Indexing prudential requirements on climate: what impacts can be expected?

Finance for Tomorrow and I4CE Webinar

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October 18th, 2021
Background to the study
Debates mainly focused on a risk-based approach
- Regulation is primarily designed for risks, with a persistent debate on the risk differential between green and brown activities
- Difficulties in correctly measuring climate risks

Our study does not position itself as a response to this debate

Focus of the study: look at the different impacts of these instruments
- Simulate the application of different GSF and PF
- Evaluate the impact on the financing of green projects (mobility, energy retrofitting and renewables) and carbon-intensive activities
- Evaluate the impact on the banks' internal profitability
- Evaluate the effects of growth and contraction of all credits
Modeling results for the Green Supporting Factor
The effects on bank lending rates of transition projects

- Modeling of 3 values 15%, 25% and 50%
- The GSF applies only to incoming flows
- Very favourable assumption of transferring all the cost reduction from the bank to the client

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>Low GSF at 0.85 (15% reduction in prudential requirements)</th>
<th>Moderate GSF at 0.75 (25% reduction in prudential requirements)</th>
<th>High GSF at 0.5 (50% reduction in prudential requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIAL ANNUAL LOAN RATE</td>
<td>4.41%</td>
<td>4.41%</td>
<td>4.41%</td>
</tr>
<tr>
<td>ANNUAL LOAN RATE WITH GSF</td>
<td>4.28%</td>
<td>4.19%</td>
<td>3.97%</td>
</tr>
<tr>
<td>PERCENTAGE POINT CHANGE IN ANNUAL RATE</td>
<td>0.13PTS</td>
<td>0.22PTS</td>
<td>0.44PTS</td>
</tr>
</tbody>
</table>
The Green Supporting Factor

The effects on bank lending rates of transition projects

• Mobility sector
  – Credit parameters: 48 months, 3% interest rate
  – Impact of the GSF = maximum 0.6% decrease in total cost
  – Ex: for the purchase of an electric vehicle at 30 000€, the gain linked to a strong GSF will be 200€.
  → To be compared to public subsidies (5k to 7k€ in France) and to the electric car cost reduction (2 months)

• Energy retroffiting sector
  – Loan parameters: 82 months, interest rate at 3.6%.
  – Impact of the GSF = maximum 0.7% decrease in total cost
  – Ex: for a deep renovation costing 80 000€, the gain linked to the GSF is 600€.
  → To be compared to public subsidies: on average €10,500 for the higher-income households
The effects on bank lending rates of transition projects

- Renewable energy sector: example of wind power
  - Loan parameters: 15 years, annualized rate of 3.5%.
  - Impact of the GSF = 1% decrease in total cost with a -25% GSF, 2.5% decrease with a -50% GSF
  - Impact is more interesting when maturity is longer

But this should be put into perspective in view of the existence of the Infrastructure Supporting Factor, the regulatory and financial risks that exist at the beginning of a project, and the abundance of financing offers when projects are mature.
The Green Supporting Factor

**Effects on the credit growth and bank profitability**

- The expected effect of the GSF on loan volumes is uncertain, and even under a favourable assumption, the additional growth in credits (green and generalist) would be very low (around 0.08%/year).

- Despite its low impact on the transition, the GSF is moderately profitable for banks, with a gain of €0.1 to €0.4 billion/year for the entire French banking sector.

- The GSF does not particularly encourage the banking sector to adopt a proactive climate strategy. Indeed, in the short term there is no additional remuneration compared to a wait-and-see attitude.
The Green Supporting Factor

The effects on bank profitability

**FIGURE 6: ASSUMPTION OF BALANCE SHEET GROWTH STRATEGY: A LIMITED EFFECT ON CREDIT, AND WEAK CORRELATION WITH BANKING SECTOR CLIMATE COMMITMENT**

Credit growth in percentage points

- Proactive
- Delayed
- Wait-and-see

- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
Modeling results for the Penalising Factor
## Determining calibration and scope of application

### The Penalising Factor

- **PF applies to both stocks and inflows**

- **Assuming that all additional costs are transferred to the customer**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Extreme PF, localised scope</th>
<th>Moderate PF, limited scope</th>
<th>Low PF, broad scope</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calibration</strong></td>
<td>3.5</td>
<td>1.25</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Share of RWAS (Concerned by PF)</strong></td>
<td>0.4%</td>
<td>4%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Plausible scope of sectors concerned</strong></td>
<td>Coal</td>
<td>Coal, oil, gas</td>
<td>Coal, oil, gas, cement, petrochemicals, aeronautics, combustion vehicles</td>
</tr>
<tr>
<td><strong>Increase in prudential requirements</strong></td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

**The Penalising Factor**
The Penalising Factor

Modeling the behaviour of banks following PF

- Modeling of 5 exit scenarios
- Not all scenarios are possible depending on the chosen perimeters
Results for PF +250% on a "coal" perimeter

• A strong or even extreme PF (increase in requirements from 100% to 250%) can increase the cost of some projects by about 10%, especially those with a long maturity.

• The entry into force of a PF has an immediate and significant effect on the banking sector, which can either increase its capital or contract its balance sheet.
The Penalising Factor

Results for PF +250% on a "coal" perimeter

- Applying an extreme PF on a localised perimeter creates a **strong incentive** and a mobilisation of banks **to quickly exit** the activities concerned, making the effects on credit transitory and limited.
The incentive is **diffuse** (weak and on a large number of sectors), the exit from carbon-based activities is **longer** to set up.

- The contraction of credit is 1% from the first year and in 2028, the **amount outstanding remains 0.8% below** the reference scenario.
- This credit crunch is affecting **all sectors, including the transition sectors**.
- The effects of the credit crunch are more lasting over time.

**FIGURE 18: ASSUMPTION OF BALANCE SHEET REDUCTION STRATEGY: CONTRACTION EFFECTS POSSIBLE FOR ALL CREDIT, WHICH ARE LASTING DUE TO HARMFUL SECTOR WITHDRAWAL STRATEGIES BEING TOO LATE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Very delayed withdrawal</th>
<th>Very late withdrawal</th>
<th>Delayed withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>-1.2</td>
<td>-1</td>
<td>-0.8</td>
</tr>
<tr>
<td>2021</td>
<td>-1</td>
<td>-1</td>
<td>-0.8</td>
</tr>
<tr>
<td>2022</td>
<td>-1</td>
<td>-1</td>
<td>-0.8</td>
</tr>
<tr>
<td>2023</td>
<td>-1</td>
<td>-1</td>
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<td>-1</td>
<td>-1</td>
<td>-0.8</td>
</tr>
<tr>
<td>2026</td>
<td>-1</td>
<td>-1</td>
<td>-0.8</td>
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<tr>
<td>2027</td>
<td>-1</td>
<td>-1</td>
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</tr>
<tr>
<td>2028</td>
<td>-1</td>
<td>-1</td>
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</tr>
<tr>
<td>2029</td>
<td>-1</td>
<td>-1</td>
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The Penalising Factor
Results for the PFs +25% "fossil fuels" and +10% "fuel-intensive activities"

• If applied widely, the PF could penalise carbon-intensive sectors in transition
• The PF adopts a very static reading of companies and their role in the transition, without analysing the dynamics of transformation.
• If the scheme is limited to fossil fuel producers: the negative effects are limited due to the very specific organisation of the energy sector into subsidiaries.
• On the other hand, in the case of a broad scope, there is a significant risk of penalising the financing of green projects (automobile, aeronautics, cement industry, etc.)
Recommendations
Recommendations

Handle PF with cautious and explore Pillar 2 options

→ The impact of the GSF is not significant enough to trigger new green projects

→ A very strong PF can be interesting to accelerate the end of fossil fuels for which we already have a clear exit strategy

→ However, the PF must be handled with care and restricted to a limited scope to avoid the effects of a credit crunch and penalization of transition companies

→ It seems more interesting to explore Pillar 2 instruments such as net-zero commitments to 2050 and transition plans for banks
Impact assessment of the GSF

Description of the rate model and results for the GSF
The rate model

Objectives:
1. Propose a model for setting the bank loan rate as a function of tied-up capital
2. Use the model to determine the impact of a GSF on the level of rates

Methodology:
Calculation of the equity capital raised
Calculation of the expected profit, then of expected GNP
Calculation of the interest rate

<table>
<thead>
<tr>
<th>Amount of the loan concerned</th>
<th>Weighted risk factor</th>
<th>Prudential ratio</th>
<th>Equity capital raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0,75</td>
<td>0,08</td>
<td>6</td>
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</table>

<table>
<thead>
<tr>
<th>Level of expected ROE</th>
<th>Expected benefit</th>
<th>Profit/GNP ratio</th>
<th>Expected GNP</th>
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<tbody>
<tr>
<td>6,3%</td>
<td>0,126</td>
<td>0,19</td>
<td>1,99</td>
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<th>Cost of financing</th>
<th>Total cost bank</th>
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Description of the rate model and results for the GSF

The rate model

Methodology:

Calculation within the framework of a GSF

**HYPOTHESIS:** bank earnings are deferred into profits for customers **Constant ROE**

- Calculation of the new expected profit, then of new GNP at constant costs
- Calculation of the interest rate at ongoing funding

<table>
<thead>
<tr>
<th>Amount of the loan concerned</th>
<th>Weighted risk factor</th>
<th>Prudential ratio</th>
<th>GSF level</th>
<th>Equity raised without SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0,75</td>
<td>0,08</td>
<td>0,75</td>
<td>4,5</td>
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<tr>
<th>Level of expected ROE</th>
<th>Value of expected profit</th>
<th>Expected GNP</th>
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<tbody>
<tr>
<td>6,3%</td>
<td>0,283</td>
<td>1,86</td>
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<td>2,79</td>
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Result of the rate model

Rate changes of between 0.1 and 0.5 percentage points on annualised rates

The riskier the loans, the more they benefit in absolute terms from a rate reduction.
In order to calculate the impact on long-term loans, it is necessary to reason in proportion.

A GSF of 0.85 lowers the bank debt burden of a project by 2.82%.
Impact of the GSF on the transition sectors

Different sectors studied:

- **Energy renovation:** an inadequate tool for the amount of public aid
  - Bank financing reserved for the highest deciles (7-10).
  - A low bank debt burden (7%) in relation to the cost of the project because i) 50% bank financing ii) 8 year maturity
  - A variation in total cost of 0.2 to 0.7% depending on the level of the GSF (2-10% of the 7% of the debt burden)
  - For an 80k€ project, a maximum impact of 600€.
  - **State subsidies are 20 times higher** (>10k€)

- **Mobility:** a market too short-term for the GSF to be relevant
  - A market financed by bank debt (1/3 of vehicles financed between 50 and 100% by bank debt)
  - Short to medium term bank debt (average maturity = 4 years)
  - At current interest levels, the debt burden represents at best 10% of the total project cost.
  - A variation in total cost of 0.2 to 1% depending on the level of the GSF (2-10% of the 10% of the debt burden)
  - For a 40k€ project, a maximum impact of 400€.
  - **Bonus-malus of an amount 10 times higher** (between 4 and 6,000€ for electric vehicles)
Impact of the GSF on the transition sectors

Different sectors studied:

- **Energy:**
  - 80% of the renewable projects market is financed by bank debt
  - Long-term projects (average maturity=15 years)
  - The debt burden is therefore significant in proportion (25% of total cost)
  - A variation in total cost of 0.5% to 2.5% depending on the level of the GSF. (2-10% of the 25% of the debt burden)

- **BUT**
  - A prudential tool already exists (ISF at 0.75)
  - The financing gap relates to assets under exploration or under construction, not to completed projects
  - These projects are more risky (regulatory risk, local opposition, etc.)
  - The FRG does not reduce the risk of these unsuccessful projects, and therefore does not fill this gap
  - The GSF, added to the ISF, would further tighten the financing offer for completed projects => risk of overvaluation

- **SO**
  - Keep the ISF, but green it (adapt criterion 1(o) of article 501 of the CRR and ask for eligibility to the green taxonomy, in addition to the current environmental assessment)
Impact assessment of the GSF

Analysis and impact for banks
The impact model for banks

Objectives:
1. Propose a model to assess the impact of the GSF on banks
2. Use the model to determine the predicted effect of a GSF on credit
3. Use the model to determine the gain to the banking system from a GSF

Methodology:
1. Construction of a base scenario (same as PF)
2. Definition of banking strategies in case of GSF
3. Elaboration of climate scenarios
4. Analysis of the results of the simulations compared to the baseline scenario
Definition of banking strategies in case of GSF

- **Definition of banking strategies in case of GSF**
  - **Less recapitalization strategy:**
    - Bank balance sheet constant compared to the trend
    - RWA/Balance sheet ratio reduced in proportion to the eligible green share in the portfolio
    - RWAs and CET1 capital are lower in trend
    - The bank uses the GSF to grow at its trend level, without having to recapitalize as much.
  
  - **Balance sheet growth strategy:**
    - CET1 capital and RWA are constant and equal to the trend
    - The RWA/Balance Sheet ratio is reduced in proportion to the eligible green share in the portfolio
    - The bank balance sheet is up compared to the trend
    - The bank uses the GSF to grow above its trend level, and reinvests the capital freed up by lower prudential requirements.

- We model these strategies in the "constant ROE" framework, i.e. the bank passes on the gains to its customers, and in the "increased ROE" framework, i.e. the bank absorbs the gains.
Analysis and impact for GSF banks

Scenarios for the evolution of green investments

- **Hypothesis:**
  - The GSF is applied to incoming flows in 2022 (flows from 01/01/2022 are taken into account and the RWAs for the year 2022 are thus reduced)
  - The green share of incoming flows is estimated at 2%.
  - The balance sheet renewal rate is set at 12%.

- **Voluntary scenario:**
  - The French banking system is committed to the climate, and green banking investments are growing by 20%/year (the rate required to comply with the SNBC)

- **Strategy 5 years late:**
  - The French banking system is committed to the climate, but lacks ambition. Growth in green banking investments of 10%/year (at this rate, the 2028 investment values will correspond to the 2023 SNBC objectives)

- **Strategy no effort**
  - The French banking system is not involved in the climate. Growth of green banking investments at the same rate as the trend growth of the balance sheet, i.e. 3%/year.
Simulation of the evolution of the green share in the portfolio

Applying a GSF on incoming flows makes the impact gradual and later.

It is necessary to wait until 2025 to exceed 1%, whereas at that time the green share of inflows is 3.2% in the voluntarist scenario.

Prudential requirements lowered from 0.3% to 0.5% by 2028 if GSF at 0.75. (to be linked to the immediate 1% of EMS SF)
Simulation for GSF at 0.75 and ROE+.

Possibility of releasing capital in the short term and distributing it to shareholders (for 1% of annual net income)

Possibility to reinvest this capital but the gain is long term (0.3% of net income over 2022-2028, weighted by 2028)

Even with no effort, the banking system is rewarded (almost 50% of the voluntary gain)

The gap widens in 2028 and beyond => incentive to be proactive in the long term when immediate investment is needed.
Impact on credit

Only the balance sheet growth strategy allows for a credit surplus.

It is a strategy that has advantages only in the long term => will it be the most chosen?

Limited reduction in requirements => even in the best scenario, limited effect on credit (0.6% is 2 months of growth at 3%).

Conclusion: We should not expect the GSF to have an effect on credit, compatible with the magnitude of the transition needs (+20%/year of green bank investments)
PF impact assessment

Description of the rate model and results for the PF
The rate model

Objectives:

1. Propose a model for setting the bank loan rate as a function of tied-up capital
2. Use the model to determine the impact of a PF on rate levels

Methodology:

- Calculation of the equity capital raised
- Calculation of the expected profit, the level of expected GNP
- Calculation of the interest rate

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Description of the rate model and results for the PF

The rate model

Methodology:
- Calculation in the context of a PF

- **HYPOTHESIS:** banking costs are passed on to customers *constant ROE*

- Calculation of the new expected profit, then of new GNP at constant costs

- Calculation of the interest rate at ongoing funding

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<tr>
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<th>Weighted risk factor</th>
<th>Prudential ratio</th>
<th>PF level</th>
<th>Equity raised without SF</th>
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<tbody>
<tr>
<td>100</td>
<td>0,75</td>
<td>0,08</td>
<td>1,25</td>
<td>7,5</td>
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<th>Value of expected profit</th>
<th>Expected GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,3%</td>
<td>0,472</td>
<td>2,11</td>
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</thead>
<tbody>
<tr>
<td>0,93</td>
<td>3,05</td>
<td>3,05%</td>
</tr>
</tbody>
</table>
Description of the rate model and results for the PF

Result of the rate model

Rate changes between 0.1 and 1 percentage point on annualized rates

The more capital-intensive the loans, the more they are affected by an increase in the rate in absolute terms.
In order to calculate the impact on long-term loans, it is necessary to reason in proportion.

A PF of 1.25 increases the bank debt burden of a project by 5.15%.

The final impact depends on the weight of the bank debt burden in the total cost of the project.

The curve is not linear since the financing rates are constant, regardless of the risk profile.
Description of the rate model and results for the PF

Result of the rate model

At RW=1, we have an elasticity of 0.188

1% decrease in prudential requirements => 0.19% decrease in proportion to the bank rate.

Example: a GSF of 0.75 leads to a 25% reduction in requirements, i.e. 25x0.188=4.7% reduction in the bank rate
PF impact assessment

Analysis and impact of PF on the banking system
The impact model for banks

• Objectives:
  1. Propose a model to assess the impact of the PF on banks according to i) calibration ii) scope of application
  2. Use the model to determine the predicted effect of a PF on credit
  3. Use the model to determine the losses to the banking system due to the PF

• Methodology:
  • Construction of a basic scenario
  • Definition of PF implementation procedures
  • Definition of banking strategies in case of PF
  • Elaboration of exit scenarios
  • Analysis of the results of the simulations compared to the baseline scenario
Construction of the base scenario

- Study on the 6 major French banking groups
- Construction of the scenario from the 2019 aggregate data (ACPR), before the health crisis
- Scenario assumptions:
  - The aggregate bank balance sheet tends to grow at a given rate on entry (here 3%/year)
  - The ratios NBI/Balance Sheet (2.15%), Results/NBI (0.19), RWA/Balance Sheet (0.34), CET1/RWA (14.4%), are fixed constant during the simulation and equal to their value in 2019 (see parenthesis)

- The baseline scenario provides data on changes in the balance sheet, NBI, earnings, RWAs and CET1 capital
Analysis and impact of PF on the banking system

Definition of banking strategies in case of PF

– Recapitalization strategy:
  – Bank balance sheet constant compared to the trend
  – RWA/Balance sheet ratio increased in proportion to the eligible gross share in the portfolio
  – RWA and CET1 capital are higher in trend
  – The bank adapts to the PF by recapitalising to maintain its balance sheet level.

– Balance sheet contraction strategy:
  – CET1 capital and RWA are constant and equal to the trend
  – The RWA/Balance Sheet ratio is increased in proportion to the eligible gross portion in the portfolio
  – The bank balance sheet is down compared to the trend
  – The bank adapts to the GFC by reducing its balance sheet so as not to have to recapitalise heavily => credit contraction
Definition of PF implementation procedures

- No brown taxonomy => theoretical freedom regarding i) calibration ii) scope of application
- For comparison purposes, all scenarios are for a 1% **increase in prudential requirements**.
- It is assumed that the RWA/Balance sheet ratio is representative for the portfolios studied, i.e. coal=0.4% of assets, => coal=0.4% of RWA.
- **In all scenarios, the PF applies in 2022 to the stock of eligible assets**

- **Strong PF scenario but localized on coal**
  - PF set at 3.5
  - Coal perimeter set at 0.4% of assets (source ACPR-AMF)

- **Moderate PF scenario on fossil perimeter**
  - PF set at 1.25
  - Fossil perimeter set at 4% (estimated gas+oil exposure)

- **Low but extended PF scenario**
  - PF set at 1.1
  - Fossil perimeter set at 10% (brown and derivative activities including aeronautics, thermal automobiles, etc.)
Description of the rate model and results for the PF

Elaboration of exit scenarios

The variable that dictates the behavior of the model is the output rate. We have modeled 3 of them here:

1) Voluntary exit at 100% in 2027
2) Exit 5 years late in 2035 with a 20% reduction target for 2030
3) No exit

These exit scenarios are more or less realistic depending on the size of the portfolio eligible for PF. => choose as input variable
Description of the rate model and results for the PF

Financial impact of the PF on the banking system

The 1% increase in requirements is immediate. Effective as early as 2021, as the banks are setting aside 2021 capital for 2022.

Two consequences:
- banks recapitalize €3.7bn at the end of 2021 (12% of net income, 1% of current capital).
- Banks are squeezing credit (strategy of less recapitalization)
In the case of banks that do not wish to recapitalise, the contraction of credit relative to trend is immediate:

-1% of balance sheet vs. trend

If quick exit, then effects can quickly fade.

=> Argues (impact level) for a strong but localized PF, which really encourages exit when possible.
Thank you for your attention!