

# **PRINCIPLES OF SUSTAINABLE FINANCE**

## **Chapter 2: Externalities - internalisation**

# Overview of the book

## Part I: What is sustainability and why does it matter?

1. Sustainability and the transition challenge

## Part II: Sustainability's challenges to corporates

2. **Externalities - internalisation**
3. Governance and behaviour
4. Coalitions for sustainable finance
5. Strategy and intangibles – changing business models
6. Integrated reporting - metrics and data

## Part III: Financing sustainability

7. Investing for long-term value creation
8. Equity – investing with an ownership stake
9. Bonds – investing without voting power
10. Banks – new forms of lending
11. Insurance – managing long-term risk

## Part IV: Epilogue

12. Transition management and integrated thinking

# Learning objectives – chapter 2

- ▶ explain the concepts of externality and internalisation
- ▶ understand the role of government regulation and taxation
- ▶ understand the integrated value approach for measuring externalities
- ▶ explain policy and technology uncertainty
- ▶ use scenario analysis

# Why externalities matter

# Impact of people on nature

$$I = P * A * T$$

I = Impact on natural resources

P = Population (number of persons)

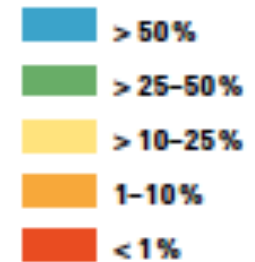
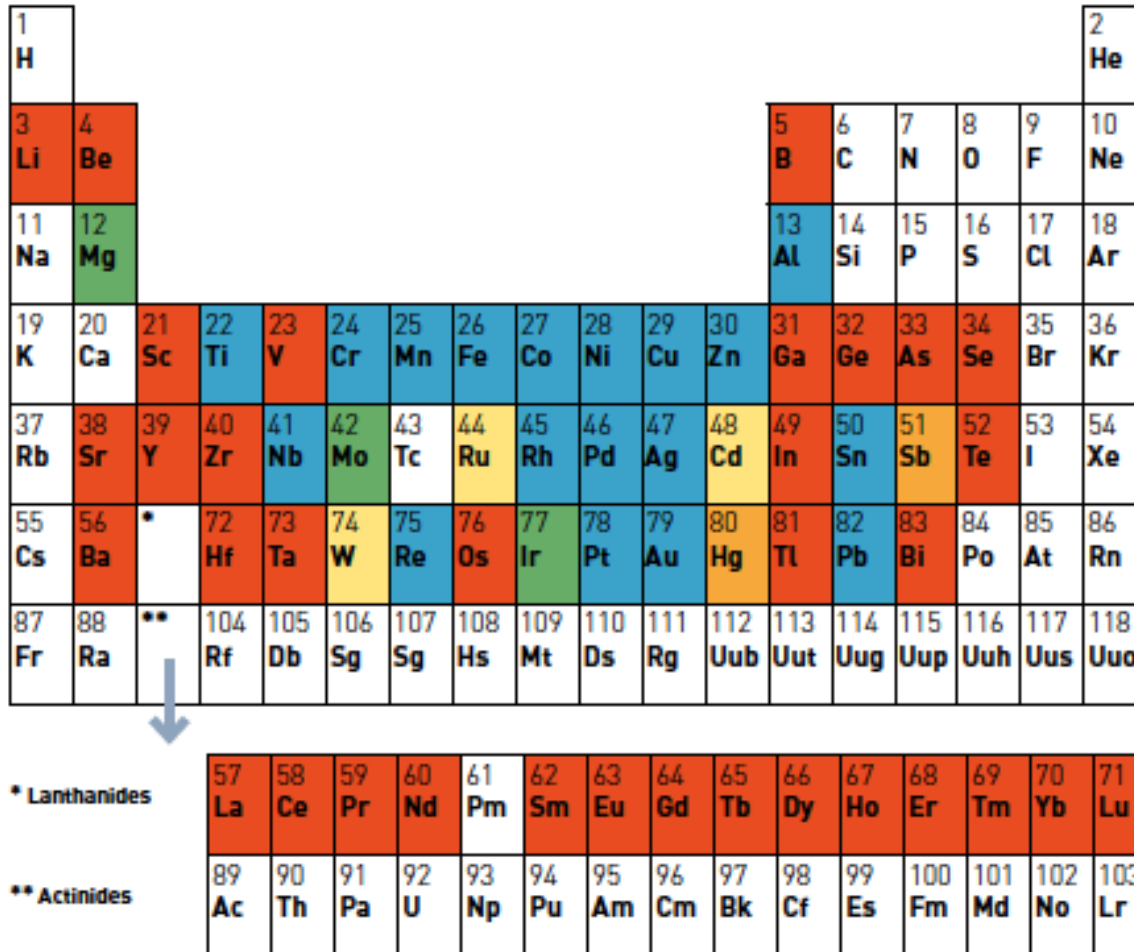
A = Affluence (consumption per person)

T = Technology (impact per unit consumption)

# Natural resources are finite

- ▶ Non-renewable or abiotic resources  $N^a$  are finite
- ▶ Speed of depletion  $T$  in years depends on annual demand  $D^a$ 
  - $T = N^a / D^a$
- ▶ Example:  $T = 70$  years for copper (Cu)
  - But depends on new discoveries ( $N^a$  ↑)
  - And intensified use ( $D^a$  ↑) and re-cycling ( $D^a$  ↓)

# Recycling rates



# Social and human capitals

- ▶ Goal of **decent work and inclusive economic growth** (SDG 8)
  - Preserve social (S) and human (H) in production process
- ▶ **Common language**: link SDGs to capitals (S, H, N)
- ▶ Not only negative, but also **positive externalities**
  - **N**: companies investing in renewable energy; material savings
  - **S + H**: companies training employees; sustainable food production and improvement of health care



# Linking SDGs and Capitals

SDG	Brief description	Social & human capitals	Natural capital
1	No poverty	X	
2	Zero hunger	X	
3	Good health and well-being	X	
4	Quality education	X	
5	Gender equality	X	
6	Clean water and sanitation		X
7	Affordable and clean energy		X
8	Decent work and economic growth	X	
9	Infrastructure, industry and innovation	X	
10	Reduced inequalities	X	
11	Sustainable cities and communities	X	
12	Responsible consumption and production	X	X
13	Climate action		X
14	Life below water		X
15	Life on land		X
16	Peace, justice and strong institutions	X	
17	Partnerships for the goals	X	

# Perspectives on externalities

Economist:  
a public good which is  
not priced



Human rights advocate:  
ensuring every person's  
claim to life's essentials



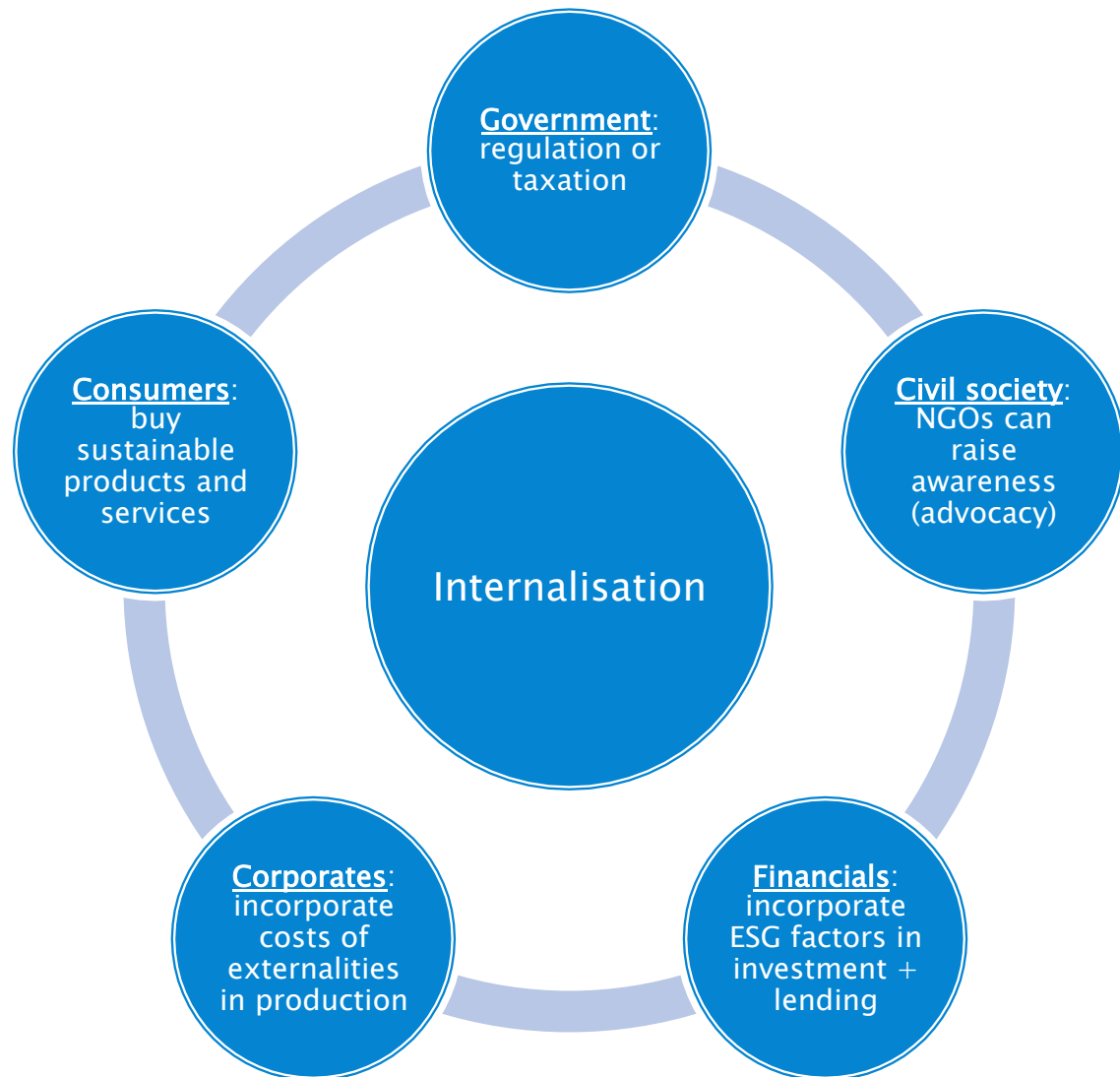
Ecologist:  
need to operate within  
ecological limits



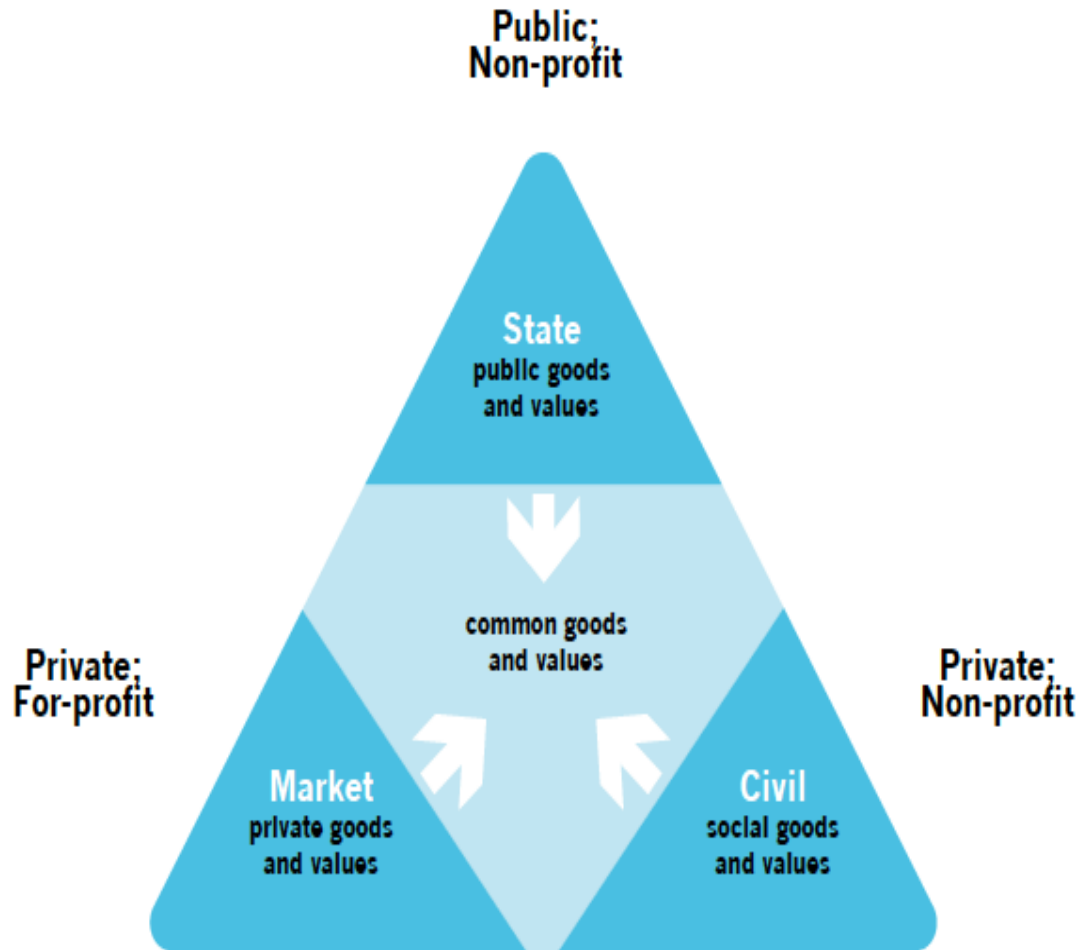
Sustainable development:  $I = F + S + E$

# Internalising externalities

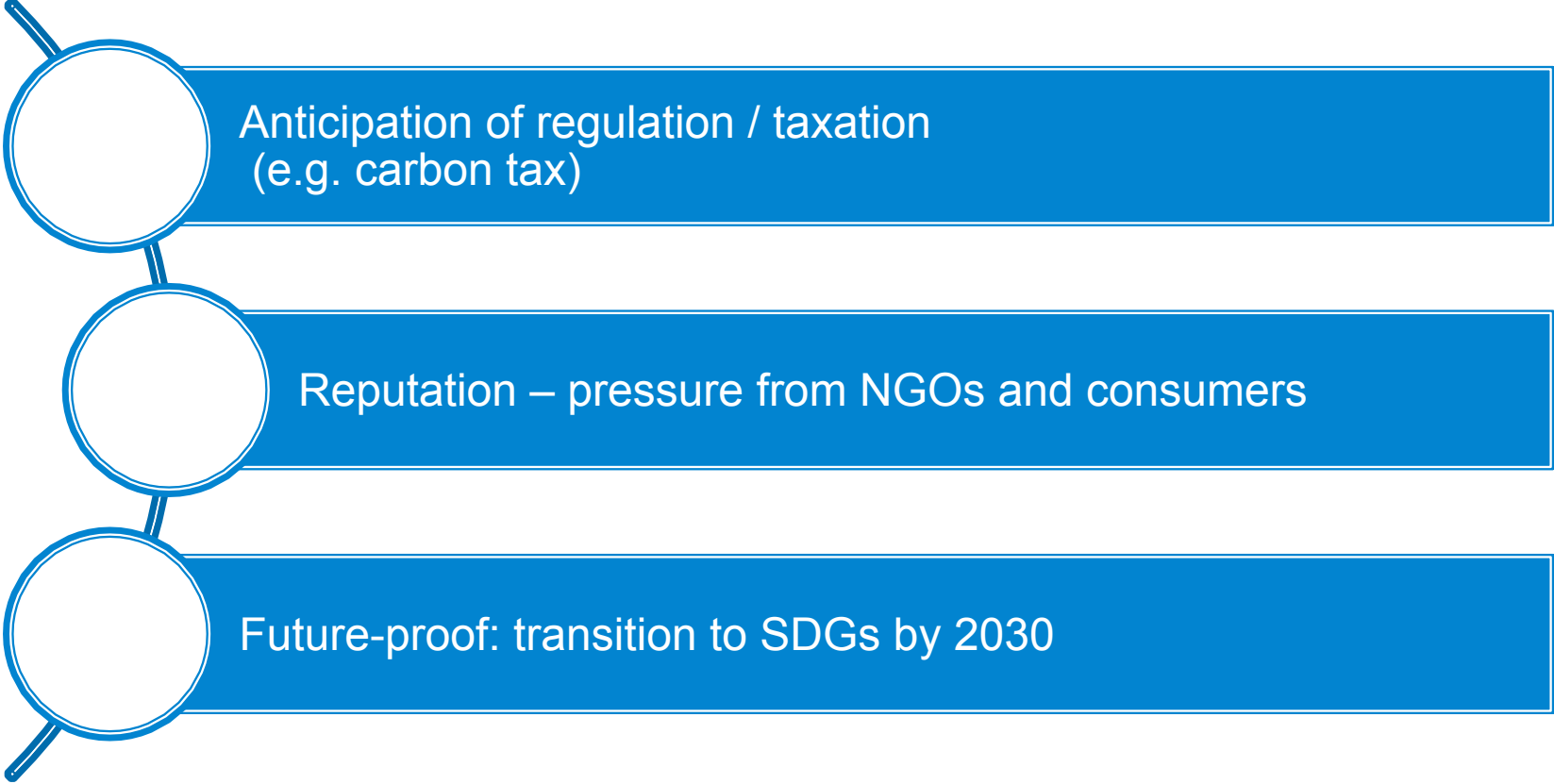
Problem:  
externalities not  
reflected in  
market prices



# Who should act?



# Why integrate ESG factors?



Anticipation of regulation / taxation  
(e.g. carbon tax)

Reputation – pressure from NGOs and consumers

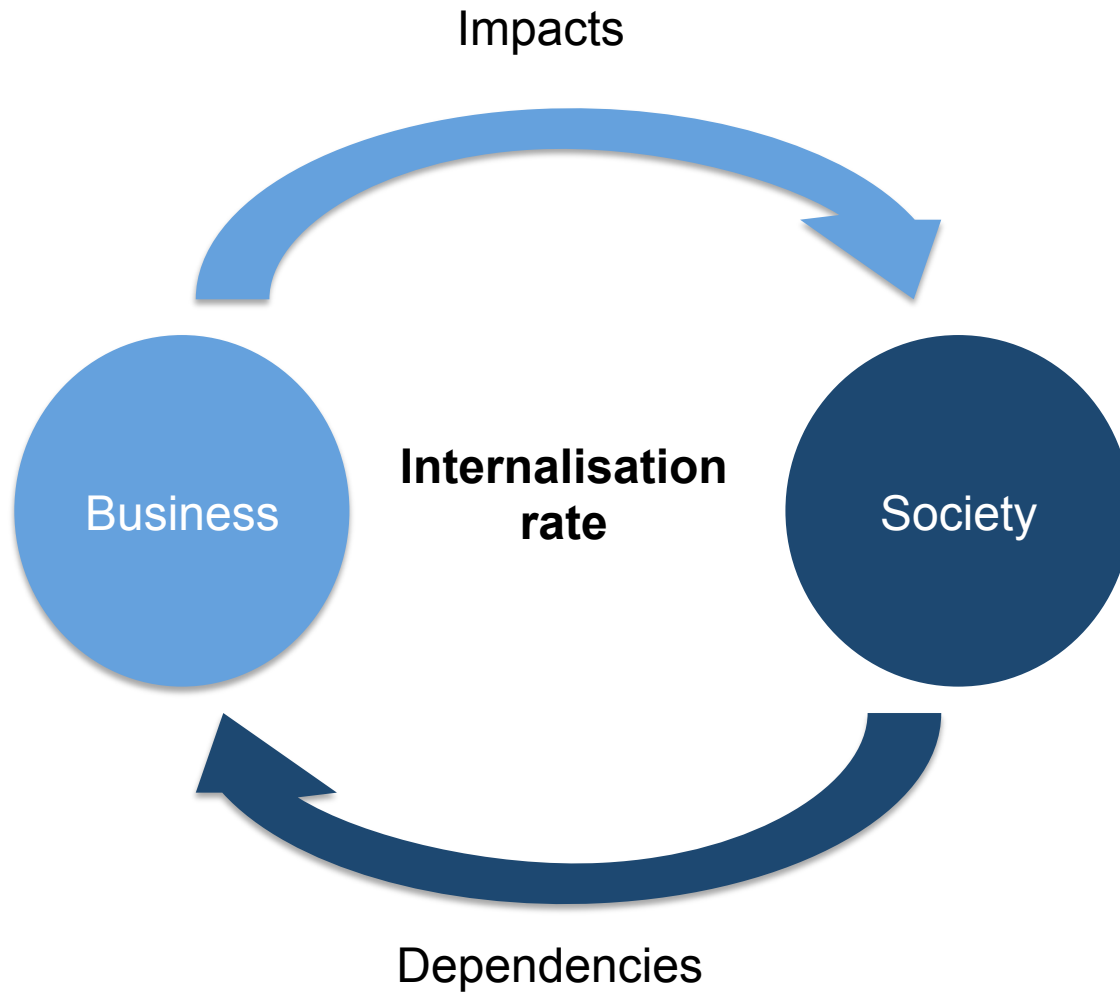
Future-proof: transition to SDGs by 2030

# Example of reputation risk



- Violating SDG 8 - Decent work, incl. paying 'living wage'

# Internalisation of social and environmental impacts



# Government intervention



# Government intervention

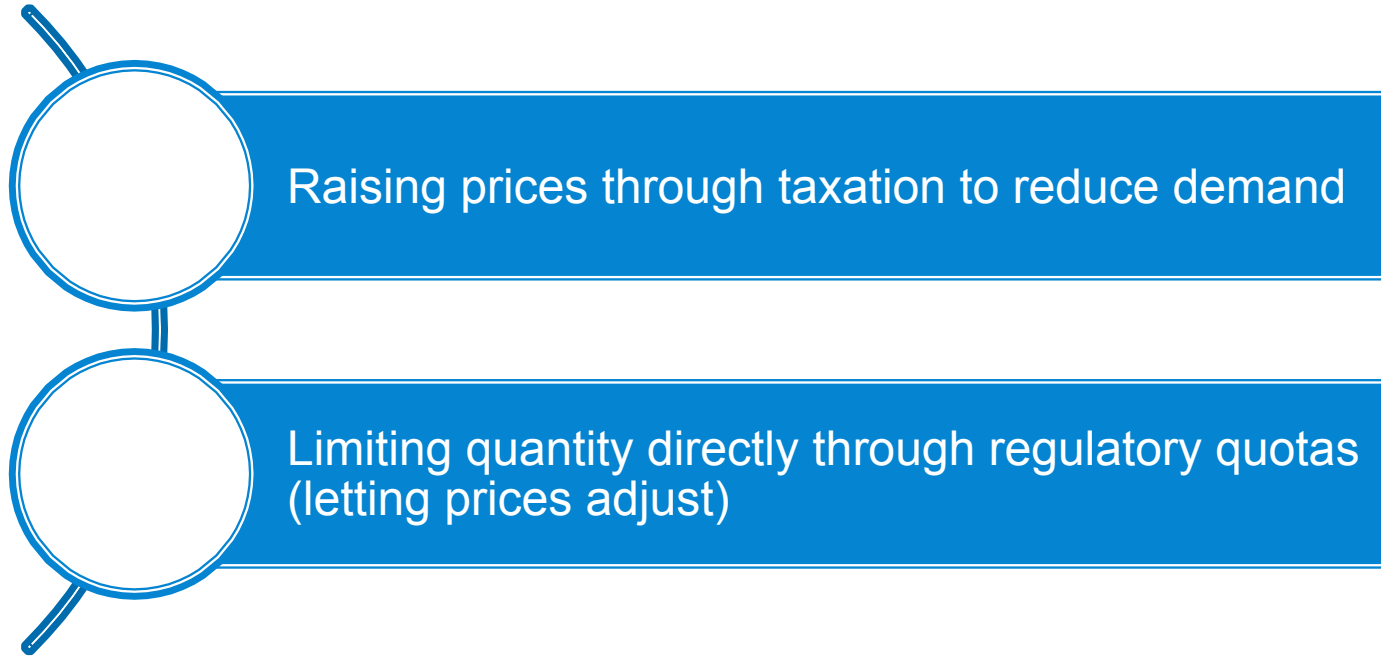
The climate economy guru - Nicolas Stern (2015):

- *“Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change”*

Main recommendations

- Energy infrastructure investments **lock in** energy use for 20 years → stop investing in fossil fuel powered utilities and networks
- First best: **carbon tax** of \$40-50 per tCO<sub>2</sub>e by 2020 and \$50-100 by 2030

# Basic approaches to reduce externalities



They give theoretically the same result  
unless the demand curve is uncertain

# Example regulatory approach

**Montreal Protocol**  
on Substances that Deplete the Ozone Layer

# Taxing externalities

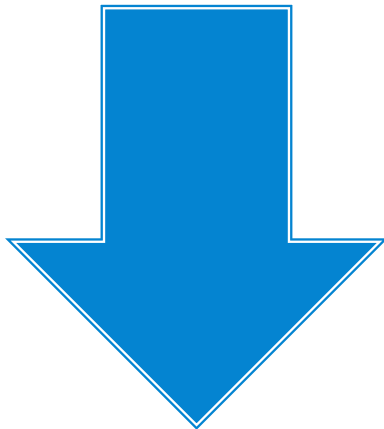
- ▶ **Carbon tax** is efficient way to get public good of low carbon economy
  - Marginal adjustment cost = tax
- ▶ Alternative is **Emissions Trading Systems (ETS)** – cap emissions and trade allowances
- ▶ Also **taxes on natural resources** to prevent depletion

# Carbon taxes in practice



Early adopters

- Scandinavian countries started in 1990s – now at \$50-130 per tCO<sub>2</sub>e
- Result: reduction in emissions, without loss of economic growth
- Key is redirecting taxes: taxing carbon instead of labour



Laggards

- Most countries have no effective carbon taxes
- Even worse: fossil fuels are subsidised up to \$330 bn
- Subsidies very inefficient way of income support in low-income countries

# Social externalities

## High income countries

- max working hours
- health and safety regulation
- gender equality
- minimum wage

## Low income countries

- advances in education, but...
- underpayment
- child labour
- human rights

### Instruments

- **Living wage** (SDG 8)  
instrumental for other SDGs (poverty, hunger, health care, education), as living wage allows families to live decently
- Taxes to **change behaviour**:  
alcohol, tobacco, sugar rich beverages, etc.

# Discussion: who acts first?

Who should act first to internalise externalities?

- **Government** should tax and regulate versus **all parties** should act

# Measuring and pricing externalities

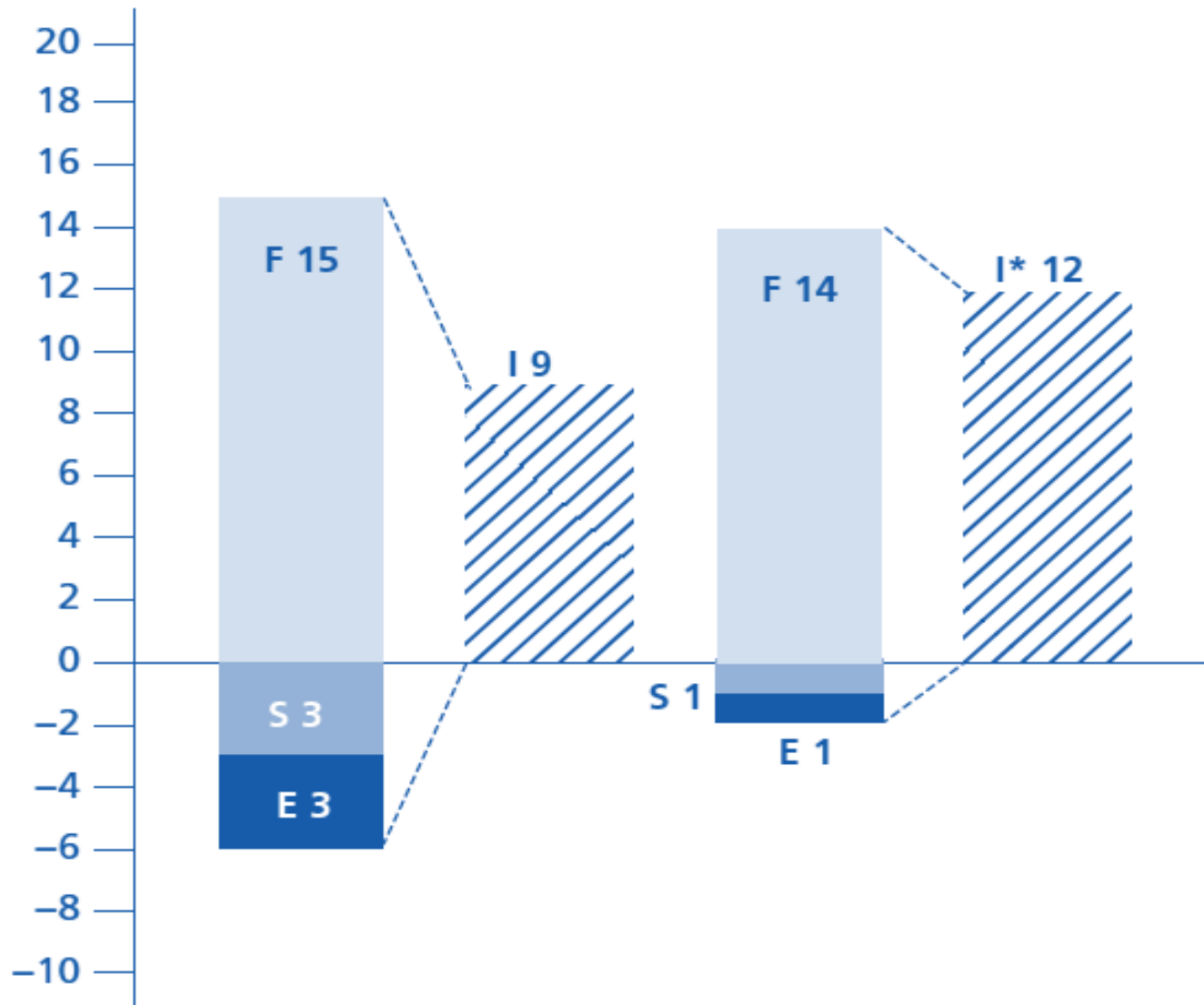


# How to deal with externalities?

What can business do with remaining externalities?

- **Measuring and monetisation** is possible through technology (IT, data) and science (life cycle analyses, environmental economics)
- **Pricing** is possible by optimising across F, S and E dimension

# From financial value to integrated value



# True prices of roses from Kenya

- ▶ **Conventional price € 0.70 (F) and true price € 0.92 (F+S+E)**



## **Optimise production process (reducing S + E)**

- Transport by ship to reduce carbon emissions
- Solar powered greenhouse
- Closed-loop hydroponics to reduce water + fertiliser use
- Training in health and safety to improve workers' skills
- Gender committees to reduce harassment + gender discrimination
- Pay a basic living wage to improve wellbeing of workers

- ▶ **Optimised true price € 0.74**

# Pitfalls to monetisation

- Calculation done on **efficiency grounds**
  - But also need to invest in **adaptive capacity** to absorb shocks
  - Example: overinvest in safety to protect people & environment **and** to reduce production losses
- **Ethical aspects** of externalities
  - Difficult to monetise ethical aspects, like human rights
  - Three capitals (F, S, E) are not substitutable
- **Perverse outcomes**
  - Negative impact of deforestation can be offset by large economic gains
  - Use constraint of equation 1.2:  $SEV_{t+1} \geq SEV_t$

# Scenario analysis

# Policy uncertainty

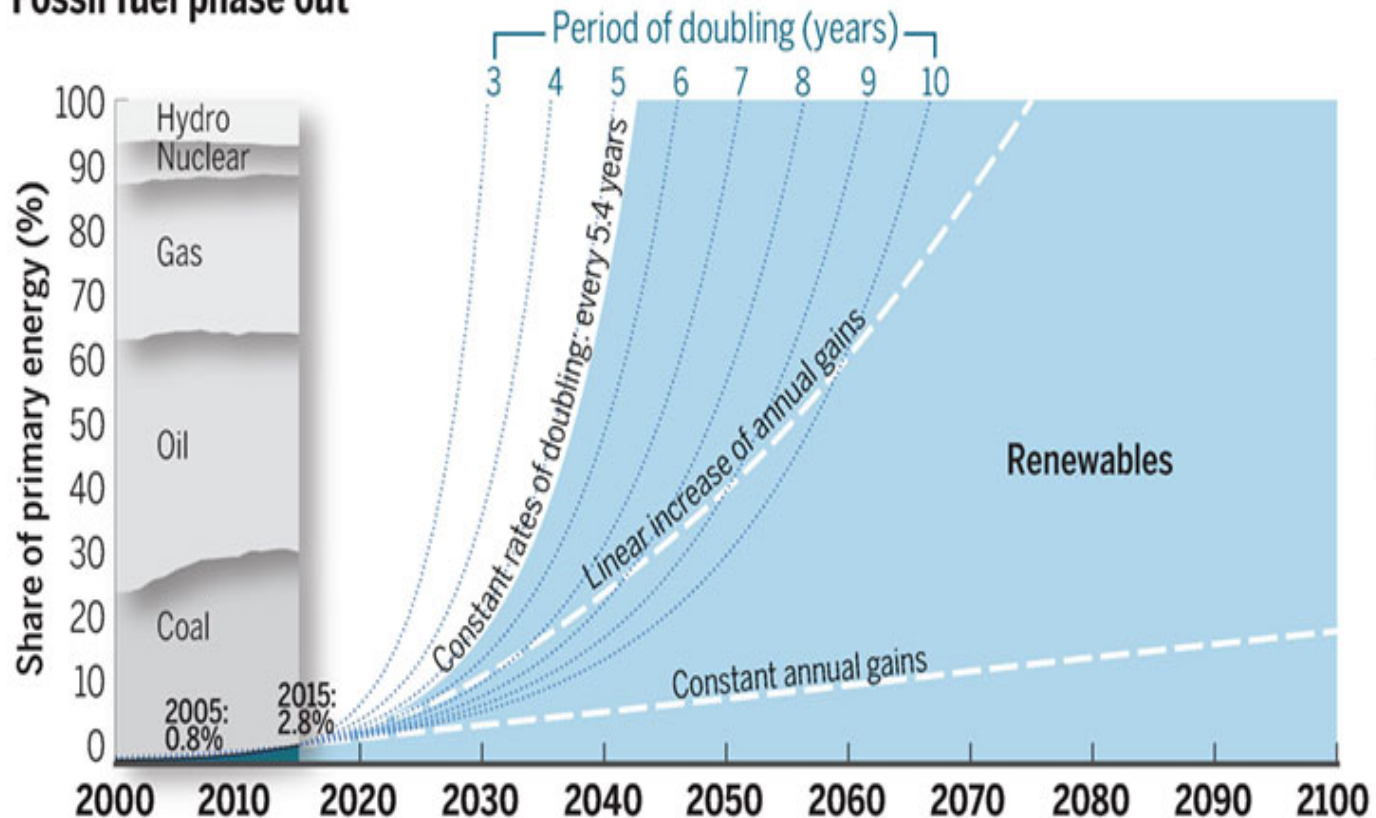
- **Timing:** when will labour laws be tightened and carbon taxes be introduced
- **Reversal:** policies may be reversed / changed (e.g. solar panel subsidies)

# Technological uncertainty

- **Exponential growth:** new innovations and spectacular rise of renewables (solar PV, wind) → Moore's law: doubling of capacity each x years
- **Changes** in consumer behaviour and preferences

# Exponential growth of renewables

## Fossil fuel phase out



## Stranded assets

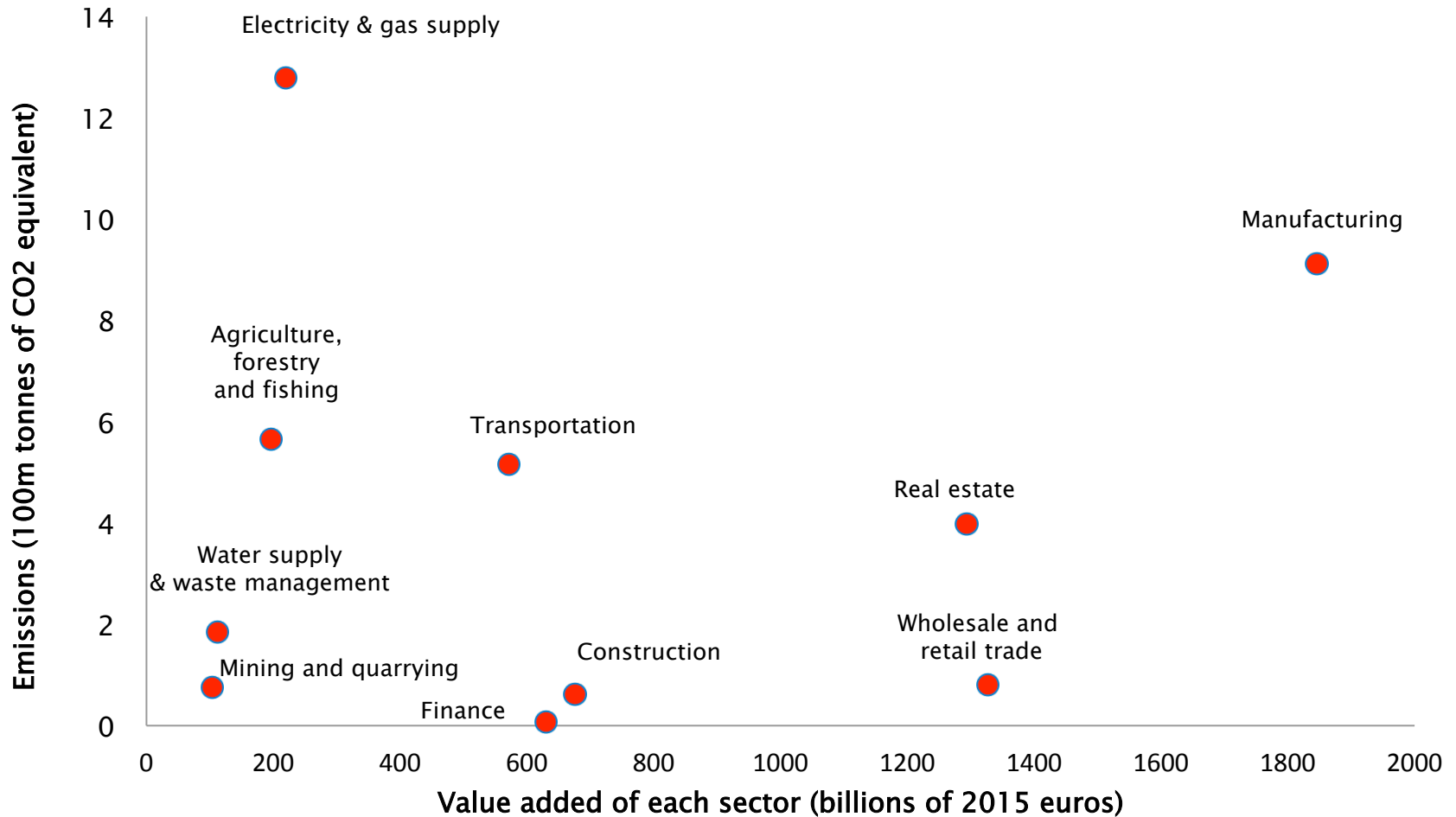
- **Government regulation** (e.g. carbon pricing), or
- **Technological change** (e.g. reduced cost of solar PV or wind)

## Which assets?

- Carbon pricing affects **all carbon-intensive** assets
- Intensive agriculture (fertiliser + irrigation) may lead to **degraded land** (lower soil quality), species loss and human migration
- Broadly applicable: **car parks in cities** can become stranded asset (car share)



# Environmental exposures beyond energy sector



Source: Calculations based on Eurostat data.

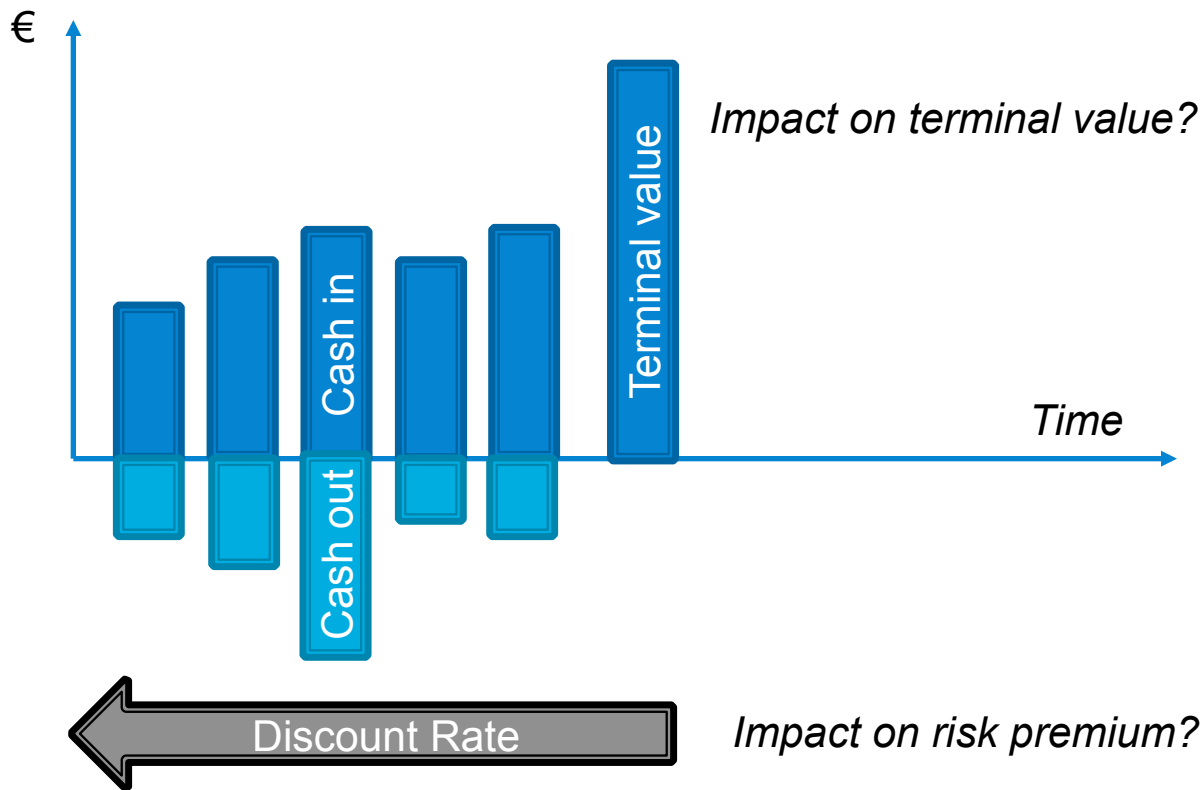
Notes: Real estate emissions include household heating and cooling costs

# Scenario analysis

- ▶ Scenario analysis to get **insight in development** of externalities over time
- ▶ Strategic approach to making scenarios
  1. **Determine most important uncertainties** for the future
  2. **Elaborate the scenarios** with trends, uncertainties and possible actions
  3. **Re-present scenarios as appealing stories** about (paths to) the future
- ▶ Analyst reports are the **fortune tellers** of investor community
  - *From* DCF analysis of **main scenario** (often ‘business as usual’)
  - *Towards* DCF analysis of **3 or 4 scenarios** including disruptions and internalising externalities

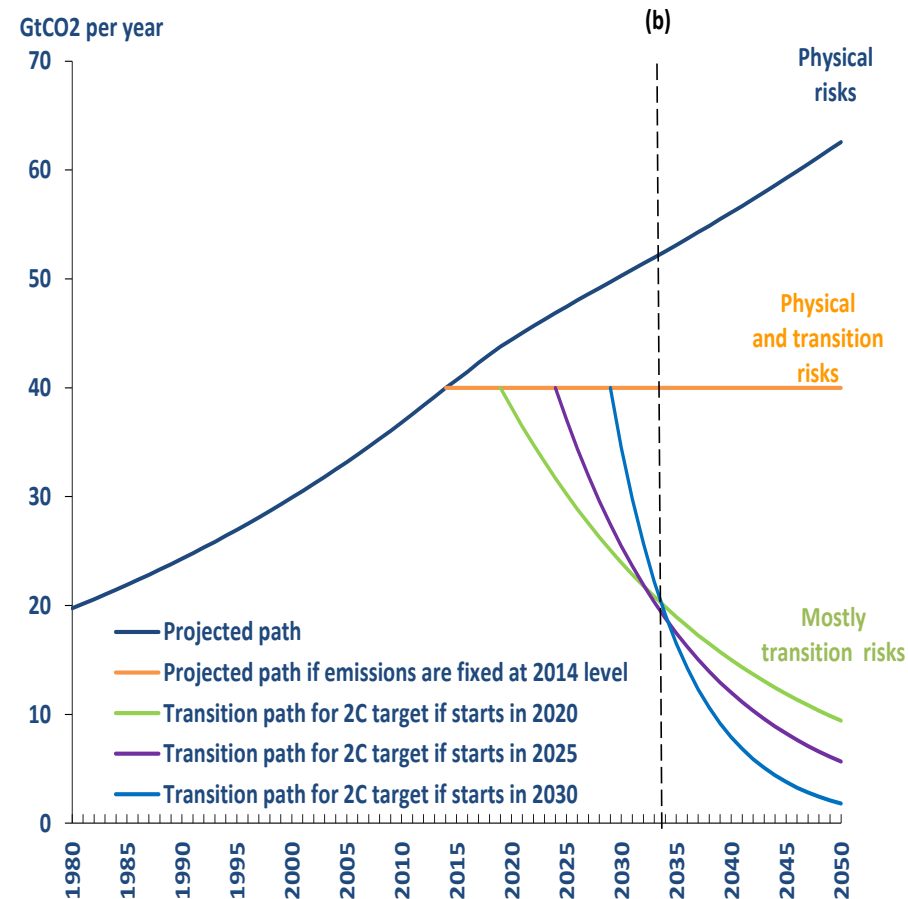
# Impact of scenarios on DCF

*Impact on cashflows? (e.g. loss of market share)*



# Adverse scenario: disorderly transition

- Shift to low-carbon economy requires **strong reductions** in carbon emissions
- An early and gradual shift can facilitate a **soft landing** in a low carbon economy
- The adverse scenario is a **hard landing** with large emissions cuts implemented over a short horizon
- Amplified by **lack of technical progress**
- A later transition may also pose **larger physical risks** from climate change



# Stress testing

- ▶ Central banks and supervisors conduct (climate) **stress tests of financial sector** using extreme scenarios
- ▶ Goal is to
  1. **Raise awareness** of major environmental exposures at financials
  2. **Monitor major concentrations** at financials in supervision
- ▶ Possible instruments
  - **Large exposure rules** for high carbon concentrations
  - **Brown capital charge** for high carbon assets

# Conclusions

- ▶ **Social and environmental externalities** are relevant, but absent in traditional production function and neo-classical finance
- ▶ **Instruments** to internalise externalities
  - Government: **taxes and regulation** first best, but not always done
  - Business: incorporating S + E in decision making (**integrated value**)
- ▶ **Scenario analysis** is tool to deal with **uncertainties**
  - Calculate **value company** under different scenarios
  - Prompt companies to **reconsider strategy** and **take action**