- Review of exercise set 2 → especially problem 1
- Short refreshment on NPV and probability trees

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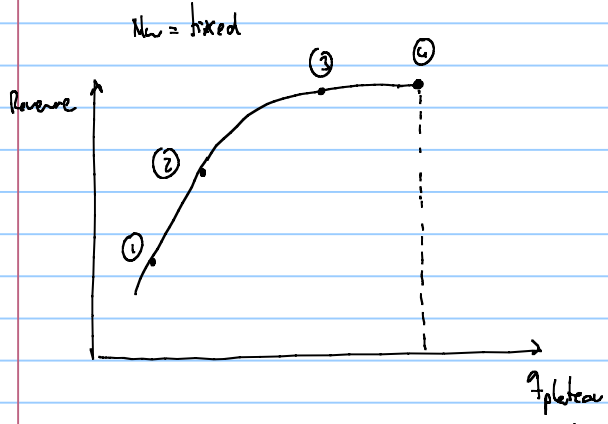
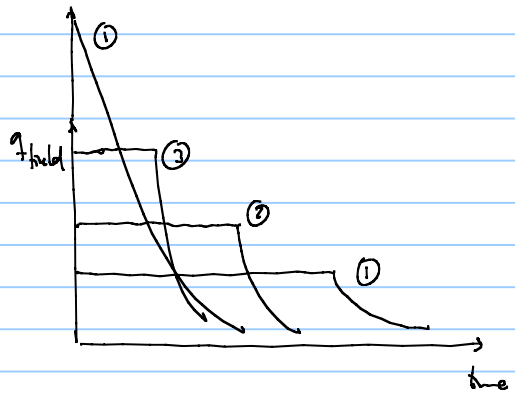
Exercise set 1

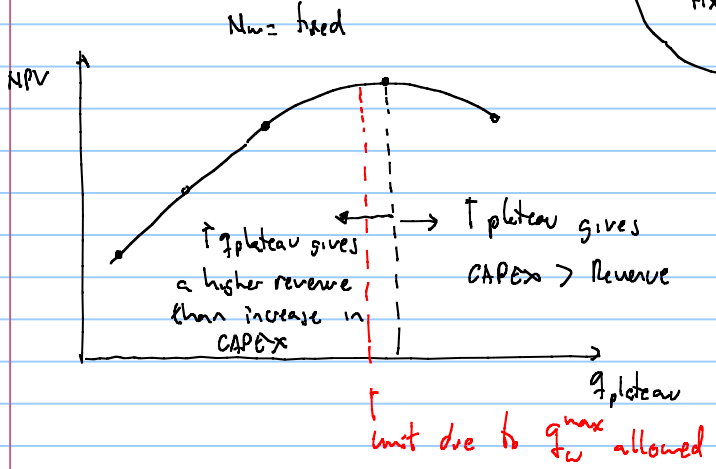




NPV = Revenue − CAPEX − Drilling

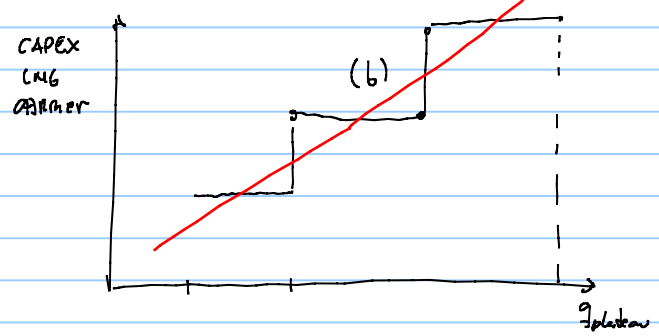
Fixed / constant

$CAPEX_{Facilities} = f(q_{plateau})$



for our case $CAPEX_{Facilities}$

valid for a range of variation of $q_{plateau}$



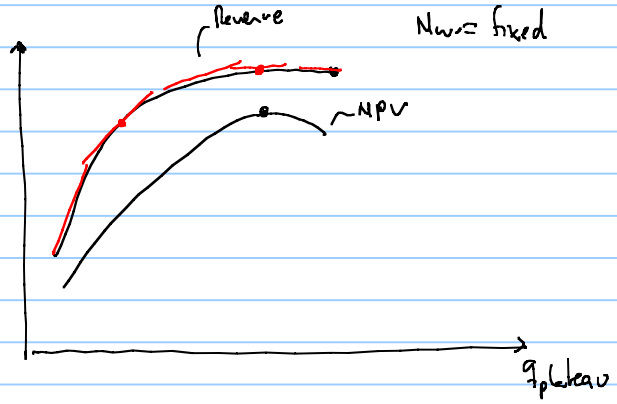
where is the maximum of NPV?

$$\frac{\partial NPV}{\partial q_{plateau}} = 0$$

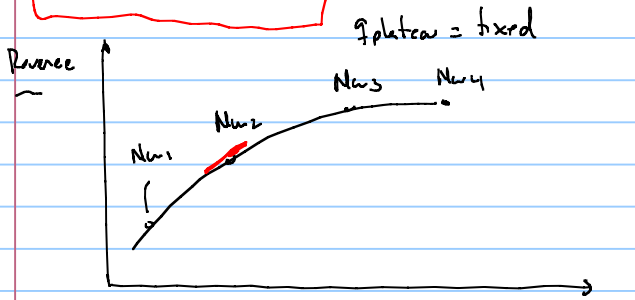
$$NPV = Revenue - CAPEX - OPEX$$

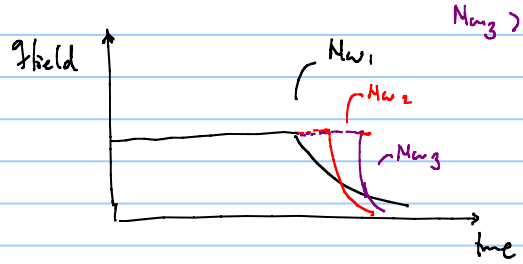
$$\frac{\partial Revenue}{\partial q_{plateau}} = \frac{\partial CAPEX}{\partial q_{plateau}}$$ affected by slopes "a" and "b"

if LNG facilities only $\frac{\partial CAPEX}{\partial q_{plateau}} = a$



what about N_w ?





doesn't depend strongly on N_w in our case

$$NPV = Revenue - CAPEX - OPEX$$

(LNG plant, LNG carrier, subsea system) $= f(q_{plateau})$

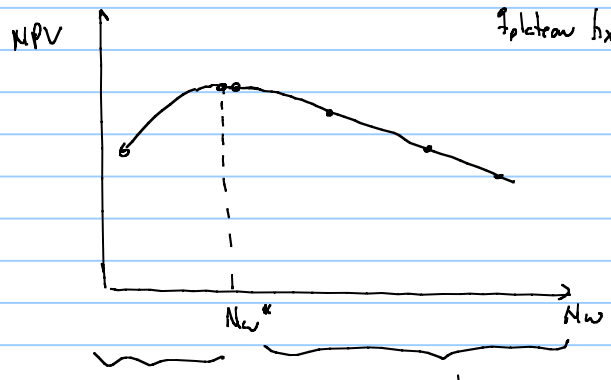
for a linear production potential (understimated case)

$$t_{plateau} = \left(\frac{q_{ppo}}{q_{plateau}} - 1 \right) \frac{1}{m}$$

$$q_{ppo} = N_w \cdot \tilde{q}_{ppo}$$

$$m = \frac{1}{N_w A J}$$

$$t_{plateau} = \left(\frac{\tilde{q}_{ppo}}{q_{plateau}} - \frac{1}{N_w} \right) \frac{1}{AJ}$$



↑ N_w gives longer plateau
increases the revenue
Increase in revenue > increase in drillex

Increase in drillex > increase in revenue

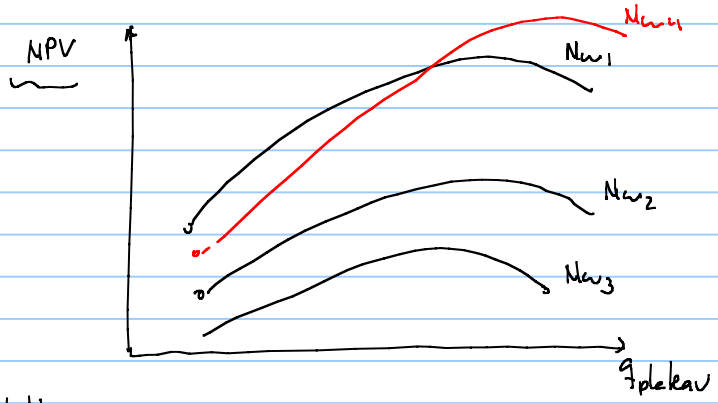
$$\frac{\partial NPV}{\partial N_w} = 0 \qquad \frac{\partial Rev}{\partial N_w} = \frac{\partial DRILLEX}{\partial N_w}$$

that's where the maximum is located

is a big number, $\frac{0.1}{N_w}$ 159 USD

NPV vs $q_{plateau}$ N_w is fixed

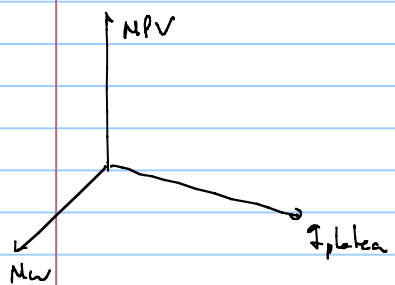
NPV vs N_w $q_{plateau}$ is fixed

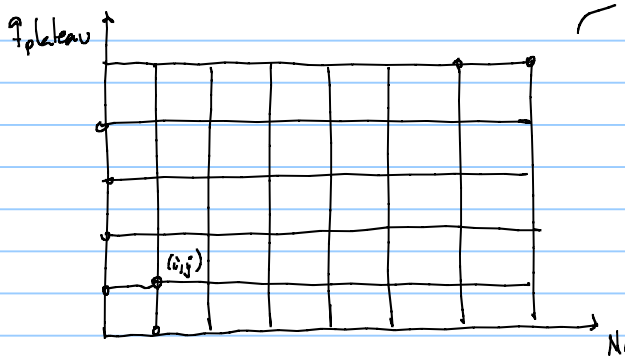


A better way:

Color map

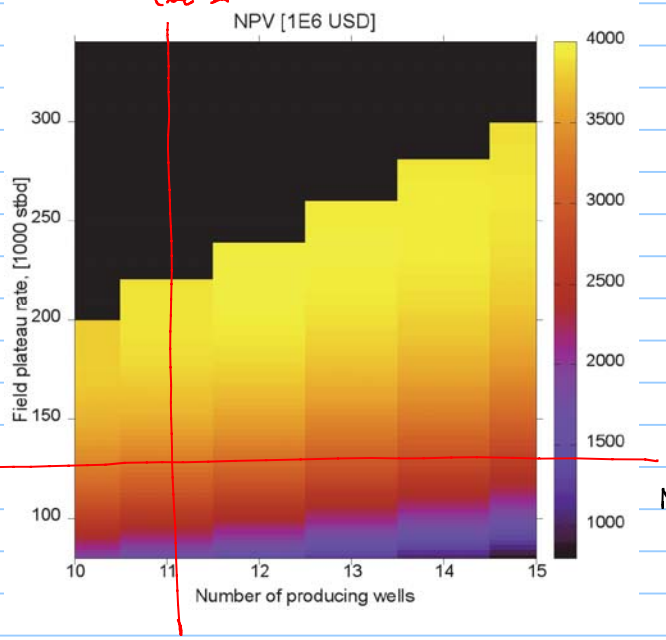
3D plot



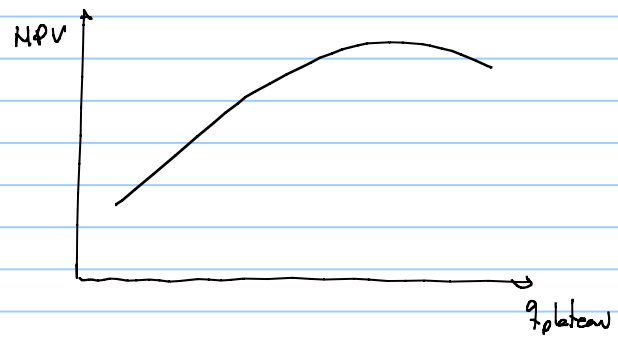


evaluate all combinations i, j

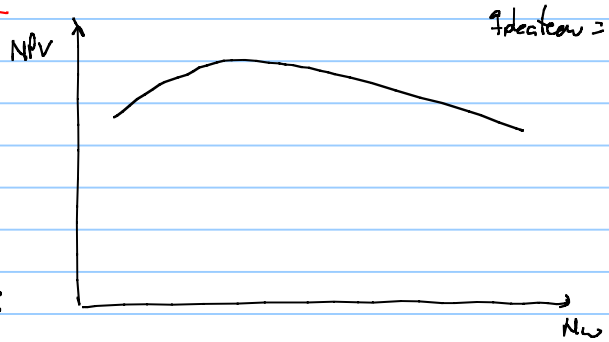
Example from the compendium, Page 102. offshore oil field, undersaturated.



along line 1

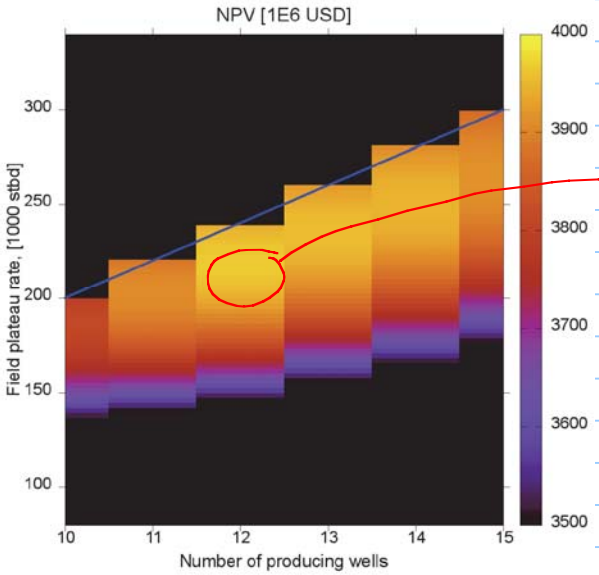


along line 2



$q_{plateau}$ = fixed

adjusting the color scale for NPV:



best N_w vs. $q_{plateau}$ combination for this field

$N_w = 12$, $q_{plateau} = 210000$ stb/d

CAPEX $\neq f(N_w)$

FACILITIES
LNG PLANT

in reality they are also affected by N_w

CAPEX = CAPEX + CAPEX + CAPEX + CAPEX (renaming OPEX)

CAPEX offshore structure
↳ it is also affected by N_w, specially for structure that houses wellheads/x-mas trees

CAPEX subsea umbilicals manifolds template flowlines pipeline

CAPEX TOPSIDE FACILITIES

CAPEX LNG CARRIER FLEET

to estimate the cost of facilities one should include also q_{to}, q_{tw}, q_{tj}

$$CAPEX_{facilities} = f(q_{to_{max}}, q_{tj_{max}}, q_{tw_{max}})$$

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TPG4151 - Subsurface Decision Analysis

About Timetable Examination Autumn 2018/Spring 2019

Examination arrangement

Examination arrangement: Portfolio assessment
Grade: Letters

Evaluation form	Weighting	Duration	Examination aids
Work	35/100		
Written examination	65/100	4 hours	D

Course content

Everyone makes decisions, but few people think about how they do it. Yet, psychological research shows that we are prone to many different errors of thought that degrade our decision making ability. In this course we will discuss the principles and fundamental concepts for the normative theory of decision making under uncertainty. We will develop a language, set of theories, and tools to transform complex decisions into ones where the course of action is clear. The course follows the typical chain of considerations that attends most exploration and development projects. The skills learnt will be applicable to exploration and production decisions and from relatively small investments, such as whether or not to core a well, to major field development or exploration program decisions.

More on the course
No

Facts
Version: 1
Credits: 7.5 SP
Study level: Second degree level

Coursework
Term no.: 1
Teaching semester: AUTUMN 2018
No.of lecture hours: 4
Lab hours: 4
No.of specialization hours: 4
Language of instruction: English
Location: Trondheim