

Notice, Soft Cap, Hedging

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Let them Trade? Not without **Notice**?

- **Economics:** If a buyer would pay £10,000 and a seller would accept, £4,000
 - Both could be better off.
 - They should trade.
 - Consumers count on NG to make their offer.
 - Should NG refuse?
- Suppose the CM reward is only £4,000.
- Suppose VoLL is £10,000

Many more warm generators

Popular view #1:

- ➔ Some generators find they can make more money catching stress events than they spend keeping warm. So they warm voluntarily.
- Since load is better off paying £4,000 than suffering a blackout, this extra warming is efficient.
- According to this incorrect view STOR must be very inefficient.

STOR Is Perfectly Efficient

- **Popular view #2:**
- ➔ It would cost STOR more to warm one more generator than the benefit it provides (£10,000/MWh during stress hours).
- **No generators will decide to warm** on their own to capture CM rewards of only £4,000.
- This contradicts Popular view #1.

If Generators Would Warm Voluntarily

- Then it proves STOR did not capture all possible benefit.
- If STOR Is Optimal, then none will warm voluntarily. (Assuming they are smart.)
- **Conclusion:** It's best to let people trade when they want to. Don't stop them because
 "The regulator would have done that
 if it was good for you."

But CM Doesn't Pay, It Penalizes!?

- Suppose the CM Price = £30/kW
- **Penalty** = £10,000/MWh
- Two stress hours per summer.
- Slow Gen gets: £30,000 – £20,000 = £10k.
- Fast Gen gets: £30k
- Suppose the CM Price = £10/kW
- **Reward** = £10,000/MWh **It's all the same.**

Soft Cap

- Objectives:
 - Limit liabilities
 - Keep the incentives going and strong
 - Keep the incentives uniform (if we can)
- How?
 - Let the penalties accumulate: 4 misses → £40k
 - Then switch philosophy at the cap (£40k)
 - Estimated capacity: 5/10 misses → 50% of £40k

The Soft-Cap Formula

- UCP = UnCapped Penalty
 - SCP = Soft Cap Penalty
 - MaxP = Maximum possible Penalty
 - APC = Annual Penalty Cap
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- If $\text{MaxP} < \text{APC} \rightarrow \text{SCP} = \text{UCP}$
 - If $\text{MaxP} > \text{APC} \rightarrow \text{SCP} = (\text{UCP}/\text{MaxP}) \times \text{APC}$
 - UCP/MaxP = estimate of derated capacity
 - $\text{SCP} = (\text{UCP}/\text{MaxP}) \times \text{Min}(\text{MaxP}, \text{APC})$

The Incentive Is Uniform

- $SCP = UCP \times \text{Min}(\text{MaxP}, \text{APC}) / \text{MaxP}$
- SCP gives the UnCapped Incentive times
 $\text{Min}(\text{MaxP}, \text{APC}) / \text{MaxP}$
- What if a portfolio has twice as many generators?
- $\text{Min}(2 \times \text{MaxP}, 2 \times \text{APC}) / (2 \times \text{MaxP})$
- It's the same incentive!
- Since the UCP is constant,
- **The SCP incentive is uniform** for all generators!

Why Can the Penalty Go Down?

- Say the cap (£40k) is hit after 4 missed hours.
- A generator that misses all 4 hits the cap.
- But say it makes 5 out of the next 6 hours.
- Now it looks like, the generator was unlucky at the start but is certainly giving us more than zero capacity — more like 50% of its derated capacity.
- So penalize it for half it's capacity — £20k.

Does the Incentive Go to Zero?

- No.
- Say the penalty hits the max after 4 hours.
- Then the generator misses hour 5.
- No penalty for that, so no incentive.
- Wrong.
- If it made hour 5, penalty would decrease to $(4/5) \times £40k = £32k$. The penalty is 80% of full strength. It decreases quite slowly.

Hedging

- Will caps damage the secondary (hedging) market?
- No. But this is the wrong question !
 - Ignores the benefit of the cap.
- Will caps increase the penalty risk of generators?
- If Speeding tickets were £10/kmph, and they got soft-capped at £40? or £60?

Is a Cap Risky?

- Would speeding be more risky?
- Well sure because I want to hedge my ticket risk and now I don't know how much hedge to buy.
- ????
- What if I just buy the same hedge—it costs me the same and pays me more than I need.

Inhomogeneous Products?

- Caps make the product inhomogeneous.
- Nope. Lawyers make the product.
- If you want to prove there is such a problem, write down the best product and try it out.

Product: If there is a shortage hour, the owner will be paid the standard non-capped Penalty, and £0 otherwise.

Hedging with No Cap

- Say you have a 100 MW gen up and running, and your derated capacity is 80 MW.
- You want to sell a 20 MW hedge.
- If you are down, buy an 80 MW hedge.
- If you are 50% likely to be down by a 30 MW hedge.
- Every probability of performance and limit on your performance requires a different amount of hedging. ➔ Buy different amounts of hedge.

How to Hedge with a Cap

- When we get past the number of hours needed to hit the cap, the penalty is reduced.
- So you need less hedge.
- So you buy less.
- If you can't work the formula, don't bother.
- Pretend you are not capped and you will do almost as well. And you will have no downside risk, just upside risk.

But Will Someone Sell You a Hedge?

- If you are likely to “overproduce” you have upside risk—the risk that England will not have a good, long blackout for years.
- You are not a gambler, so you want to get paid the average amount every year.
- So you sell a hedge and this reduces your risk.
- And you get paid to worry less.
- This is a very sweet deal.

“But I don’t believe economists.”

- Right. So no one with upside risk wants a sweet deal.
- So the downside guys get desperate and offer more money.
- Still no deal. Nobody will take the free money.
- Heck, it’s better than free.
- Nobody wants to be paid double and feel safer.

Talk to Ladbrokes

- A financial secondary market is just a betting market.
- Ladbrokes can find a million speculators that will pay a lot to increase their risk—and accept less-than-fair odds.
- I'm sure they can find you a few speculators that will hedge risks at better than fair odds.
—Just kidding. But there's a message here.

How can NG help?

- If you write to one of these online gambling houses and suggest a new wager that they should host, their main question is:

How do we define exactly when it pays off?

- For example: Wager: Republicans will take the House. —What if they win enough elections, but one dies just before he takes office?
- NG should provide an unambiguous answer.

Hedge Definition

- What if someone appeals the penalty rate
- What if there is some bad data that gets corrected later?
- A secondary market needs a well-defined answer (not necessarily the very best answer) that is completely unambiguous and well correlated with the very best answer.