



SUSTAINABLE  
FINANCE  
LAB

# Financial risks and opportunities of climate change and the energy transition

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Semestre thématique :

« Financement de la transition énergétique

Quelles régulations et innovations financières »

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# Overview of the presentation

- How is the energy transition relevant for the financial sector?
- What is its impact for the European financial system?
- What can regulators and supervisors do?



Comparative Economic Studies, 2016, (1–18)  
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[www.palgrave-journals.com/ces/](http://www.palgrave-journals.com/ces/)

## Symposium Article

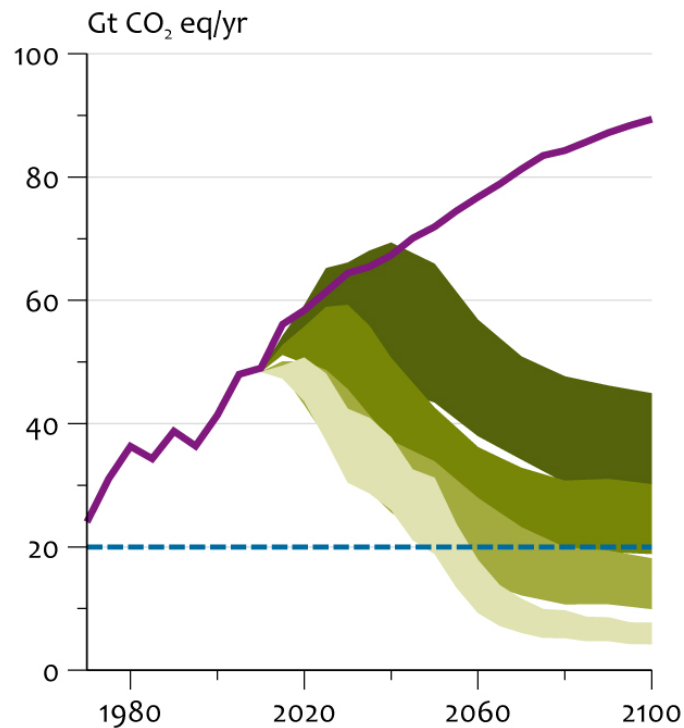
# What Role for Financial Supervisors in Addressing Environmental Risks?

DIRK SCHOENMAKER<sup>1</sup> & RENS VAN TILBURG<sup>2</sup>

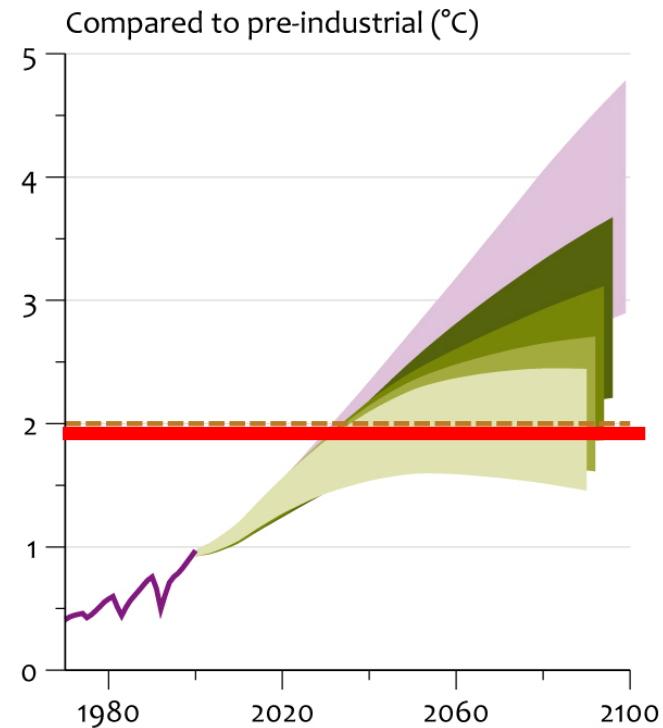
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## Global emissions and temperature increase for various concentration levels

Emissions



Temperature increase



— Trend scenario

— Trend scenario

650 ppm CO<sub>2</sub> eq

550 ppm CO<sub>2</sub> eq

450 ppm CO<sub>2</sub> eq

400 ppm CO<sub>2</sub> eq

--- Target 50% reduction in 2050 compared to 1990

--- Target 2°C

Source: Vuuren and Faber (2009)

# Climate imbalance (stress)

Physical risk



5 degree

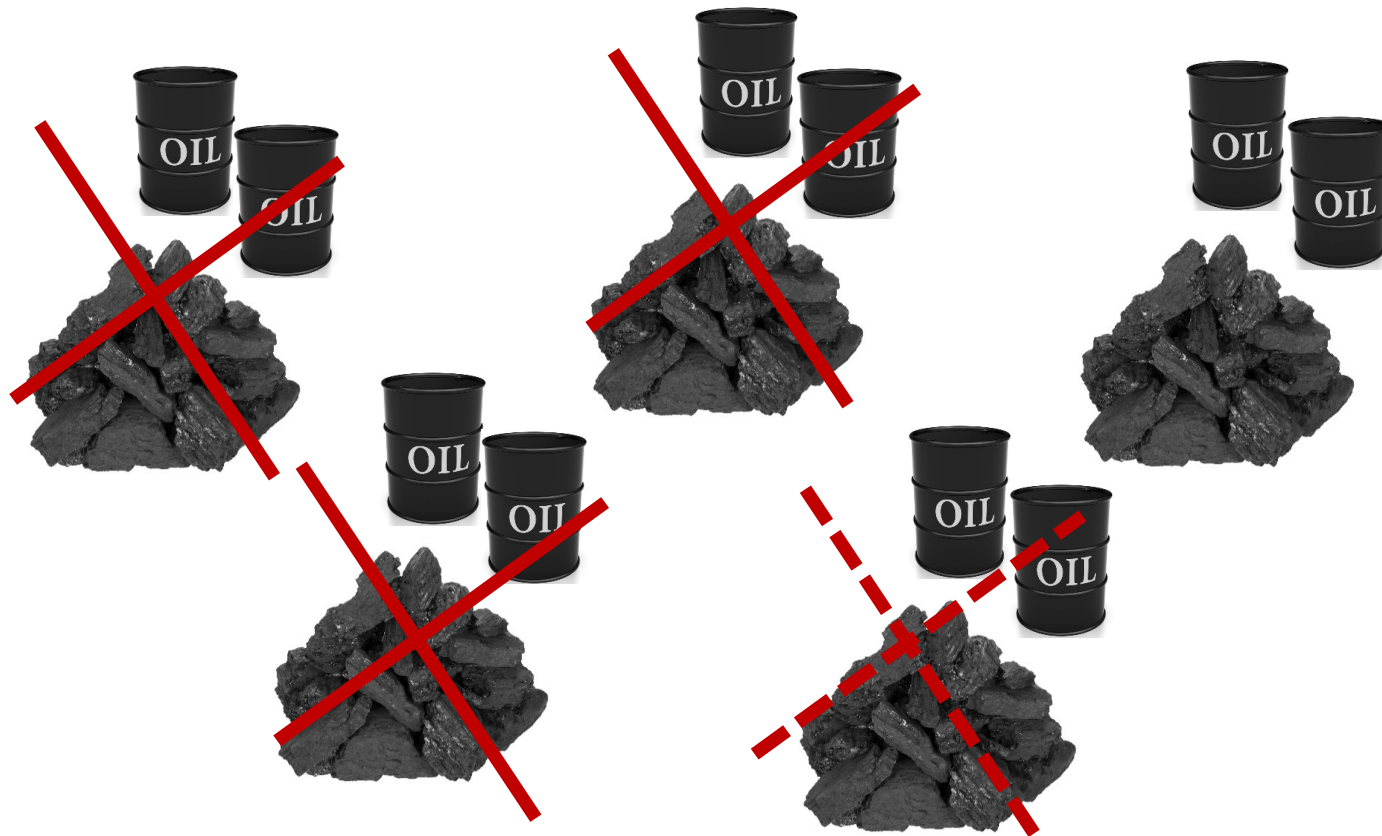
2100 new equilibrium with  
higher average temperature

Transition risk



2 degree

## Transition risk: Unburnable carbon



# The Price of Doing Too Little Too Late

The impact of the carbon bubble on the EU financial system



**The Greens | European Free Alliance**  
in the European Parliament





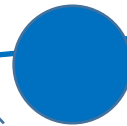
# Financial impact carbon bubble

## ***Direct effects***

- Energy commodities
- Market value of oil, gas and coal mining firms
- Credit risk of oil, gas and coal mining firms

## ***Indirect effects***

- Electricity producers, energy-intensive industries
- Other business sectors
- Governments of resource-rich countries



?

# The stress test

Exposures to high-carbon assets

*Pension funds*

*Banks*

*Insurers*

*Commodities*

*Securities*

*Loans*



Potential shocks



Estimated losses

*% assets*

*% capital*



Propagation of shocks

*Investors*

*Firms*

*Households*

Feedback  
loops

*Economy*  
*Markets*





# What we looked at

Exposures to high-carbon assets (gas, oil and coal mining companies)

## ***Pension funds***

- 23 large funds, from 8 EU countries
- >€ 1,200 billion assets (24% of EU total)

## ***Banks***

- 20 largest banks, from 8 EU countries
- >€ 22,000 billion assets (62% of EU total)

## ***Insurance companies***

- Aggregated data

## Exposure European financial institutions to fossil fuel firms (in € bn)

	Equity	Debt	Total	As % total assets
<b>Banks</b>	98	365 <sup>a)</sup>	463	1.4
<b>Pension funds</b>	196 <sup>b)</sup>	60	256	5.0
<b>Insurance</b>	109	233	342	4.0
<b>Total</b>	403	658	1.061	

## The shock, price developments in the low carbon break through scenario

Commodities	-50%
Equities	-60%
Bonds	-30%
Term & project loans	-30%
Credit facilities	-20%

# Low-Carbon Breakthrough

## ***Scenario***

- Quick and definite transition to low-carbon economy

## ***Consequences***

- Sudden loss on high-carbon assets
- Estimated total losses for EU banks (0.4% assets), pension funds (3%) and insurance companies (2%)  
**€350-400 billion**
- This is unlikely to trigger harmful feedback loops

Figure 17: Estimated losses of pension funds (% of total assets)

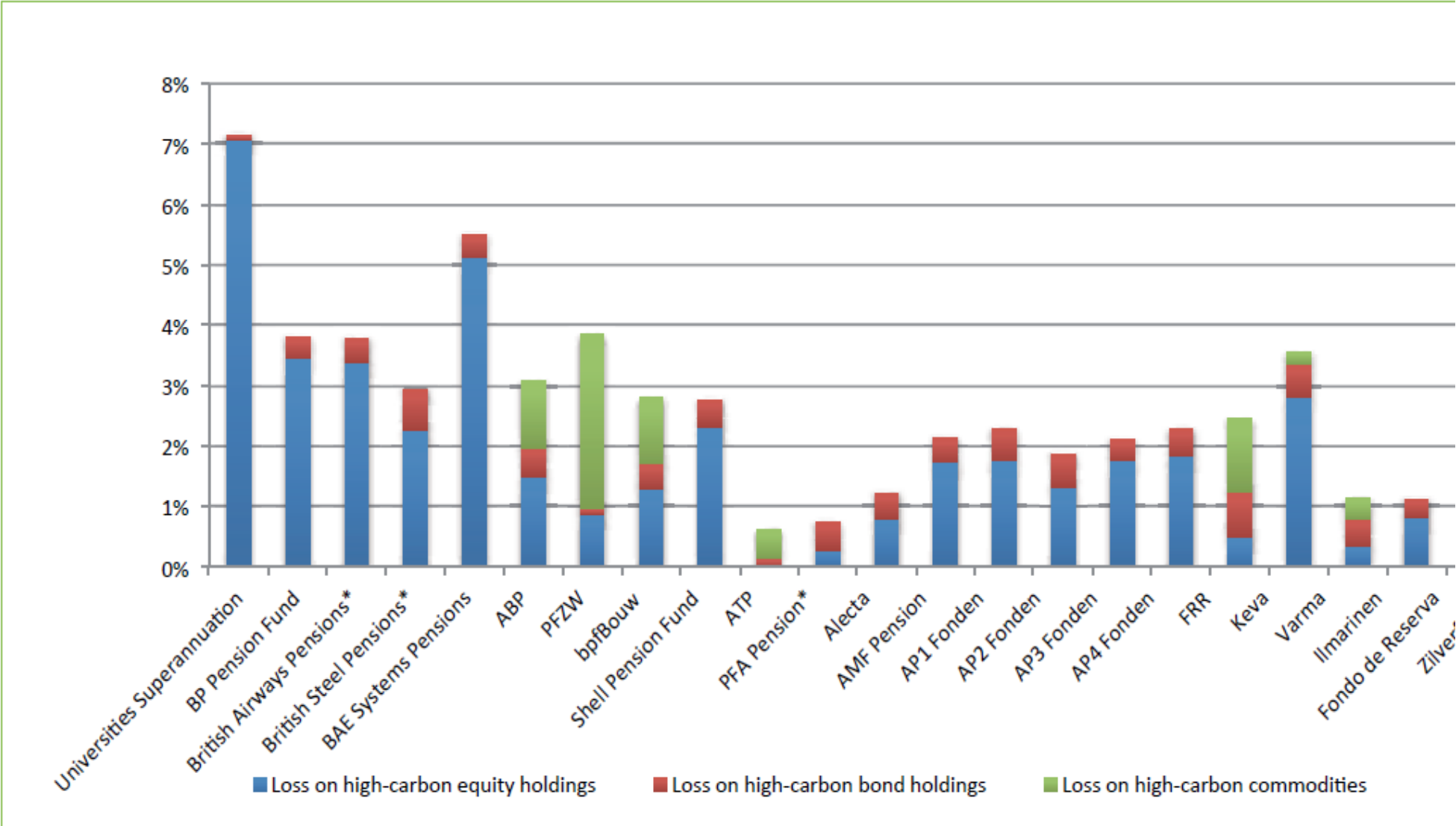
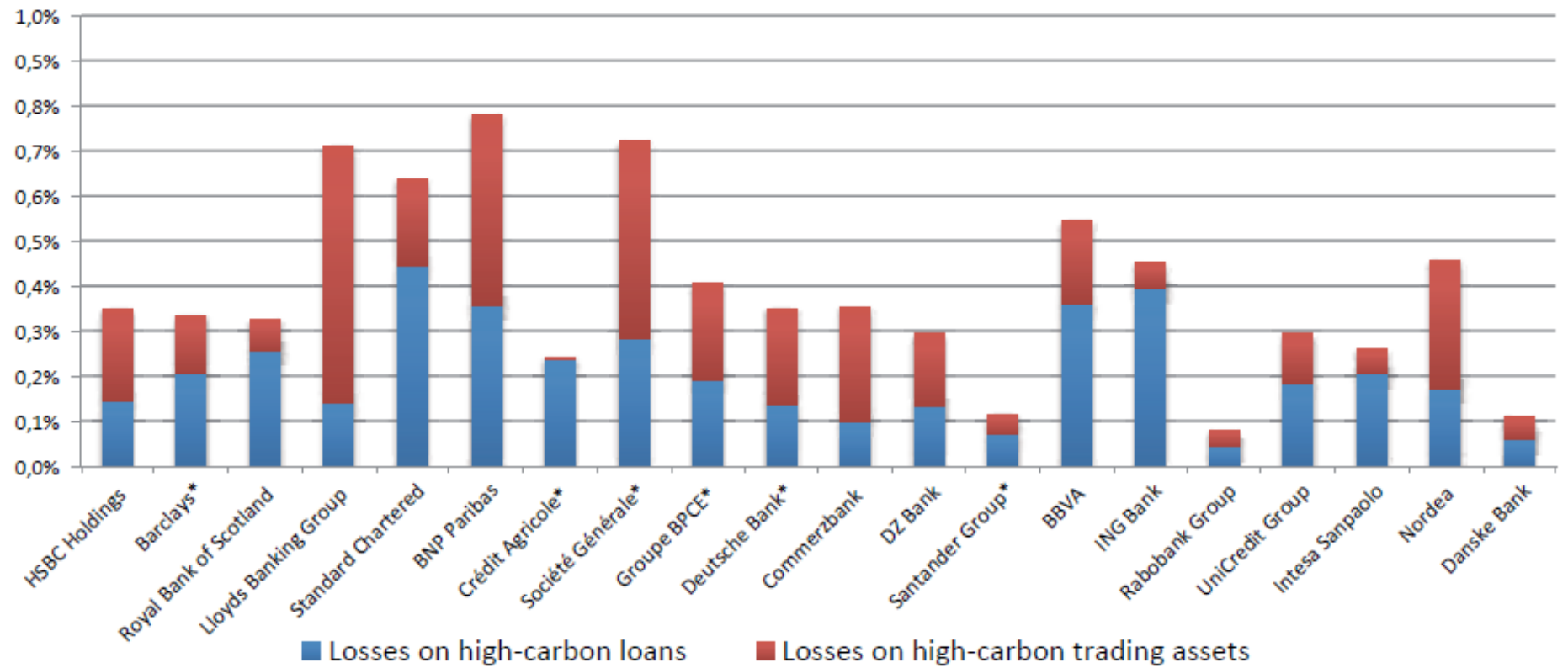


Figure 18: Estimated losses of banks (% of total assets)



\* = Excluding losses on corporate bonds due to lack of available data

# Uncertain Transition → Larger losses

## ***Scenario***

- Emissions remain eventually within carbon budget
- Transition path is initially slow and uncertain

## ***Consequences***

- Ongoing **capital expenditures € 500 billion/year**
- Increasing stranded assets and losses
- Uncertainty about valuation of assets



# Carbon Renaissance → Most harmful

## ***Scenario***

- Strongly increasing demand for fossil fuels
- Ineffective climate policies

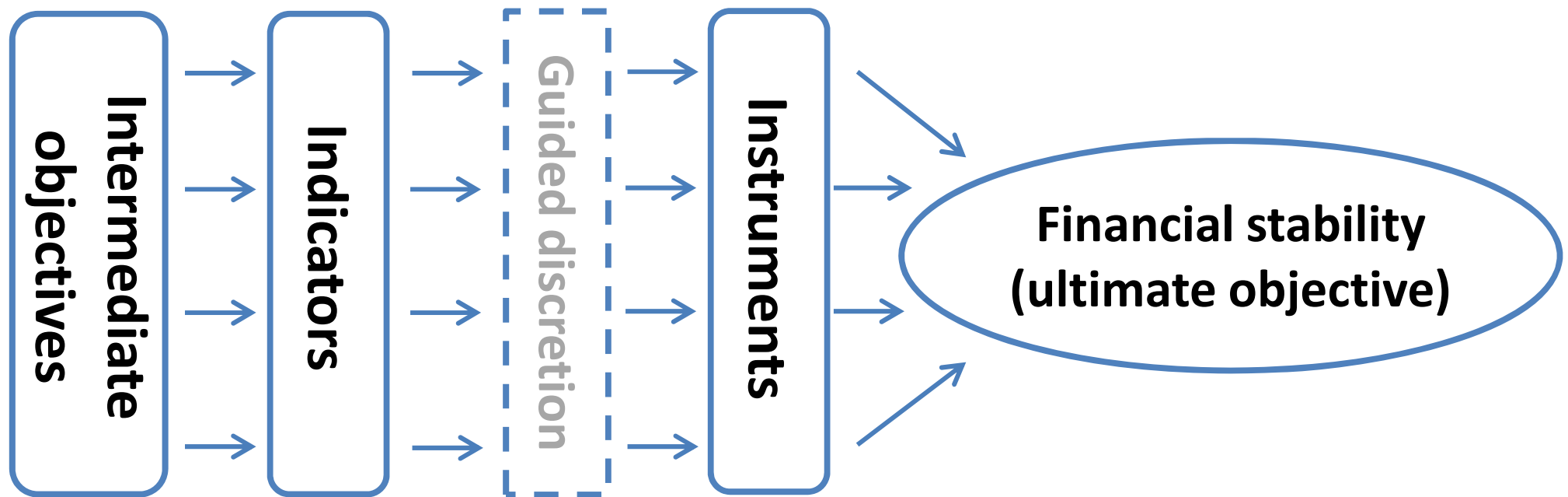
## ***Consequences***

- Uncontrollable climate change (more floods, draughts, extreme storms, etc.)
- Serious harm to global economy
- Larger losses on broad range of assets

# Conclusions

- **Serious money** at stake
- **Specific financial institutions** could encounter **serious problems**
- **No financial stability argument** against effective climate policy **now**
- **The longer we wait, the more expensive it gets** (and the bigger the financial stability risk)

# Macroprudential policy strategy

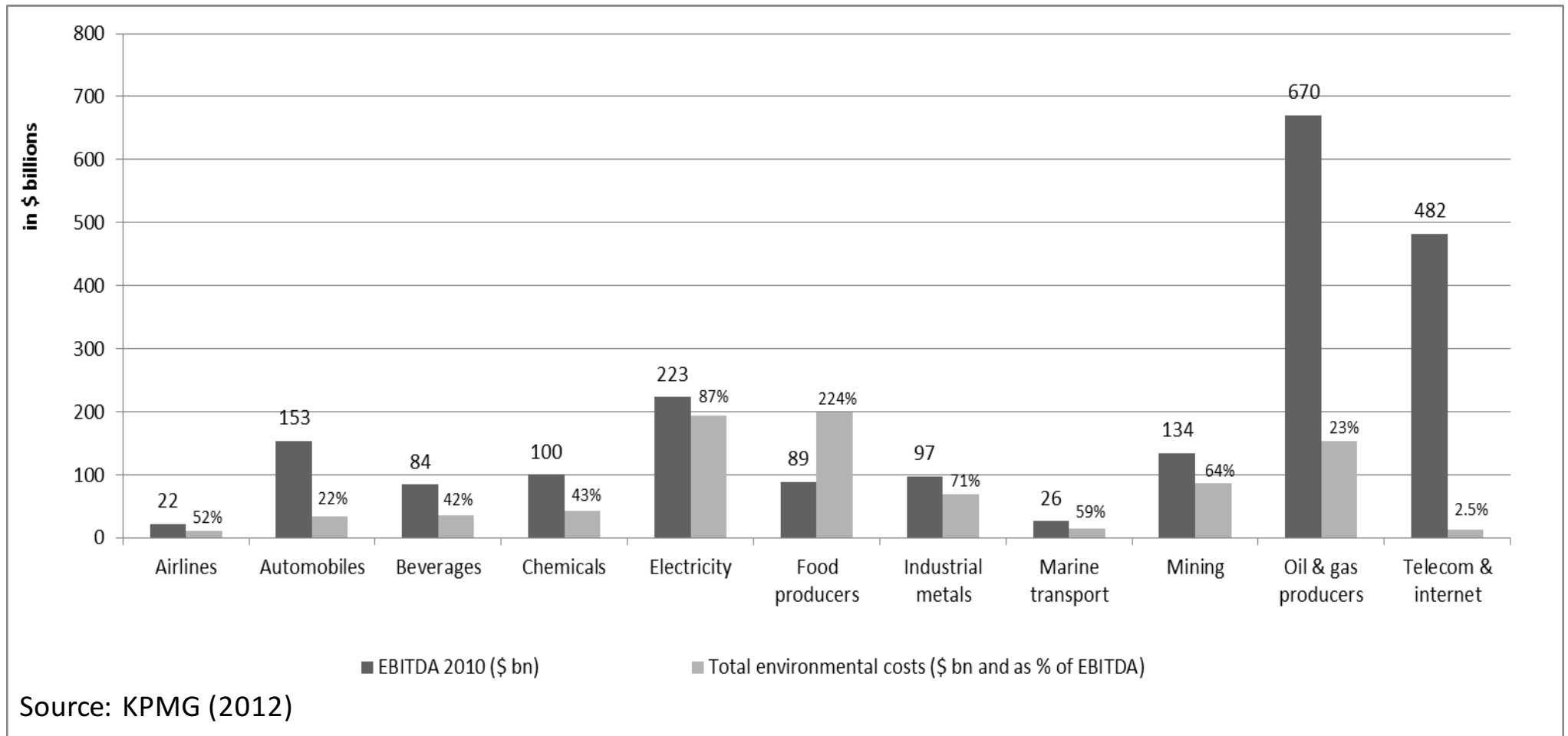


Source: ESRB (2014)

# Financial crisis sensitivity of asset classes

Criteria	Housing	Shipping	Dotcom	Carbon
Long-lived	✓	✓	✗	✓
Capital intensive	✓	✓	✓	✓
Economic share	✓	✗	✓	✓
Debt-financed	✓	✓	✗	✓
Crisis prone	Yes	No	No	Yes

# External environmental costs



# Cyclical pillar

Intermediate target	Excessive credit growth for carbon intensive and dependent economic activities		
Indicators	Carbon intensity and dependency credit		
Key instruments	Counter cyclical capital buffer	Capital instruments, <b>higher risk weights</b> for: <ul style="list-style-type: none"> <li>- <b>carbon intensive and dependent sectors</b> (transport, mining, energy)</li> <li>- <b>carbon intensive and dependent companies</b> within these sectors</li> </ul>	'Carbon cap' <ul style="list-style-type: none"> <li>- exclusion list</li> <li>- maximum debt finance for carbon intensive/ dependent sectors and companies</li> </ul>

# Structural pillar

<b>Intermediate target</b>	<b>Exposure concentration to carbon intensive and dependent assets</b>	<b>Misaligned incentives</b>
<b>Indicators</b>	Net exposure	Carbon intensity and dependency of SIFIs
<b>Key instruments</b>	Large exposures restrictions	SIFI capital surcharge



# Impact

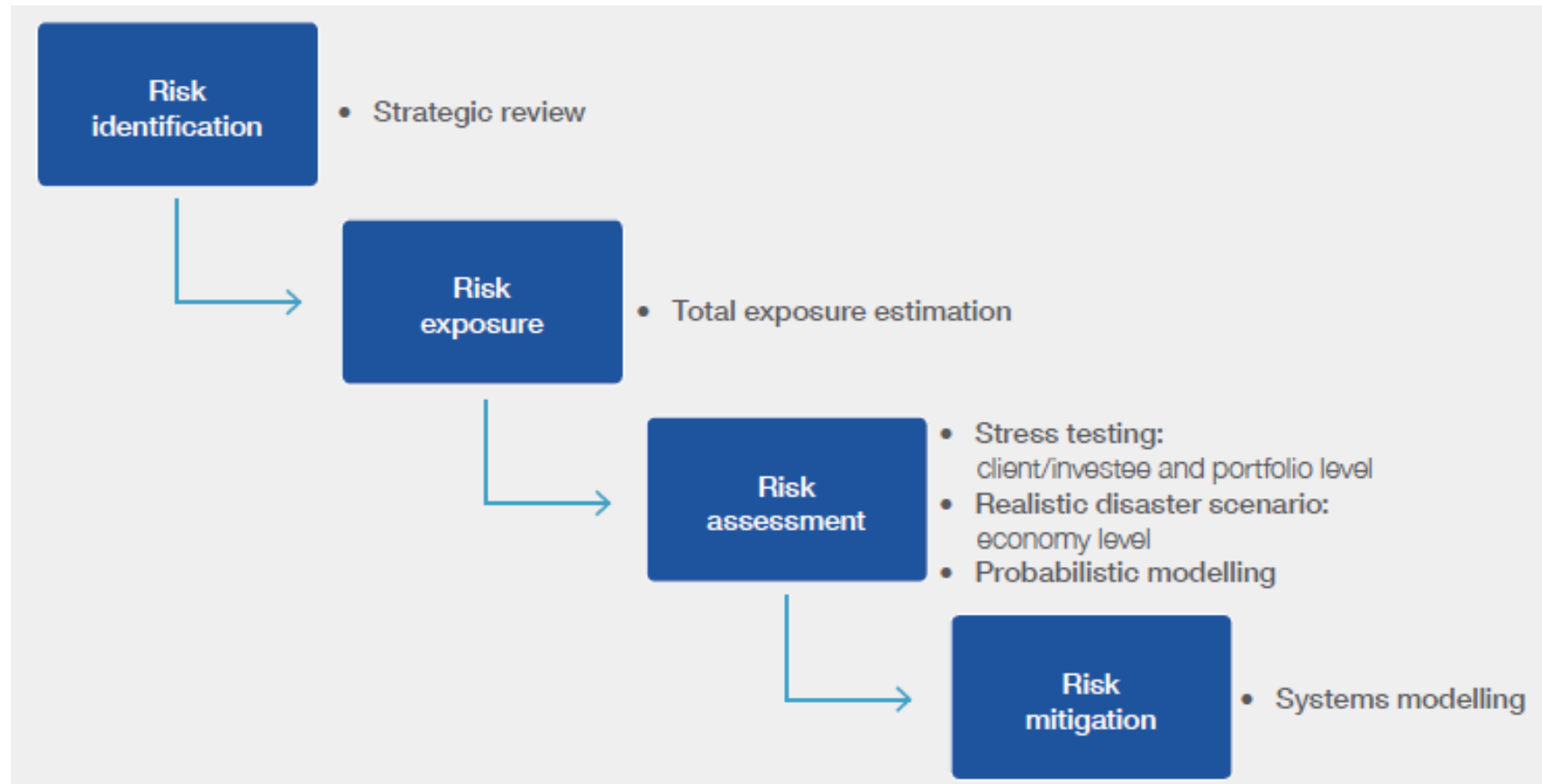
## **Regulators and supervisors**

- materiality acknowledged
- asking questions/ demanding transparency (French Art 173)

## **Financial institutions**

- setting goals for exposure and engagement
- but still largely without real risk assessment

# An identified yet unassessed risk



Source: CISL (2016)

## Way forward

**Develop environmental risk scenarios**, including **indirect affects**, for different asset classes:

- to do carbon **stress tests**.
- used to **calibrate** the macroprudential instruments;

Make this an integral part of macroprudential supervision also in the IMF Financial Sector Assessment Program (**FSAP**) and the **FSB peer review** assessments of the macro prudential policy framework.

Looking ahead through the rear view mirror





**Merci!**

**Further reading:**

"The price of doing too little too late" 2014, with Weyzig et al.

"Financial risks and opportunities in the time of climate change" 2016, with Schoenmaker.

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# Carlota Perez, Finance and technology

		INSTALLATION PERIOD		DEPLOYMENT PERIOD	
GREAT SURGE		Frenzy bubbles	TURNING POINT	“Golden ages”	
1 <sup>st</sup>	1771 The Industrial Revolution Britain	Canal mania	1793–97	Great British leap	
2 <sup>nd</sup>	1829 Age of Steam and Railways Britain	Railway mania	1848–50	The Victorian Boom	
3 <sup>rd</sup>	1875 Age of Steel and heavy engineering UK / USA/Germany	London funded global market infrastructure build-up (Argentina, Australia, USA)	1890–95	Belle Époque (Europe) “Progressive Era” (USA)	
4 <sup>th</sup>	1908 Age of Oil, Autos and Mass Production USA	The roaring twenties Autos, housing, radio, aviation, electricity	Europe 1929–33 USA 1929–43	Post-war Golden age	
5 <sup>th</sup>	1971 The ICT revolution USA	Internet mania, Telecoms, emerging markets Financial casino & housing	2000/07–20??	Sustainable global knowledge-society?	
		Recession Institutional recomposition			