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 »

Paris 9 December 2016
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?
Global emissions and temperature increase for various concentration levels

Emissions

Temperature increase

Source: Vuuren and Faber (2009)
Climate imbalance (stress)

Physical risk

2100 new equilibrium with higher average temperature

5 degree

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
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

Potential shocks

Estimated losses

Propagation of shocks

Feedback loops

Economy
Markets

Pension funds
Banks
Insurers
Commodities
Securities
Loans

% assets
% capital

Investors
Firms
Households
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)

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Debt</th>
<th>Total</th>
<th>As % total assets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Banks</strong></td>
<td>98</td>
<td>365(^a)</td>
<td>463</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Pension funds</strong></td>
<td>196(^b)</td>
<td>60</td>
<td>256</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td>109</td>
<td>233</td>
<td>342</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>403</td>
<td>658</td>
<td>1.061</td>
<td></td>
</tr>
</tbody>
</table>
The shock, price developments in the low carbon break through scenario

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodities</td>
<td>-50%</td>
</tr>
<tr>
<td>Equities</td>
<td>-60%</td>
</tr>
<tr>
<td>Bonds</td>
<td>-30%</td>
</tr>
<tr>
<td>Term &amp; project loans</td>
<td>-30%</td>
</tr>
<tr>
<td>Credit facilities</td>
<td>-20%</td>
</tr>
</tbody>
</table>
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

Figure 2 Macro-prudential policy strategy

Figure 3 Macro-prudential policy cycle

Source: ESRB (2014)
# Financial crisis sensitivity of asset classes

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Housing</th>
<th>Shipping</th>
<th>Dotcom</th>
<th>Carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-lived</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Capital intensive</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Economic share</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Debt-financed</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Crisis prone</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
External environmental costs

Source: KPMG (2012)
## Cyclical pillar

<table>
<thead>
<tr>
<th>Intermediate target</th>
<th>Excessive credit growth for carbon intensive and dependent economic activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators</strong></td>
<td>Carbon intensity and dependency credit</td>
</tr>
</tbody>
</table>
| **Key instruments** | Capital instruments, **higher risk weights** for:  
- carbon intensive and dependent sectors (transport, mining, energy)  
- carbon intensive and dependent companies within these sectors  
- ‘Carbon cap’  
  - exclusion list  
  - maximum debt finance for carbon intensive/ dependent sectors and companies |
| Counter cyclical capital buffer | Capital instruments, **higher risk weights** for:  
- carbon intensive and dependent sectors (transport, mining, energy)  
- carbon intensive and dependent companies within these sectors  
- ‘Carbon cap’  
  - exclusion list  
  - maximum debt finance for carbon intensive/ dependent sectors and companies |
## Structural pillar

<table>
<thead>
<tr>
<th>Intermediate target</th>
<th>Exposure concentration to carbon intensive and dependent assets</th>
<th>Misaligned incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
<td>Net exposure</td>
<td>Carbon intensity and dependency of SIFIs</td>
</tr>
<tr>
<td>Key instruments</td>
<td>Large exposures restrictions</td>
<td>SIFI capital surcharge</td>
</tr>
</tbody>
</table>
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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<table>
<thead>
<tr>
<th>GREAT SURGE</th>
<th>INSTALLATION PERIOD</th>
<th>DEPLOYMENT PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1771</td>
<td>Frenzy bubbles</td>
</tr>
<tr>
<td></td>
<td>The Industrial Revolution</td>
<td>1793–97</td>
</tr>
<tr>
<td></td>
<td>Britain</td>
<td>Great British leap</td>
</tr>
<tr>
<td>2nd</td>
<td>1829</td>
<td>Frenzy bubbles</td>
</tr>
<tr>
<td></td>
<td>Age of Steam and Railways</td>
<td>1848–60</td>
</tr>
<tr>
<td></td>
<td>Britain</td>
<td>The Victorian Boom</td>
</tr>
<tr>
<td>3rd</td>
<td>1875</td>
<td>Frenzy bubbles</td>
</tr>
<tr>
<td></td>
<td>Age of Steel and heavy engineering</td>
<td>1890–96</td>
</tr>
<tr>
<td></td>
<td>UK / USA/Germany</td>
<td>Belle Époque (Europe)</td>
</tr>
<tr>
<td></td>
<td>London funded global market infrastructure build-up (Argentina, Australia, USA)</td>
<td>“Progressive Era” (USA)</td>
</tr>
<tr>
<td>4th</td>
<td>1908</td>
<td>Frenzy bubbles</td>
</tr>
<tr>
<td></td>
<td>Age of Oil, Autos and Mass Production</td>
<td>1929–33</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>Post-war Golden age</td>
</tr>
<tr>
<td></td>
<td>The roaring twenties</td>
<td>USA</td>
</tr>
<tr>
<td></td>
<td>Autos, housing, radio, aviation, electricity</td>
<td>1929–43</td>
</tr>
<tr>
<td>5th</td>
<td>1971</td>
<td>Frenzy bubbles</td>
</tr>
<tr>
<td></td>
<td>The ICT revolution</td>
<td>2000/07</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>Financial casino &amp; housing</td>
</tr>
<tr>
<td></td>
<td>Internet mania, Telecoms, emerging markets</td>
<td>recession</td>
</tr>
</tbody>
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<th>Turning Point</th>
<th>Golden ages</th>
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<td>“Progressive Era” (USA)</td>
<td></td>
</tr>
<tr>
<td>2000/07-20??</td>
<td>Sustainable global knowledge-society?</td>
<td></td>
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