Catastrophe (CAT) Bond Transactions

Name	Date of Issuance	Attachment	Coverage	Expected loss	Pricing	Pricing/Expected Loss
PG&E Cal Phoenix Re	Aug 2018	$1.25B	$200M	1.01%	7.5%	7.5
Sempra SD Re Ltd (series 2018-1)	Oct 2018	$1.326B	$125M	0.21%	4%	19
Sempra SD Re Ltd (series 2020-1)	July 2020	$1B	$90M	1.52-1.8%	9.75%	5.4-6.4
Sempra SD Re Ltd (series 2021-1) class B	Oct 2021	$1.21B	$135M	1.56-1.85%	9.25%	5-6
LA DWP Protective Re Ltd (series 2020-1)	Dec 2020	$125M	$50M	0.64-0.74%	10.75%	15-18
LA DWP Power Protective Re Ltd (series 2021-1)	Oct 2021	$125M	$30M	0.64-0.76%	15%	20-23

Example CAT Bond

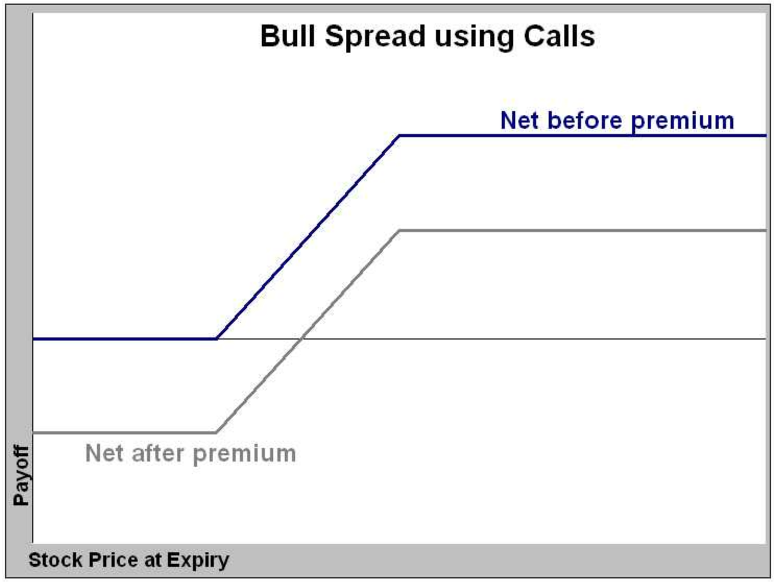
Financial Tools Can Be Used to Analyze Risk

Power Protective Series Re Ltd. (Series 2021-1) / LADWP



Attachment: \$125m
Coverage: \$30m
Premium: \$4.5m (15% of \$30m); 20-23x Expected (0.64-0.76%; \$192k to \$228k)
https://www.artemis.bm/deal-directory/power-protective-re-ltd-series-2021-1/

"Bull Spread" (Call Spread)

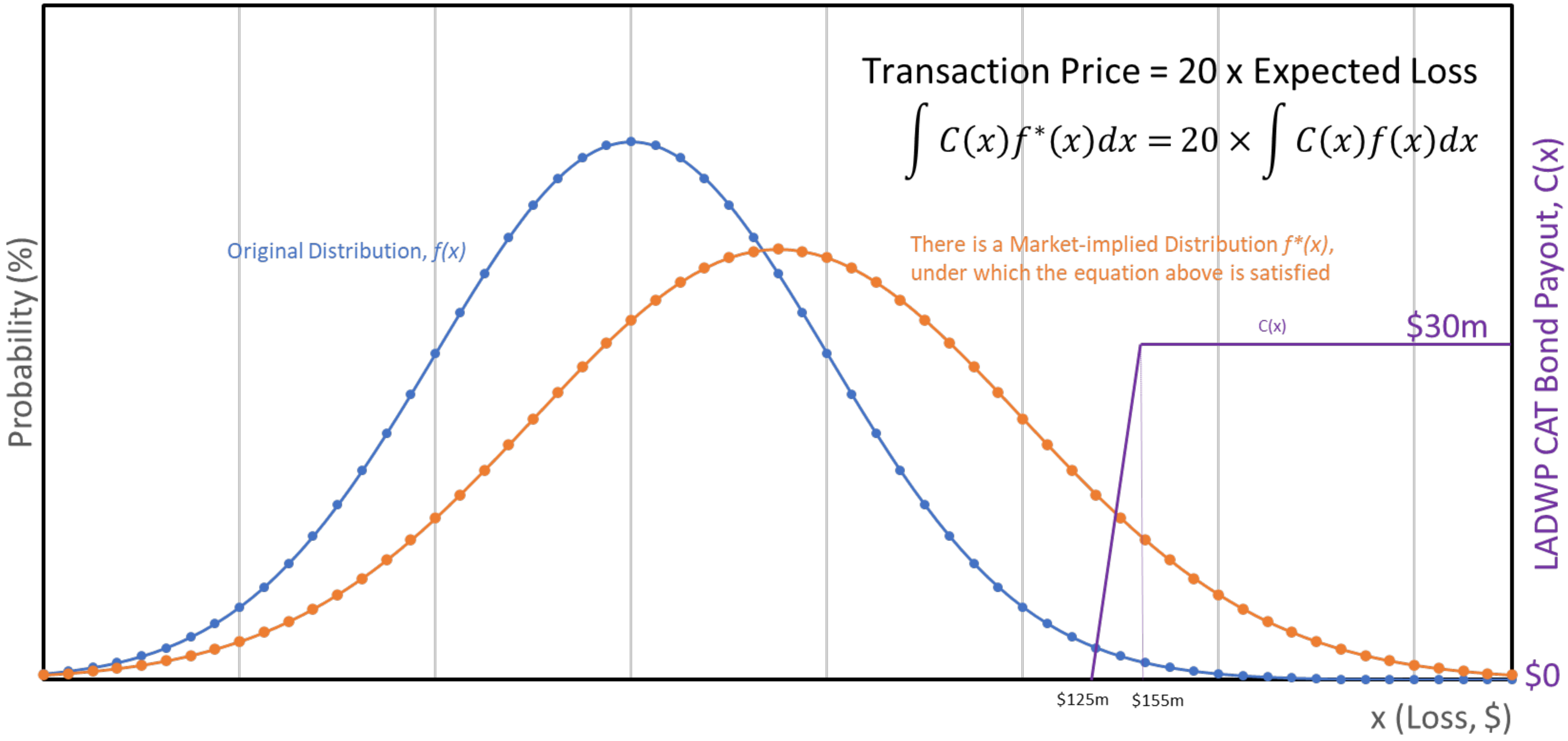


"A bull call spread is constructed by buying a call option with a lower strike price (K), and selling another call option with a higher strike price."
https://en.wikipedia.org/wiki/Bull_spread

C(x) = Payoff = max(Loss – Attachment, 0) – max(Loss – (Attachment + Coverage), 0)

Extracting Distribution Information from Prices

Price of a CAT bond is the discounted, expected Payoff under the Market-Implied Distribution. Knowledge of Prices leads to information about this distribution.

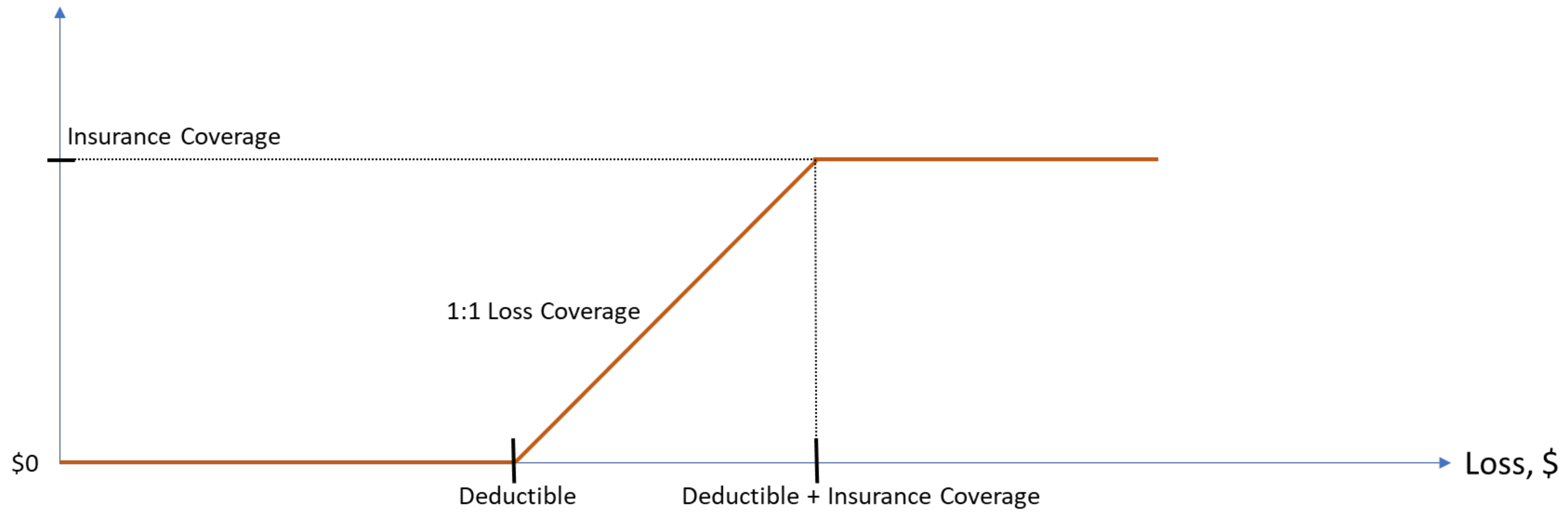


Sample Market Data

Insurance Policies

In general, policies have a “call spread” structure.

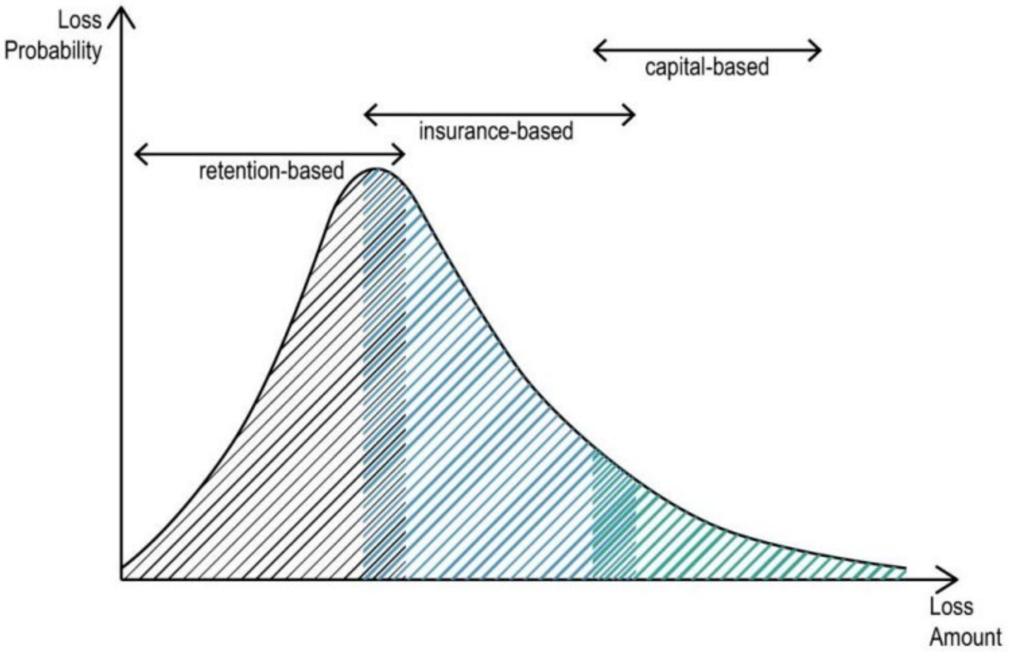
Payoff, \$ = max(Loss – Deductible, 0) – max(Loss – (Insurance Coverage + Deductible)), 0)

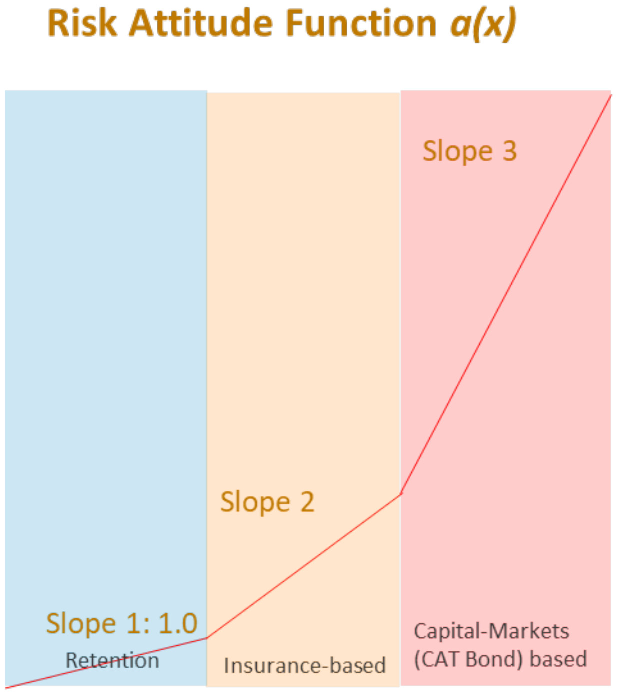


Loss Ratio = Expected Losses / Premiums
Generally range from 50% to 75%

Example Scaling Function Form

A candidate Scaling Function form based on Risk Financing Strategy*.





- *Retention-based tier:* For high frequency/lower-loss risks, firms often assume "deductible" amounts in insurance contracts, i.e., assume losses under a certain amount.
- *Insurance-based tier:* For lower probability/higher magnitude risks, losses are transferred to insurance companies.
- *Capital-based tier:* Transfer tail/catastrophic risks to capital markets and reinsurers via CAT bonds and other products.

3 piece-wise linear segments:

- First segment slope set to 1.0 to reflect preference to "in-house" the risk.
- Slope 2 and Slope 3 calibrated to market information

* Carolyn Kousky, Katherine Greig, and Brett Lingle, "Financing Third Party Wildfire Damages: Options for California's Electric Utilities", February 2019, Wharton Risk Management and Decision Processes Center

Calibration Example

Assumptions Required

- Underlying per-Event Loss Distribution (e.g., Lognormal)
- Number of Fires per year
- Risk Scaling Function shape (e.g., 3 linear segments)

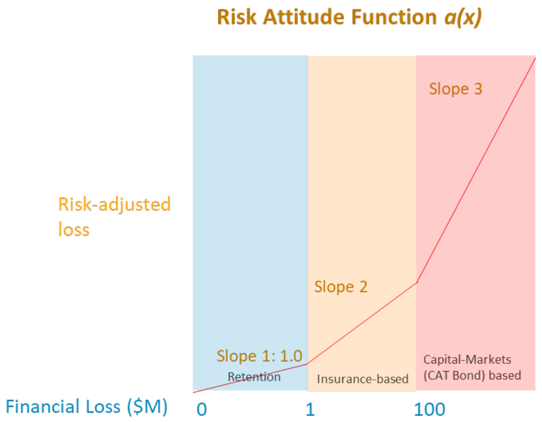
Available Data

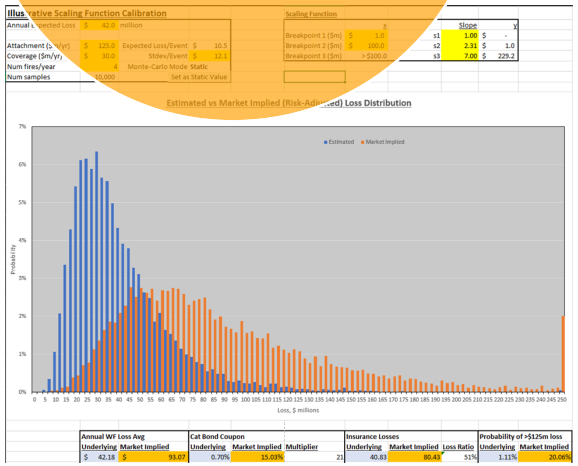
- Expected Annual Losses: $42m per annum (Estimate provided by LADWP)
- Expected CAT bond price: 0.64% to 0.75% ($192k to $228k)
- Transacted CAT bond price: 15% ($4.5m; 20 – 23x Expected price)
- Insurance Loss Ratio: 50% to 75%

σ_{event}=$12.1m

Slope 2 = 2.31

Slope 3 = 7.00





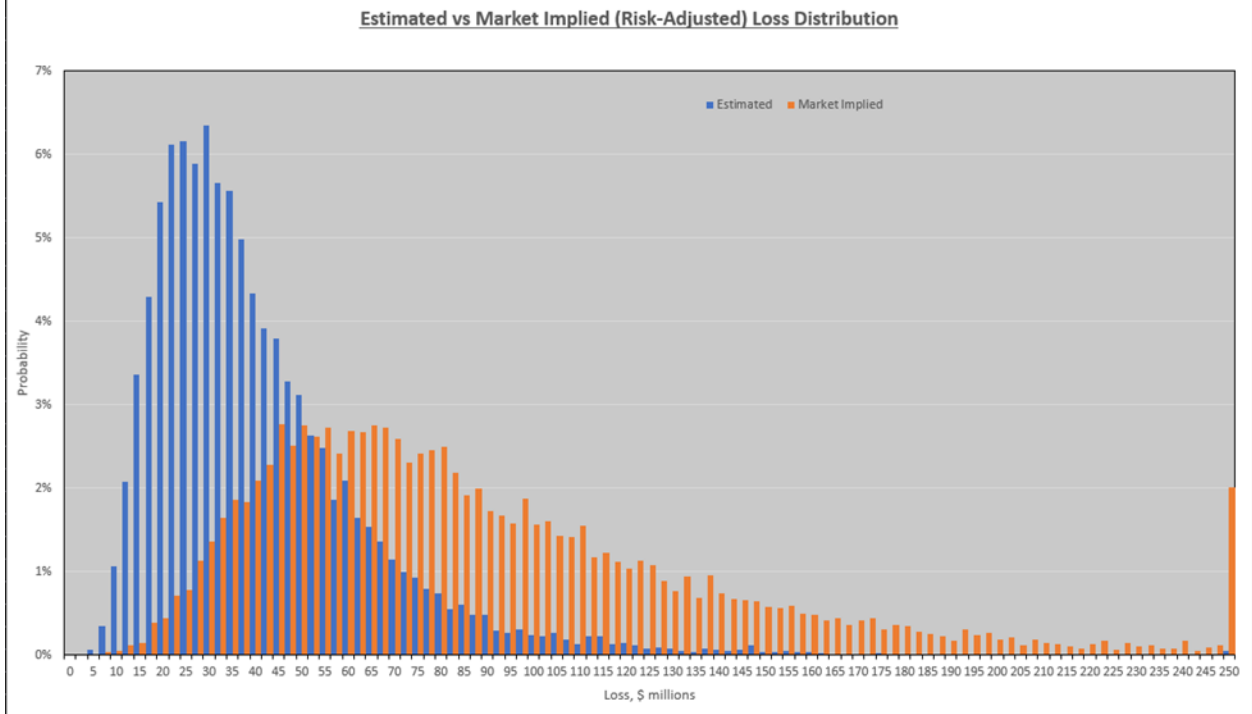
Calibration Example Spreadsheet

Illustrative Scaling Function Calibration

Annual Expected Loss	$ 42.0	million		
Attachment ($m/yr)	$ 125.0	Expected Loss/Event	$	10.5
Coverage ($m/yr)	$ 30.0	Stdev/Event	$	12.1
Num fires/year	4	Monte-Carlo Mode	Static	
Num samples	10,000	Set as Static Value		

Scaling Function

	x		Slope	y
Breakpoint 1 ($m)	$ 1.0	s1	1.00	$ -
Breakpoint 2 ($m)	$ 100.0	s2	2.31	$ 1.0
Breakpoint 3 ($m)	> $100.0	s3	7.00	$ 229.2



Annual WF Loss Avg		Cat Bond Coupon			Insurance Losses			Probability of >$125m loss	
Underlying	Market Implied	Underlying	Market Implied	Multiplier	Underlying	Market Implied	Loss Ratio	Underlying	Market Implied
$ 42.18	$ 93.07	0.70%	15.03%	21	40.83	80.43	51%	1.11%	20.06%

Other Considerations

ESJ Prioritization

Additional premiums/benefits representing societal priorities like ESJ can be incorporated. For example, with a multiplier:

$$a_{DVC}(x) = M_{DVC} \times a(x)$$

M_{DVC} can be determined by policy makers or tied to available statistics (e.g., income levels), data or studies.

Non-Wildfire Risks

- Ideally, Risk Scaling Functions can be developed on a Risk-by-Risk, Attribute-by-Attribute basis.
- CAT bond data exists for other risks (cybercrime, earthquake, etc.).
- If no data exists, general liability insurance policies and pricing can be applied.
- PG&E expects to become more skilled over time in identifying and employing relevant market data. In the meantime, approaches to consider include using a general Risk-Scaling Function where Risk-specific information is unavailable.

Areas of Investigation

Treating the Risk Scaling Function as a Transformation Leads to New Avenues of Inquiry

Example: Risk Scaling – Power Law Edition??

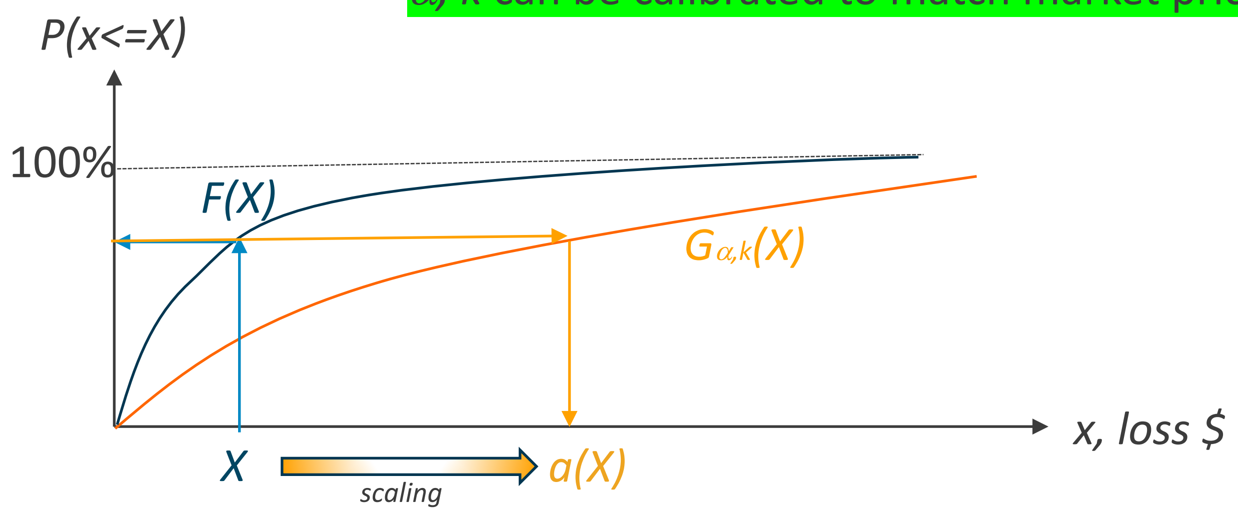
Assume Market-Implied Distributions are Power-Laws

$f(x), F(x)$ - Original Distribution (pdf, cdf)

$g_{\alpha,k}(x), G_{\alpha,k}(x)$- Truncated Power Law Distribution (pdf, cdf) with parameter α, truncated at k

$a(x) = G_{\alpha,k}^{-1}(F(x))$ – Converts any distribution to a Power Law.

α, k can be calibrated to match market prices.



Conclusion

CPUC should not mandate any Risk Scaling Function.

With the Cost/Benefit Approach, we can compare risk assessment across industries.

- Mandating a function destroys this ability.

PG&E provided a *simplified example* of how market prices can be related to bowties.

- It is not exhaustive, and only meant to prompt discussion.
- First step in an evolving journey.

Market prices provide a way to be consistent in making investment decisions.

- With a linear slope=1.0 Risk Scaling Function, a physical mitigation program will likely be valued *lower* than a financial product providing only risk-transfer benefits.

Therefore, IOUs should maintain the ability, via the Risk Scaling Function, to apply the latest information and innovations across industries to the RDF.

Thank You

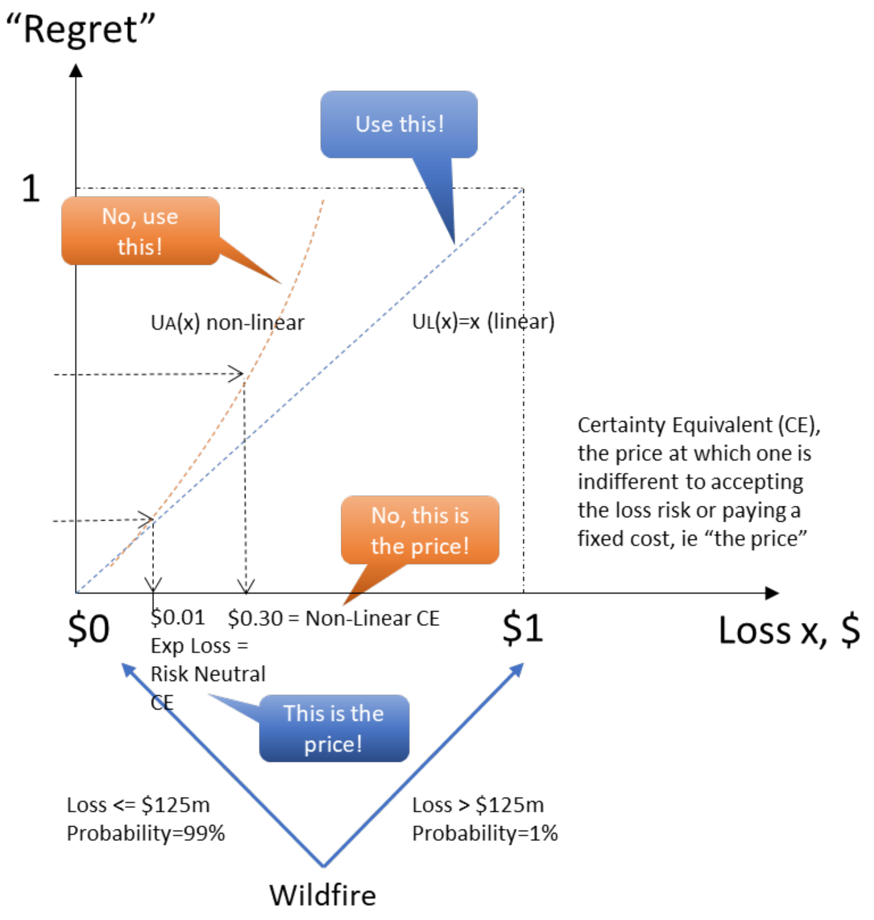
Vincent Loh
vincent.loh@pge.com

Yumi Oum
yumi.oum@pge.com

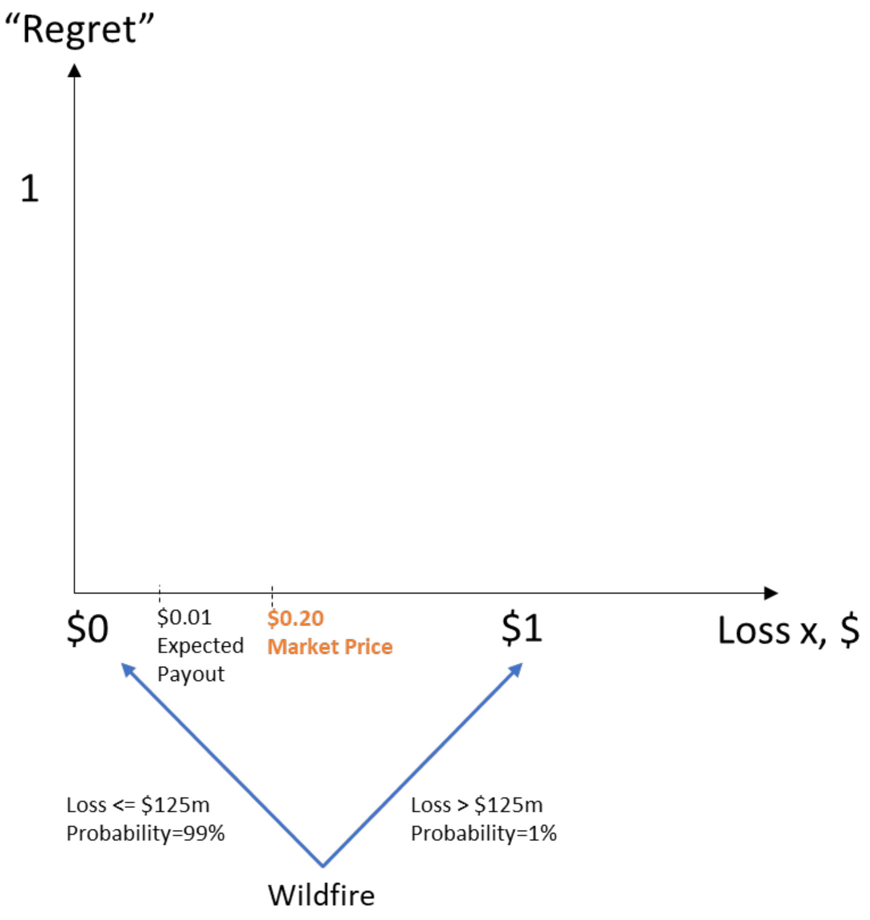
Appendix

Risk Scaling Function and Markets

RDF



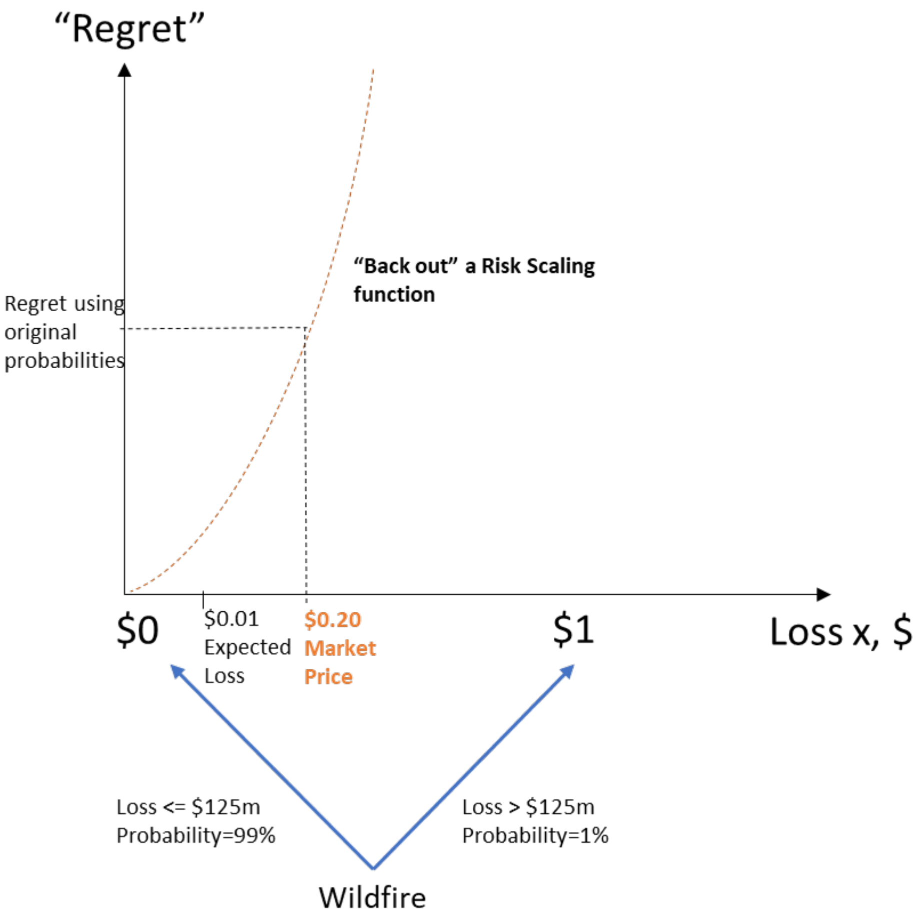
Markets Simplify Analysis



Risk Scaling Function and Markets

Markets Simplify Analysis – Two Equivalent Approaches

Use to Infer a Risk Scaling Function



Even Simpler – Assume Linear, but Infer Probabilities

Break

11:20 – 11:25 am

Risk Scaling: General Discussion

11:25 am – 12:25 pm

Discussion Questions: Preferences

- Throughout its proposal, PG&E makes the assumption that the prices from insurance and capital markets "encode preferences". PG&E talks about using these prices as "observed data" to infer a "targeted" distribution that is computed using the parameters in PG&E's new risk scaling function.
  - Whose risk preferences are exhibited within the prices of insurance and capital markets?
  - Whose risk preferences does this "target" distribution represent?
  - Whose risk preferences are not represented?

Discussion Questions: Relevance to R.20-07-013

- Are the market prices for CAT bonds or insurance contracts, relevant to the kinds of risk we are assessing in this proceeding?
  - Is PG&E's proposal asking to base revenue recovery from customers on the Catastrophe Bond market?
  - What are the inefficiencies that exist within the CAT bond market?
  - What implications do these inefficiencies have for risk scaling functions in this proceeding?
  - Is this market efficient enough to allow it to influence risk assessment and utility rates?

Discussion Questions: Cost-Benefit Approach

- PG&E notes that with the shift to the Cost-Benefit Approach, the RDF should allow risks to be comparable with other independent dollar-based markets that consider risk (the insurance and capital markets). However, the insurance and capital markets are concerned with financial risks.
  - What assumptions need to be made in order to make comparisons with the IOUs' safety risks?
  - Can the pricing mechanisms of insurance and capital markets be used to affect distributions of safety risks?

Should the Commission allow for insurance or other financial products to stand in for actual safety mitigations, assuming that they achieve the same levels of monetized risk reduction?

Discussion Questions: Safety and Reliability

- PG&E maintains that the prices of financial instruments and insurance contracts may be appropriate for assessing the financial consequences of risk events.
  - In what way are these data appropriate for assessing the safety and reliability consequences of risk events?
  - In what ways are they inappropriate for assessing the safety and reliability consequences of risk events?

Discussion Questions: Relevance 2.0

- Assuming PG&E's approach is only relevant to the financial attribute, then why is it necessary to embed the prices of insurance contracts or CAT bonds into risk assessment?
  - Should the utilities be engaging in risk hedging by purchasing insurance or CAT bonds?
  - What are the implications of using this method as justification for investing in risk mitigations?

Discussion Questions: RDF Irrelevant?

- In its Conclusion, PG&E states:
  - "A physical mitigation program is a superior product to financial risk transfer, and if the RDF is incapable of recognizing this, it is in peril of becoming irrelevant."
  - In what way would the RDF become "irrelevant"?
  - What assumptions are made that allows the IOUs to make a comparison between a physical mitigation program and a financial risk transfer?
  - What assumptions are made to justify using the tools of financial markets rather than decision-making science?

Discussion Questions: Other IOUs

- Do SCE and Sempra see the approach laid out by PG&E as relevant to their own approach to risk scaling?

- What modifications would SCE and Sempra propose for improving the approach that PG&E has presented?

Discussion Questions: Intervenors

- Do the intervenors have any concerns about the implications PG&E's approach for evaluating future RAMP and GRC filings?
  - Do intervenors have any concerns about the implications that PG&E's approach has for the selection of mitigations in future RAMP and GRC filings?
  - Does PG&E's approach improve on the transparency of the RDF? If so, how? If not, why not?

CPUC Close and Next Steps

12:25 pm – 12:30 pm

Next Steps

1. Workshop Recording on Youtube (3-4 days)

   https://www.youtube.com/user/CaliforniaPUC

2. TURN & PG&E File Risk Scaling Proposals (October 12)

3. Ruling with Questions for Party Comment (approx. October 16)

4. Workshop #4 Opening Comments (November 6)

5. Workshop #4 Reply Comments (November 13)

Thank you!

Edwin "Eddie" Schmitt
edwin.schmitt@cpuc.ca.gov

Rulemaking (R.) 20-07-013: Phase 3 Workshop #4: October 6, 2023 (Optional Date)

Risk Scaling