Quantifying the utility of war to increase small state deterrence capability
– deterrence in an operational analytical perspective
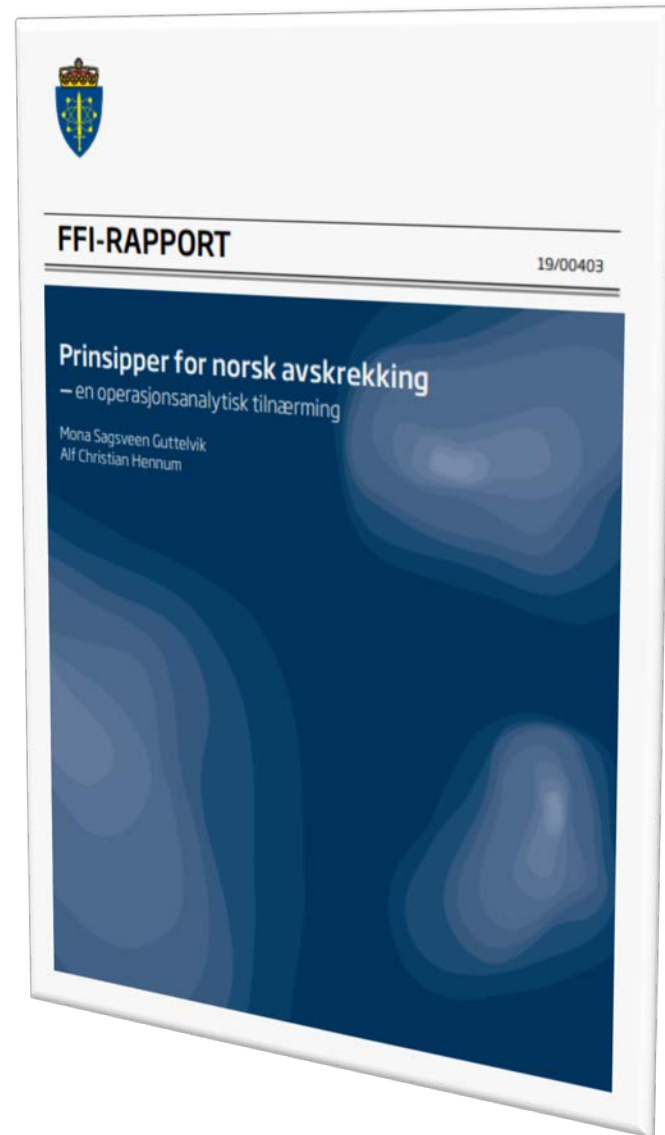
13th NATO OR&A Conference

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FFI-RAPPORT

19/00403

Prinsipper for norsk avskrekking
– en operasjonsanalytisk tilnærming

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Why deterrence at FFI?

- Norwegian Defence Research Establishment (FFI) is the prime institution responsible for defence-related research in Norway

- The Norwegian Armed Forces task number one:
  1. Ensure credible deterrence based on NATO's collective defence
  2. …

- How do we ensure credible deterrence?

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Deterrence strategy

- A military strategy intended to prevent an opponent from attacking by the threat of using power (revenge)

- Deterrence by punishment
  - Threatening to seriously harm
  - Nuclear deterrence and principle of mutually assured destruction (MAD)

- Deterrence by denial
  - Threatening to deny the adversary achieving his objectives through aggression
  - Conventional deterrence

- Extended deterrence
  - Deter not only to protect own state but also partner states
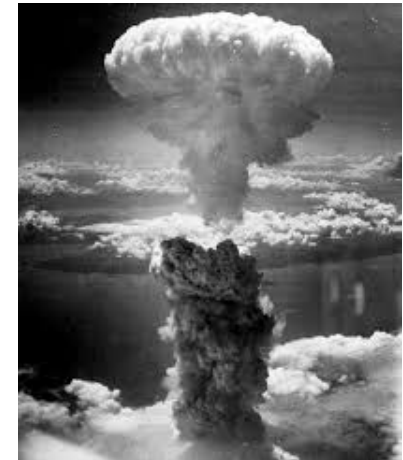
Deterrence in an operational analytical perspective

- Use a model inspired by Bruce Bueno de Mesquita to quantify the utility of war

- What happens with the utility when the parameters are varied?

- How can a small state make the utility as small as possible?
  - Make the assumption that measures who indicates low utility for an adversary are measures that will deter the adversary

- Uses the categories of deterrence – punishment and denial – and make suggestions to what the Norwegian Armed Forces can do to deter

Model for utility of war – small nation

- Assume rational actors

- Assume two possible outcomes: winning or loosing and that each of the states have a probability of appearing

$$U^{Norway} = P^{Norway}_{Success} U^{Norway}_{Success} + P^{Norway}_{Failure} U^{Norway}_{Failure}$$

- The conflict will have a cost, C^{Norway}

$$U^{Norway} = P^{Norway}_{Success} U^{Norway}_{Success} + P^{Norway}_{Failure} U^{Norway}_{Failure} - C^{Norway}$$
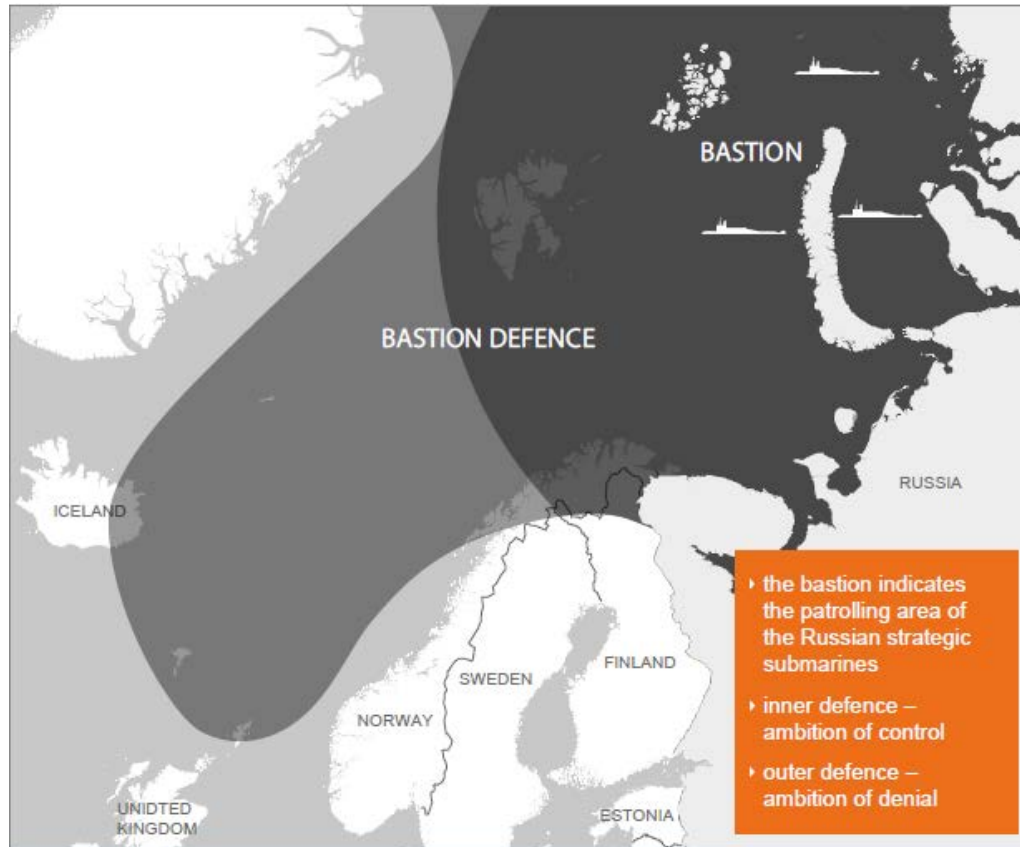
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Model for utility of war – alliance

$$U^{Allied} = P_S^{Allied} U_S^{Allied} + P_F^{Allied} U_F^{Allied} - C^{Allied}$$

- There will be a probability $P_{Involve}^{A}$, that the allied will get involved in the conflict

- The total utility can be calculated by:

$$U = P_{Involve}^{A} U^{Allied} + (1 - P_{Involve}^{A}) U^{Norway}$$

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From the Norwegian perspective

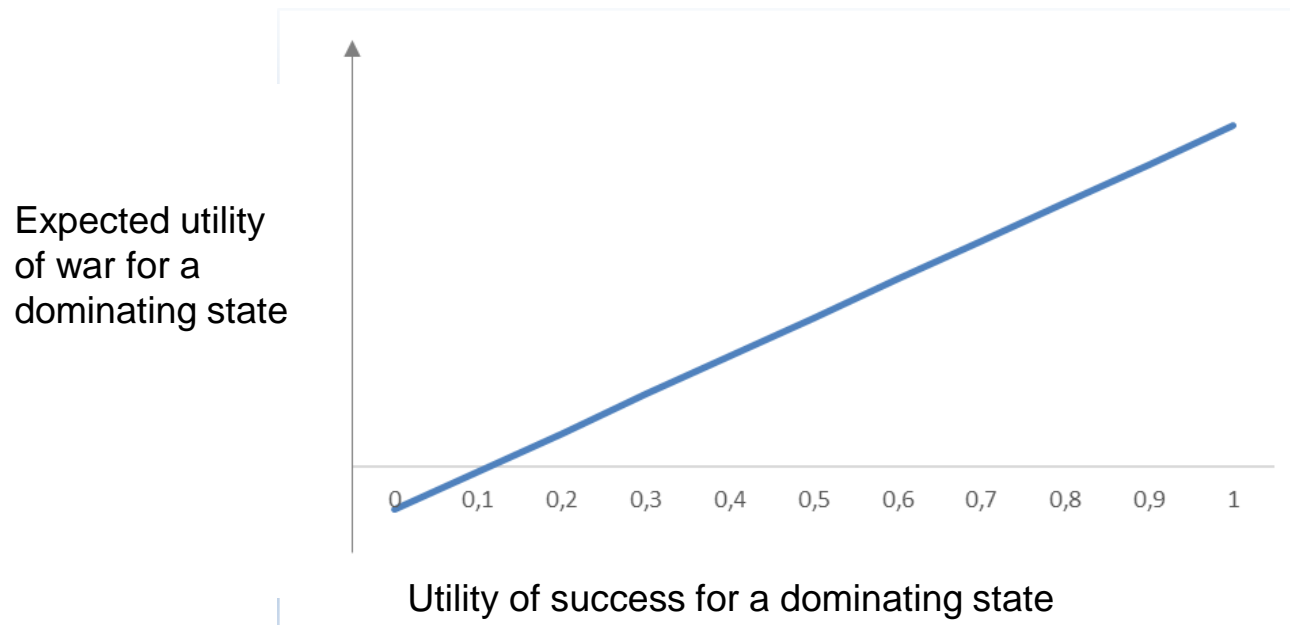Military context: Norway << Russia << NATO

The utility parameter for success; $U_{Success}^{Norway}$

- Depends on the aggressors objective

- Could depend on type of conflict
  - International conflict vs. bilateral conflict

- The expected utility of war almost always positive regardless of utility for success

- If we know the opponents objectives we can make it harder for him to achieve them
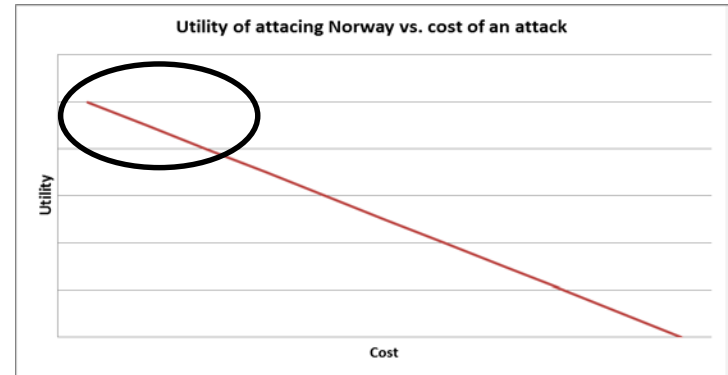 - Indicates deterrence by denial

$$U^{Norway} = P_{Success}^{Norway} U_{Success}^{Norway} + P_{Failure}^{Norway} U_{Failure}^{Norway} - C^{Norway}$$

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Consequenses of differences in military power

Expected utility of war for a dominating state

Utility of success for a dominating state

(x-axis: 0, 0,1, 0,2, 0,3, 0,4, 0,5, 0,6, 0,7, 0,8, 0,9, 1)

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The cost parameter; C^{Norway}

- Is it possible for Norway to influence the utility through the cost parameter?
  - How to influence the cost?
  - How to create uncertainty?

Utility of attacing Norway vs. cost of an attack

- It is a theoretical possibility to increase the cost and deter conflicts with low utility for success
  - Indicates deterrence by punishment
  - An opponent would probably use other, non-military means if the utility for success is low

- The cost parameter can indirectly influence $P_{Involve}^{Allied}$
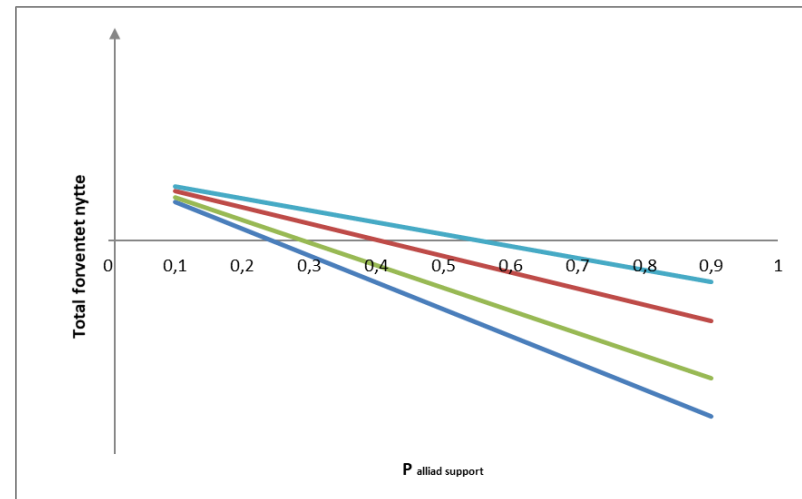
How much *Cost* is enough to deter?

Expected utility of war

Cost agaist a small state
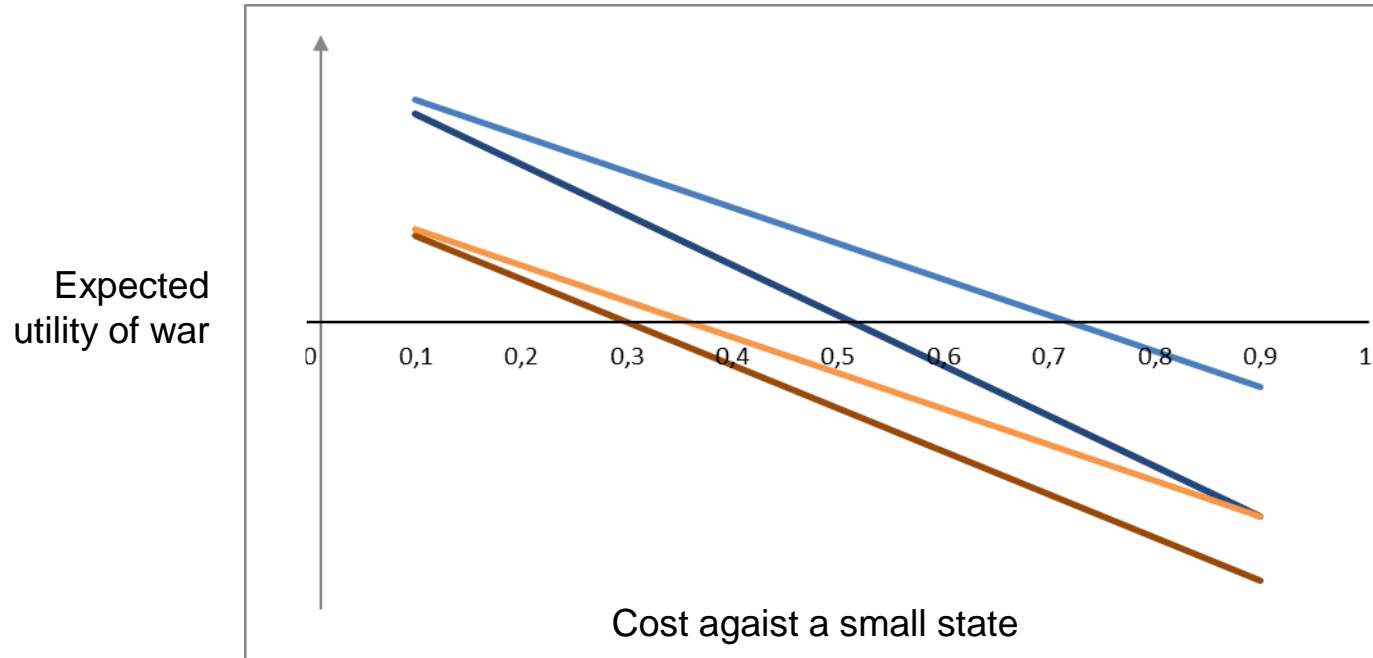
The probability parameter; $P_{Involve}^{A}$

- Expected utility against allied, U^{Allied}, always small or negative in todays context

- Utility against Norway (probably) high

$$P_{Involve}^{Allied} = 0;\ U = U^{Norway}$$

$$P_{Involve}^{Allied} = 1;\ U = U^{Allied}$$

Total forventet nytte

0   0,1   0,2   0,3   0,4   0,5   0,6   0,7   0,8   0,9   1

P alliad support

- Norway depends upon allied and extended deterrence – but what kind?

$$U^{Allierte} = P_{S}^{Allied} U_{S}^{Allied} + P_{F}^{Allied} U_{F}^{Allied} - C^{Allied}$$

$$U = P_{Involve}^{A} U^{Allied} + (1 - P_{Involve}^{A}) U^{Norway}$$

Bilateral vs. bastion conflict

- Adversary wants bilteral conflict
  - if the alliance gets involved in the conflict:
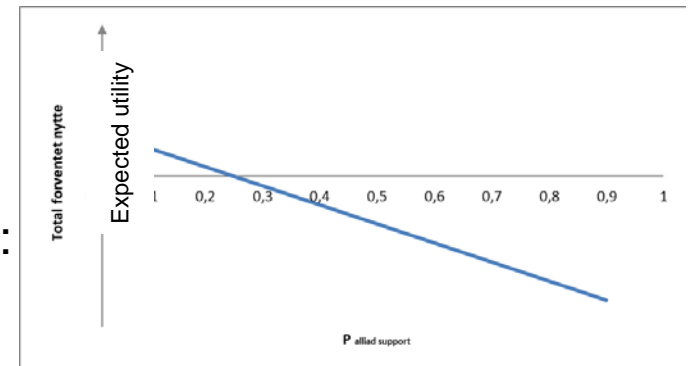
$$U^{alliance} = p_{win}^{alliance} U_{win}^{Norway} - c^{alliance}$$

- Adversary is in conlfict with alliance: Bastion conflict
  - Need Norwegian territory to «win» against the alliance

$$U^{Norway} = p_{win}^{Norway} U_{win}^{NATO} - c^{Norway}$$

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What does this tell us about deterrence?

$$U = P_{Involve}^{A} U^{Allied} + (1 - P_{Involve}^{A}) U^{Norway}$$

- **Norway depends upon allied support**
- **Indirectly possible to affect through cost and host nation support**
- **INTOPS/burden sharing**

- **Small in todays context, dominates in the model**

- **Harm the attacker – punishment and/or denial**
- **Prevent opponents achieving objectives - denial**

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Summary

- By quantifying the utility of war we can demonstrate the relationship between utility and deterrence

- The Norwegian armed forces task number one:
  «Ensure credible deterrence based on NATO's collective defence»

- Norwegian armed forces depends upon extended deterrence but should explore the possibilities for using both deterrence by punishment and denial in the future

- Can this model be used in long term planning?
  – How do we choose future force structure elements?

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