

# RISK MANAGEMENT MAGAZINE

Vol. 17, Issue 1  
January – April 2022

## EXCERPT

<https://www.aifirm.it/newsletter/progetto-editoriale/>



### **Capital adequacy in banks and sustainable finance: the Green Supporting Factor**

**Mariantonietta Intonti, Annalisa Ceo, Giovanni Ferri**

# Capital adequacy in banks and sustainable finance: the Green Supporting Factor<sup>1</sup>

Mariantonietta Intonti (University of Bari Aldo Moro), Annalisa Ceo (University of Bari Aldo Moro), Giovanni Ferri (LUMSA University – Rome)

Article submitted to double-blind peer review, received on 28<sup>th</sup> February 2022 and accepted on 25<sup>th</sup> April 2022

## Abstract

*Starting from the analysis of the contents of the EU Action Plan on Sustainable Finance, we focus on action eight: “The EU Commission will explore the feasibility of including risks associated with climate and other environmental factors in institutions’ risk management policies, as well as the potential calibration of capital requirements of banks as part of the Capital Requirement Regulation and Directive. The aim would be to consider such factors, where this is justified from a risk perspective, to safeguard the coherence and effectiveness of the prudential framework and financial stability. Any recalibration of capital requirements, based on data and the assessment of the prudential risk of banks’ exposure, would need to rely on and be coherent with the future EU taxonomy on sustainable activities”. We focus on the characteristics of the Green Supporting Factor (GSF), a particular weighting mechanism for bank loans, useful to integrate environmental sustainability in the risk assessment and in the prudential requirements of banks. In light of the study carried out, we argue that it is possible to introduce corrective systems that favor green loans or penalize brown loans towards the ecological transition. Furthermore, to check the actual effectiveness, in particular of the GSF, and to correctly calibrate its extent following an assessment of ESG risks (significantly climate risks), we review two experimental applications carried out by financial intermediaries.*

## 1. Introduction

Action eight of the EU Action Plan on sustainable finance, directed at integrating the sustainable transition into the prudential requirements of banks (and insurance companies), aims to prompt financial intermediaries to consider sustainability risks (relating to the environment, social and corporate governance) in their assessment of loans and in their subsequent definition of the minimum amount of regulatory capital, to impact the growth of the ESG (Environmental, Social, Governance) loan and investment market, with a particular focus on the environment. In pursuing this goal, the role of the supervisory authorities is crucial, both for defining regulatory capital requirements in the face of ESG risks, and for monitoring these rules’ enforcement. In this context, drawing also on the scant literature on the subject, the paper reflects on the opportunity to introduce a new risk weighting system (more favorable for green loans) for determining the capital requirements, in order to facilitate the arrangement and dissemination of these financing instruments, useful for reaching the goal of ecological transition on time. Starting from the analysis of the contents of the EU Action Plan on Sustainable Finance, we focus on action eight: “The EU Commission will explore the feasibility of including risks associated with climate and other environmental factors in institutions’ risk management policies, as well as the potential calibration of capital requirements of banks as part of the Capital Requirement Regulation and Directive. The aim would be to take into account such factors, where this is justified from a risk perspective, to safeguard the coherence and effectiveness of the prudential framework and financial stability. Any recalibration of capital requirements, based on data and the assessment of the prudential risk of banks’ exposure, would need to rely on and be coherent with the future EU taxonomy on sustainable activities”<sup>2</sup>. Below, we focus on the characteristics of a particular weighting mechanism for bank loans, useful to integrate environmental sustainability in banks’ risk assessment and prudential requirements: the Green Supporting Factor (GSF). We appraise how the GSF has been analyzed at various levels, and how its pros and cons have been highlighted in the discussion, even as opposed to introducing, as suggested at times, a penalty factor for environmental-degrading banking assets, called Brown Penalizing Factor (BPF) or Dirty Penalizing Factor (DPF). On this basis, we try to answer the following research questions:

1. is it possible to introduce a new weighting risk mechanism for green bank loans (GSF) or brown loans (BSF) to improve the allocation of bank capital, in terms of better responsiveness to the risk associated with green loans?
2. is it useful to carry out experimental applications to verify the effectiveness in terms of cost of capital and ecological transition by means of green or brown corrective factors?

Our aim is to provide a brief critical summary of the scarce literature on the subject, and to review the limited experimental activities of the industry as a useful tool, to be supported, to evaluate the effective usability of a green weighting factor.

In the rest of the paper, Section 2 draws a literature review focused on GSF, Section 3 analyzes the origins of the GSF within the EU Action Plan on Sustainable Finance, Section 4, starting from the degree of capitalization versus risk of Italian banks<sup>3</sup>, in terms of mandatory minimum capital requirements CET1 ratio and Total Capital ratio<sup>4</sup>, focuses on the issue of whether the stability of the system can be influenced by the introduction of weighting factors beneficial to "green assets" (green loans), which favor the granting of such kind of loan and also a more sustainable economy.

The paper concludes with a brief review of two initial attempts for the application of weighting factors for green activities, conducted by Intesa Sanpaolo and by Natixis, on an experimental basis. Our analysis aims to highlight how practical experimentation can help verify the effective lower risk of sustainable loans and the usefulness of this instrument for the purposes of optimizing the cost of capital.

<sup>1</sup> Even if the paper is the result of a common effort, Mariantonietta Intonti mainly contributed to Sections 1, 2 and 5, Annalisa Ceo to Sections 3 and 4 and to collect literature, Giovanni Ferri to Section 1 and 6.

<sup>2</sup> European Commission, Action Plan to finance sustainable growth, 2018.

<sup>3</sup> KPMG, Bilanci dei gruppi bancari italiani- Trend e prospettive, 2020.

<sup>4</sup> Intonti M., “Verso Basilea 3: limiti e problematiche in tema di adeguatezza patrimoniale nelle banche” in Il ruolo del capitale tra regole bancarie e disciplina societaria, a cura di A. Dell’Atti e G. Giannelli, Egea, Milano, 2012.

## 2. Literature review

Scientific contributions on the GSF are rare in Italy but not at the European level<sup>5</sup>.

Existing surveys, both qualitative and quantitative in nature, reach mixed conclusions on how useful the green factor is. The most analyzed topics are the following: the features of the GSF and its applications; the effectiveness of the GSF in promoting green investments (compared to the SMEs' Supporting Factor – SMEs' SF – introduced by the Basel 2 Agreement, aiming to improve the weighting of loans granted to small and medium-sized enterprises, and abate the regulatory capital requirement on loans to such firms, as well as controlling the risk of credit crunch against them<sup>6</sup>); the peril that applying the GSF, if green investments' risk are not effectively lower, could lead to banks' undercapitalization and instability<sup>7</sup>.

In the context of the international quantitative literature, the contribution of Dafermos and Nikolaidi (2021) explore the potential impact of the Green Supporting Factor and the Dirty Penalizing Factor on climate-related financial risks and find that green differentiated capital requirements can reduce the pace of global warming and decrease thereby the physical financial risks. This reduction is enhanced when the GSF and the DPF are implemented simultaneously or in combination with green fiscal policies<sup>8</sup>.

On the other hand, Thomä and Hilke (2018), in order to quantify the effects of the GSF and of the BPF on European banks, they have estimated the impact that the two instruments, alternatively applied, can bring on bank capital requirements, comparing the results of these analyses with those relating to the SMEs' Supporting Factor verified by the EBA (2016)<sup>9</sup>.

The main empirical evidence deriving from this analysis shows that, by applying a GSF to risk-weighted assets, an improvement in the level of capital requirements is obtained but, in absolute terms, the total capital saving would be significantly lower than that identified by the SMEs' SF. Referring to previous research, the authors estimated that a GSF would result in a 5 to 25 basis points reduction in the cost of capital for green investments.

In the same line, the contribution of Thomä and Gibhardt (2019)<sup>10</sup> estimates the potential impact on capital reserves of European banks and the cost and availability of capital to "green" and "brown" investments and find that a GSF would have a limited effect on capital requirements of banks compared to possible introduction of a brown penalty factor, considering the larger universe of assets on which such a penalty would be applied.

Dankert et al. (2018)<sup>11</sup>, who were rather critical of the GSF, expressed their opinion on the issue by conducting a qualitative survey that does not support the thesis that green exposures are truly less risky than traditional exposures. Consequently, it would seem appropriate to be cautious in introducing such a correction factor, given that using capital requirements as a tool to incentivize green investments can have unintended consequences for financial stability, such as an underestimation of risks and a lower aggregate level of capitalization of the financial system.

Therefore, the evidence currently available reaches different conclusions, it does not yet support the assertion that green exposures are truly less risky, and it leaves many questions open about the effectiveness of the GSF as a policy tool to support and enhance green finance.

Overall, however, despite the existence of attempts by certain authors to evaluate its effectiveness, the analysis of the effects of the GSF both on capital requirements and on the expansion of the green investment market still appears to be scarce and certainly worthy of further contributions and insights.

## 3. Integrating sustainability into prudential requirements: the indications of the Action Plan for Financing Sustainable Growth

The climate changes that are affecting the planet, generated by the pollution of our "common home"<sup>12</sup> and a source of significant socio-economic impact in terms of human losses and of financial resources, together with the social and management tensions due to the Covid-19 pandemic and the Ukraine war, have required and continue to request the review of the regulatory framework in order to integrate the consideration of ESG, environmental (including physical and transitional climate risk), social and governance

<sup>5</sup> Thomä J., Hilke A., The green Supporting factor. Quantify the impact on European banks and green finance", 2<sup>nd</sup> Investing Initiative, 2018; Grünewald S., Climate change as a systemic risk – are macroprudential authorities up to the task? European Banking Institute, Working Paper Series, 2020.

<sup>6</sup> Sabatini G., Resolution 7-00851 Taranto, relating to the initiatives for the maintenance of the instrument of the support factor for small and medium-sized enterprises (SME Supporting factor) regarding the capital requirements of credit institutions, ABI Hearing, 2016.

<sup>7</sup> Enria A., Banking Supervision, Regulation, proportionality and the sustainability of banking, Speech at the Retail Banking Conference "Creating sustainable financial structures by putting citizens first" of European Savings Bank Group, Brussels, European Central Bank, 21 November 2019; Berenguer M. et al., Integrating Climate-related Risks into Banks' Capital Requirements, I4CE Institute for Climate Economics, 2020; Meager E., What to expect from the EU's renewed sustainable finance strategy, Capital monitor, 2021.

<sup>8</sup> Dafermos Y., Nikolaidi M., How can green differentiated capital requirements affect climate risks? A dynamic macrofinancial analysis, Post-Keynesian Economics Society, Working paper 2105, 2021.

<sup>9</sup> EBA, Reporting on SMEs and SME supporting factor, 2016.

<sup>10</sup> Thomä J. and Gibhardt K. (2019), "Quantifying the potential impact of a green supporting factor or brown penalty on European banks and lending", Journal of Financial Regulation and Compliance, Vol. 27 No. 3, pp. 380-394.

<sup>11</sup> Jacob Dankert, Lars van Doorn, Henk Jan Reinders and Olaf Sleijpen, "A Green Supporting Factor - The Right Policy?" SUERF "The European Money and Finance Forum" De Nederlandsche Bank N.V., 2018.

<sup>12</sup> Pope Francis, Enciclica Laudato si, 2015.

risks into the activity of banking risk management, also in order to induce good behavioral practices between borrowers and issuers, in light of the double materiality of the issue in the banking sector<sup>13</sup>.

With regard to environmental risk, the position has recently emerged that if banks, and not only banks, would take such risk into consideration in granting credit and in their investment activities, favoring companies and investments with low environmental and climate risk, this could foster increasingly better behavioral practices of borrowers and issuers (companies and states) from an environmental point of view, and consequently attenuate climate change, consequently accelerating the transition process towards a more sustainable economy.

In addition, if banks, besides considering climate risk in the preliminary assessment for granting loans, could benefit from allocating assets against green loans thanks to them actually facing a lower risk, this could further boost the transition process.

In order to raise public awareness on these issues, in September 2015, the United Nations signed the 2030 Agenda, followed by the European Union starting a process of including sustainability issues in the financial sector. This path, mainly relating to environmental issues, began with the signing, in December 2015, of the Paris Agreement<sup>14</sup>, the first step towards the diffusion of a growth and development model oriented towards environmental protection.

Subsequently, in December 2016, the European Commission established the High-Level Expert Group on Sustainable Finance (HLEG) which, in 2018, published the report "Financing a sustainable European Economy", aimed at launching, in March 2018, the Action Plan to finance sustainable growth, with the goal of increasing investments in sustainable projects and integrating environmental, social and governance criteria into risk management by financial operators.

**Figure 1 - From the signing of the 2030 Agenda to the Action Plan**



Source: European Commission, 2018.

The Plan identifies all the activities to be implemented with the support and involvement of financial market operators, including investors, intermediaries and managers, in order to achieve the three objectives suggested by the HLEG, namely:

1. steer capital flows towards sustainable investments;
2. limit the financial impact of environmental and social risks: an increase in world temperature exceeding the limits set by the Paris Agreement could generate destabilizing effects on the European economy and financial system, linked to events triggered by climate change. This could lead to greater exposure of banks to losses, due to the difficulties of client companies exposed to climate change and therefore also subject to climate risk;
3. ensure the transparency of market operators: greater disclosure transparency on sustainability issues could allow investors to compare the ESG performance of companies and make informed decisions on their investments.

To achieve the three objectives, the Action Plan: Financing Sustainable Growth includes ten actions (Figure 2).

<sup>13</sup> Bernardini E., Faiella I., Lavecchia L., Mistretta A. e Natoli F., Banche centrali, rischi climatici e finanza sostenibile, Banca d'Italia, Questioni di Economia e Finanza, Occasional Papers, 2021.

<sup>14</sup> European Union, Paris Agreement, ratification, 2016.

**Figure 2- Objectives and actions of the Action Plan on sustainable finance**

| <i>Objective</i>  | <i>Description</i>  | <i>Planned actions</i>   |
|---|---|--|
| <b>1 )</b> Reorienting of capital flows towards a more sustainable economy                              | Since the current level of investment is not enough to support a sustainable economic system from an environmental and social perspective, huge further investments are necessary   | 1. Establish a unified classification system of sustainable activities                                 |
|   |   | 2. Create standards and brands for sustainable financial products                                      |
|   |   | 3. Promote investments in sustainable projects   |
|   |   | 4. Integrate sustainability into financial advice  |
|   |   | 5. Develop sustainability benchmarks   |
| <b>2 )</b> Integrating sustainability into risk management  | In order to limit the financial impact of environmental and social risks, the financial decision process should include ESG considerations  | 6. Integrate sustainability into ratings and market research at best                                   |
|   |   | 7. Clarify the sustainability obligations of institutional investors and asset managers                |
|   |   | 8. Integrate sustainability in the prudential requirements of banks and insurance companies            |
| <b>3 )</b> Promoting transparency and encourage a long-term vision of economic and financial activities | In order to make informed decisions, a greater transparency is needed to allow investors to compare sustainability performances of investee companies. Besides, since sustainable investments require a long-term vision, short-termism should be limited | 9. Strengthen sustainability communication and accounting regulation                                   |
|   |   | 10. Promote sustainable corporate governance and mitigate the short-term vision in the capital markets |

Source: European Commission, Action Plan for financing sustainable growth, 2018

The first objective involves five planned actions.

1. Establishing a unified classification system for sustainable activities across the EU. The shift of capital flows towards a sustainable economy can only be achieved by clearly defining the category of activities that can be defined as "sustainable". For this reason, the Action Plan has among its primary goals the creation of a unified EU classification system, also defined as the "Taxonomy Regulation"<sup>15</sup>. The taxonomy consists in a classification that helps investors to easily identify sustainable products, thus reducing the risk of "green washing"<sup>16</sup> operations, and it will thus provide information on sustainable sectors through criteria, thresholds and parameters that will support investment choices. The taxonomy was initially focused on sustainable activities from an environmental perspective, while only recently the issue of social sustainability has been addressed.
2. Creating standards and labels for sustainable financial products, that can identify ESG financial instruments, to ensure investor protection and transparency in the sustainable finance market. The definition process has already led to the creation of an EU standard for green bonds, the bonds issued to support projects that have a positive impact on the environment, such as those relating to energy efficiency or the production of energy from renewable and clean sources etc...
3. Promoting investments in sustainable projects: in this context, the goal is to mobilize private capital towards sustainable projects, highlighting the importance of the appropriate use of financial resources as a strategic lever for achieving the ecological transition.
4. Integrating sustainability into financial advice: financial advisors are also called upon to ensure the reorientation towards sustainable investments, including sustainability in their advisory activity, identifying customer preferences in the ESG scope and suggesting a range of suitable products to meet their needs.
5. Developing benchmarks on sustainability: in addition to providing new financial instruments with sustainability characteristics, it is important to create market indices that comply with ESG criteria, which differ from traditional benchmarks and allow to specifically assess the performances of sustainable investments. For this reason, the Action Plan has provided for new ESG benchmarks to be created, based on sustainability objectives.

<sup>15</sup> European Parliament and Council, Taxonomy Regulation 2020/852 of 18 June 2020 on the establishment of a framework that favors sustainable investments and amending regulation (EU) 2019/2088.

<sup>16</sup> Phenomenon which consists in defining financial products, practices or company policies as "green" even if they are not, or only in part, in order to attract the market. This practice is adopted by companies that are interested in acquiring a "green" reputation, without adopting an effective modus operandi that differentiates them from traditional companies.

The second objective of the Action Plan includes three actions:

6. Integrating sustainability into ratings and market research in the best possible way: in the face of such a radical change, market research providers and rating agencies need to adopt different strategies to best assess the ESG performance of companies and their resulting ability to manage the risks associated with sustainability. In this context, ESMA<sup>17</sup> is called upon to intervene, pushing credit rating agencies to integrate sustainability and long-term risks in the assessments made for rating issuers.
7. Clarifying the obligations of institutional investors and fund managers: in compliance with the "fiduciary obligation", the EU requires institutional investors and fund managers to act in the individual investors' best interests. At the same time, however, no obligation is explicitly stated regarding the inclusion of ESG factors and sustainability risks in the investment process. In this context, the recent disclosure regulation (Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector) was issued.
8. Integrating sustainability into the prudential requirements of banks and insurance companies: the action intends to induce supervisory authorities to consider sustainability risks in defining the risk profile and determining the capital requirements of banks and insurance companies, in order to encourage the growth of ESG financing and investments. In this respect, Directive 2019/2034 and Regulation 2019/2033 have been published, amending the CRD IV Directive and the CRR Regulation on capital requirements in banks. The Directive requests that EBA assess the inclusion of environmental, social and governance risks into the supervisory activity of the competent Authorities and to prepare a report on the introduction of technical criteria for ESG exposures as part of the review and evaluation of the supervisory requirements; in the Regulation, on the other hand, EBA is given a mandate to develop the Technical Standards for the Disclosure of ESG risks, physical risks and transition risks, by large listed banks and to assess whether a prudential treatment dedicated to ESG exposures is justified. The Commission will then consider whether it is possible to recalibrate the banks' capital requirements for sustainable investments<sup>18</sup>.

Lastly, there are the two actions relating to the third objective, namely that of promoting transparency and encouraging a long-term vision of economic and financial activities.

9. Strengthening the communication on sustainability and accounting regulation: according to Directive 2014/95/EU on "Non-Financial Information" (NFI), "large companies that are entities of public interest [...] include in the management report a non-financial statement ("DNF", Dichiarazione Non Finanziaria in Italian) containing at least information on environmental, social, personnel aspects, and on respect for human rights [...] ". Such document constitutes a first intervention carried out at European level in order to induce institutions to disclose relevant information on the main environmental, social, governance aspects and on ESG risk management, achieving a good compromise between flexibility and standardization of the information to support investors' investment choices.
10. Promoting sustainable corporate governance and mitigating short-termism in the capital markets: this action originates from the objectives that company managers set themselves, often of an exclusively economic-financial and short-term type, neglecting opportunities and risks resulting from considerations related to environmental and social sustainability, which would instead guarantee a perspective of value creation in the long term.

Regarding action 8, the aim to include risks associated with climate and other environmental factors in the risk management policies of financial intermediaries represents a highly relevant element for the purposes of the green transition. The goal, however, should be to take ESG factors into account in determining the capital requirements for sustainable loans, in cases where this is justified from expectations of concrete lower risk, so that the effectiveness and consistency of financial stability is safeguarded. It is clear, as stated in the Principles for Responsible Investment, that any recalibration of capital requirements implemented to include these elements should be based on the EU taxonomy regarding sustainable activities<sup>19</sup>.

In our country, the Bank of Italy, in following the development of the works done by the European Commission within the scope of its competences, has focused on the most appropriate ways for intermediaries to incorporate climate risks in particular in risk management policies, as well as in prudential assessments. In this regard, there is broad consensus, even among other regulators, on the concept that the risks deriving from ESG factors do not represent a random category in their own right but rather that they affect traditional risk categories (credit, market, operational).

For this reason, intermediaries will have to organize appropriate governance, organizational and internal control systems, and they will also need to develop appropriate assessments, embracing a long-term time horizon, to determine the impact of climatic and environmental risks on their portfolios and on their business strategies. The assessment partly requires the use of new methodologies, data and forecasting scenarios, that are thus suitable for evaluating losses resulting from high impact and low frequency events, linked particularly to the occurrence of extreme climate events. In particular, for physical risk, the analysis must

<sup>17</sup> European Securities and Markets Authority: ESMA is the authority, based in Paris, responsible for the supervision of securities and their markets, at European level.

<sup>18</sup> Consob.it, Il Piano d'Azione per la finanza sostenibile.

<sup>19</sup> PRI, Principles for Responsible Investment, Action 8: Incorporating sustainability in prudential requirements, 2018.

allow for the calculation of the vulnerability indicators of assets with respect to climatic factors, for example taking into account the location of the investments; for transition risk, on the other hand, it will have to determine the impact of stricter rules on energy efficiency on the value of real estate as collateral for mortgages, to name just a few among the potential implications of such risk<sup>20</sup>.

Furthermore, one needs to consider the role of banks and insurance companies both regarding the orientation of capital flows and regarding the defense of the stability of the economic system as a whole, and the high exposure of the banking and insurance system to risks related to climate change. Therefore, it is necessary, following the Commission's indications, to incorporate sustainability considerations into prudential requirements, to avoid that bank assets are excessively skewed towards activities with high physical or transitional risks<sup>21</sup>.

#### **4. Minimum bank capital requirements, the GSF and the BPF: some critical considerations**

The degree of capitalization versus risk of Italian banks<sup>22</sup>, in terms of mandatory minimum capital requirements CET1 ratio and Total Capital ratio, determined by the ratio between the regulatory capital and the assets weighted for credit risk (RWA, Risk Weighted Assets), market risk and operational risks<sup>23</sup>, is certainly considerable. This circumstance raises the question of whether the stability of the system can be influenced by the introduction of weighting factors beneficial to “green assets” (green loans), which favor the granting of such kind of loan and with it also a more sustainable economy.

In order for the capital requirements to be correctly calibrated in relation to sustainable loans, a weighting system for RWAs needs to be identified which specifically concerns this class of loans and which is able to capture the actual risk associated with them, linked to the ESG factors. Currently, the development of green loans is influenced by the so-called Green Finance Gap<sup>24</sup>, according to which sustainable investments are considered as not convenient from a risk perspective. Moreover, by not considering the impact of climate-related risks and ESG risks in general on credit risk, the current capital requirements tend to make banks less inclined to grant green loans. Therefore, climate-related financial risks must be defined and measured more broadly and completely, to prevent a wrong approach from compromising the achievement of climate objectives, which also involves the growth of green financing.

In this regard and as already underlined, following the preparation of the Action Plan for sustainable growth, the possibility was suggested of introducing a green supporting factor, the GSF, or a specific green weighting coefficient, to be included in the weighting methodologies for quantifying risks and defining regulatory capital, particularly for banks.

This is a useful factor in overcoming the Green Finance Gap, in support of which both the European Commission, the high-level expert group on Sustainable Finance (HLEG, 2018) and the Association of European Banks have expressed their opinion<sup>25</sup>.

The underlying rationale of such instrument is that it has the potential to bring banks' investment decisions into line with green finance objectives, as established by the EU, thus introducing a framework of incentives to finance and invest for sustainable growth in Europe<sup>26</sup>.

The GSF operates in the sense that it requires bank intermediaries to have a smaller capital buffer to hold against green loans, to which reduced risk weighting coefficients are associated, based on a different concept on their degree of uncertainty. The proposed mechanism has the purpose of influencing banks' ability to generate credit, implying an adjustment of the capital requirement, and modifying the ratio between regulatory capital and risk-weighted assets<sup>27</sup>. Through the action of this mechanism, a weighting system for credit risk assets is therefore introduced which can favor, through lower weights, loans oriented towards an environmental, social and governance goal.

In order to determine the green weighting coefficient, two different weighting methods were provided for by the Basel Agreements, as follows:

- the standard method appropriately adjusted in order to take into account not only the economic-financial rating of the borrowers but also a sustainability rating calculated by specialized advisors;
- the internal rating method (IRB), equally modified to take into account the ESG factors in assessing the rating calculated internally by the bank for the borrowers.

The green corrective weighting factor, the GSF, introduced as the denominator of the capital ratio, reduces the sum of the RWAs, which has a few relevant consequences.

<sup>20</sup> Signorini L.F., *Rischi climatici e regolamentazione prudenziale*, Convegno Sviluppo sostenibile, finanza e rischio climatico, 2019.

<sup>21</sup> AIFIRM, Italian Association of Financial Industry Risk Managers, 2020, position paper n° 20.

<sup>22</sup> KPMG, *Bilanci dei gruppi bancari italiani- Trend e prospettive*, 2020.

<sup>23</sup> Intonti M., “Verso Basilea 3: limiti e problematiche in tema di adeguatezza patrimoniale nelle banche” in *Il ruolo del capitale tra regole bancarie e disciplina societaria*, a cura di A. Dell’Atti e G. Giannelli, Egea, Milano, 2012.

<sup>24</sup> One of the most commonly cited obstacles for the transition to a zero-carbon economy is related to the amount of investments aimed at this goal. Achieving climate policy goals, in line with the Paris Agreement, requires countries to rapidly decarbonise their manufacturing sectors. This involves high levels of investment in low-carbon energy infrastructure, which are currently not yet undertaken at the required scale and speed. Hafner S. et al., “Closing the green finance gap - A systems perspective”, 2019.

<sup>25</sup> D’Orazio P., Popoyan L., *Fostering Green Investments and Tackling Climate-Related Financial Risks: Which Role for Macroprudential Policies?* RUHR Economic Papers, 2018.

<sup>26</sup> Dankert J. et al., *A Green Supporting Factor — The Right Policy?* SUERF The European Money and Finance Forum, 2018, n° 43.

<sup>27</sup> D’Orazio P., Popoyan L., *Fostering Green Investments and Tackling Climate-Related Financial Risks: Which Role for Macroprudential Policies?* RUHR Economic Papers, 2018.

First of all, it allows to improve the overall capital ratio: by keeping the existing amount of regulatory capital fixed, the decrease in the assets weighted in the denominator of the capital ratio, thanks to the use of the GSF, can lead to an increase in such ratio, resulting in an improvement in the bank's capital adequacy profile. Secondly, if the bank does not need to improve the ratio, it can initiate a process of reducing or resetting the regulatory capital, reducing its cost and improving performance<sup>28</sup>.

The benefit of using the GSF, to improve the capital requirements for investments designated as green, is closely linked to the actual lower riskiness of green investments compared to others, or at least compared to carbon-intensive investments (so-called brown investments). Furthermore, the usefulness of such factor could result even higher if it were possible to prove that the risk of continuing to provide loans that do not favor the ecological transition is greater than the overall risk deriving from the application of an incentive on the capital to be allocated against the granting of green loans.

In view of the above considerations, as previously highlighted, the literature on the matter highlights that it is appropriate to assess whether green exposures are truly less risky, considering that a mechanism to reduce risk-weighting could lead to financial instability<sup>29</sup>. Indeed, the idea of introducing a green supporting factor sets two public interest objectives side by side, a greener finance and safer banks, and it is necessary to thoroughly evaluate that these objectives do not conflict but proceed towards greater environmental sustainability in finance without compromising the banks' stability and solvency.

A further tool to promote the transition towards a greener economy, partly similar to the GSF, is related to the introduction of a Brown Penalizing Factor, which, unlike the GSF, would constitute a disincentive to the granting of loans that are harmful to the environment, or "brown loans". This idea has garnered praise from a few banks specialized in sustainable finance, such as Triodos, although, like the GSF, it still rouses mixed opinions<sup>30</sup>. This factor is the exact opposite of the GSF and would apply higher risk weights to investments that do not support the transition. Whereas the GSF would lower the capital requirement for green credit, even without properly proving that green assets really are less risky (although the tool is yet to be defined), the BPF would require banks to hold more prudential capital for carbon-intensive activities and it would function as an additional weighting factor.

Still regarding the concrete application of this tool, however, it should be pointed out that a critical point is due to the fact that the EU taxonomy on sustainable economic activities offers a definition for green activity but does not provide an equivalent definition for brown activity. It is obviously quite complex to divide the entire bank loan portfolio into two categories (green and brown), since so many different activities fall in the middle, qualifying as not strictly environmentally sustainable, but at the same time not particularly harmful either<sup>31</sup>. In a nutshell, assuming that both factors were introduced, the scenario that could be envisaged would be the following: while the GSF would lower the capital requirement for green credit, even lacking appropriate proof of a lower risk associated with green activities<sup>32</sup>, the BPF would require banks to hold more prudential capital for carbon-intensive assets, but without these being clearly defined.

It is therefore believed that only with adequate practical testing by financial intermediaries, which concerns the riskiness of green and brown loans, the extent of the corrective factors, the effect on the cost of capital, and the effects systemic, can be reached a conclusion on which tool to adopt, whether green or brown or a combination of both, and on what are the long-term effects of their use. Based on this consideration, two cases of experimentation in the field are analyzed below, useful to focus on the position of some players in the industry and the possibilities of application on a larger scale, possibly shared, of these tools.

## 5. The experimental application of the GSF

Following the considerations that emerged at European level, a few international banks have started to reflect on the potential adoption of the GSF mechanism, in the process of granting ESG loans, particularly for green loans. The finding of cases of practical experimentation of GSF, as well as of BPF, is rather complex, considering that it is a technical topic, on which intermediaries do not always provide details in documents containing indications on risk management and capital adequacy, such as financial statements, sustainability reports or document on Pillar 3. It is believed, in this regard, that an activity of coordination of the experimental activities could be useful, especially if carried out with the support of the Supervisory Authority, which could induce bank intermediaries to initiate in-depth activities, collect and validate the results and carry out any sharing and application activities on a larger scale.

Among intermediaries that have started to reflect on the GSF mechanism we can find, in Italy, Banca Intesa, where the granting of ESG mortgages, mostly green, is being tested. Such mortgages could be considered less risky than traditional ones, to the extent that it could validate a lower weighting coefficient when determining the bank's capital requirements.

The sustainable loans launched by Intesa consist of mortgages and personal loans, which reward those who buy highly energy-efficient properties (energy class equal or greater than B) and those who implement upgrades aimed at increasing their energy class. Such customers obtain favorable rate conditions, considering that only 30% of Italian properties belong to a medium-high energy class, while the remainder require renovation, this could contribute to the achievement of sustainable development goals, if implemented on a large scale. Furthermore, Intesa Sanpaolo has introduced a solution to finance and incentivize sustainable growth projects for SMEs, namely ESG-Linked S-Loans.

<sup>28</sup> Ferri G., Intonti M., "Crescita sostenibile: l'Europa ha un Piano", Rivista MyAdvice, luglio-agosto 2018.

<sup>29</sup> Dankert J. et al., A Green Supporting Factor — The Right Policy? SUERF The European Money and Finance Forum, 2018, n° 43.

<sup>30</sup> Ford G., Un fattore di sostegno verde indebolirebbe le banche e farebbe poco per l'ambiente, Finance Watch, 2018.

<sup>31</sup> Manninen O., Tiililä N., Could the Green Supporting Factor help mitigate climate change? Bank of Finland Bulletin, 2020.

<sup>32</sup> Sustanaibonds – Green Social Sustainability, Green supporting factor could weaken banks, says Moody's, 2017.



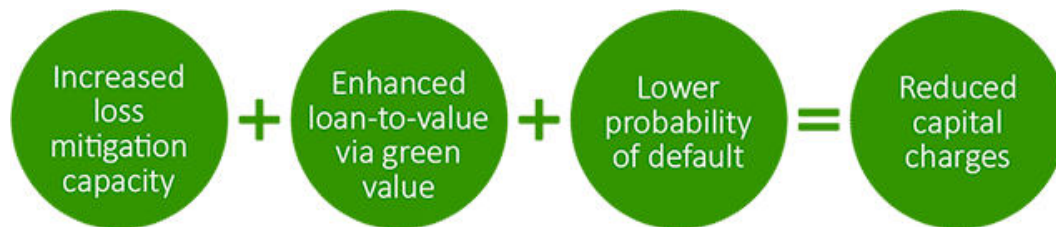
Upon the achievement of specific indicators subject to annual monitoring, certified by the company in the financial statement, companies that achieve the objectives, can obtain forms of "reward" in terms of facilitated conditions, in particular rate reductions. The loan is activated through the signing of a covenant, based on the choice of two KPIs belonging to different ESG areas (e.g., energy supply with Guarantees of Origin or Introduction of an energy supply policy that integrates environmental considerations). If the covenant is respected, based on what is declared in financial statements regarding the performance achieved on the KPIs, to the firm is granted the rate benefit.

The Intesa banking group, in line with their attention to the green world, has joined the so-called Energy Efficient Mortgages Action Plan (EeMAP), a European project which, together with the Energy Efficiency Data Portal & Protocol (EeDaPP<sup>33</sup>), is among the actions promoted within the "Energy Efficient Mortgage" (EEM<sup>34</sup>) initiative, which aims to create a standard energy-efficient mortgage, in order to encourage the renovation of buildings and to encourage highly efficient properties<sup>35</sup>.

The EeMAP<sup>36</sup> initiative, in particular, aims to create a standard European loan for energy efficiency, to incentivize borrowers to both purchase and upgrade their buildings in line with sustainability objectives. The incentives related to the granting of green mortgages may relate to reduced interest rates and / or larger amounts granted, which reflect the reduced credit risk of such loans and enhance their potential contribution to the ecological transition<sup>37</sup>.

From a capital adequacy point of view, for financial intermediaries that provide this type of loan, the reduction in the "capital charge" is connected to three significant elements: the increase in the ability to mitigate losses, the improvement of the Loan to value (LTV) ratio, defined as the ratio between the amount of the loan granted and the value of the collateral asset, thanks to the green value connected to higher energy efficiency, and the lowest probability of default linked to the creditworthiness of the counterparty, which improves the rating and makes it possible to lower the risk weight (see Figure 5).

**Figure 5 - Business case of a mortgage investment for energy efficiency**



Source: EeMAP, Energy Efficient Mortgages Action Plan, 2019.

As envisaged by the EeDaPP initiative, this effect might well be recognized in the future decisions about the regulatory framework. Those decisions could take the form of a realignment of capital requirements based on the lower risk associated with this type of exposure. In turn, this would represent an incentive for banks and investors in general to play an active role in the energy efficiency financing agenda, with a consequent impact on the interest rate as well<sup>38</sup>.

Another entity that has launched an even more incisive testing on the subject of GSF in the financial sector is Natixis Corporate & Investment Banking (CIB). It is a French multinational that deals with financial services specialized in asset and wealth management, corporate and investment banking<sup>39</sup>. Natixis CIB provides a green and sustainable hub that aims to develop Green and Sustainable Finance activities both in Europe and in America and Asia. The main mission of this network is to design and lead product innovation to generate and develop sustainable revenues; in this area of activity, the company has also provided for the introduction of an ad hoc weighting factor for all the green loans it has granted<sup>40</sup>.

During the Climate Finance Day<sup>41</sup>, Natixis CIB launched its Green Weighting Factor (GWF), a proprietary mechanism that regulates the allocation of capital based on the degree of sustainability of each loan and allows for a transition process towards a

<sup>33</sup> The EeDaPP initiative aims to complement and build on the previous EeMAP initiative, addressing the current lack of large-scale standard energy-efficient asset data sets, in order to help develop a true market for energy efficient financing, improving transparency, profitability and thus enabling a comprehensive risk analysis. See EeDaPP, The initiative.

<sup>34</sup> The Energy Efficient Mortgages initiative is a pan-European financing mechanism created by private banks, which aims to stimulate and finance investments in energy-efficient buildings, renovations aimed at saving energy to ensure a greener future. Energy Efficient Mortgages Action Plan & Energy Efficiency Data Protocol and Portal, 2019.

<sup>35</sup> Intesa San Paolo Group, Environment, and climate change, "Green Economy", 2019.

<sup>36</sup> The initiative is led by a consortium led by the European Mortgage Federation-European Covered Bond Council (EMF-ECBC).

<sup>37</sup> EeMAP, Creating an energy efficient mortgage for Europe, 2018.

<sup>38</sup> EeMAP, Energy Efficient Mortgages Action Plan, 2018; Alliance HQE, The EeMAP project - Towards green mortgages in Europe, 2020.

<sup>39</sup> Natixis, Beyond banking, Green Weighting Factor, 2019.

<sup>40</sup> Natixis, Beyond banking, Green & Sustainable Hub, 2019.

<sup>41</sup> On 11 December 2017, the Third Annual Climate Finance Day was held in Paris to boost international mobilization to finance the fight against climate change. This event has the main objective of gathering high-level representatives from the financial sector, regulators and supervisors and central banks, to highlight the most innovative initiatives aimed at accelerating the financing of the energy transition and the adaptation to global warming. Climate Finance Day was first held in May 2015, at UNESCO's Paris headquarters, marking the launch of the financial sector's campaign to tackle climate issues. This movement, which has grown considerably since the adoption of the Paris Agreement, today sees a large

greener economy by acting on the company's balance sheet. However, the transition of banks' balance sheets depends on the transition of their customers, particularly those coming from predominantly brown sectors<sup>42</sup>, for this reason customers' awareness should be raised towards the activation of green projects that can be financed with resources specifically intended for this purpose, coming from depositors who use their savings responsibly.

The GWF works in the wake of the GSF suggested at European level, applying a positive adjustment on the risk weights of RWAs that have a favorable impact on the climate and applying a negative adjustment on RWAs that, on the contrary, have an unfavorable impact<sup>43</sup>.

The objective of Natixis CIB is to integrate climate risk into the overall assessment of lending transactions, simultaneously hindering the negative impact on climate thus seeking to align with the objectives of the 2015 Paris Agreement. Such risk assessment, which is particularly innovative and complex, allows to improve and render the overall banking risk measurement activity more precise, while at the same time improving asset allocation.

The application of the GWF by Natixis provides that each loan is assigned an environmental rating through a seven-level color scale, ranging from dark brown to dark green, through a specific analysis activity that assesses the sustainability impact of the loans<sup>44</sup>. As for the evaluation of investment projects, Natixis has developed a benchmark called green/brown ratio, which measures the involvement of a company in green rather than brown activities, based on the indications provided by the TEG. Figure 6 lists a few examples of what can be considered green or brown<sup>45</sup>.

**Figure 6 - Green and brown activities**

| Green activities quoted in the report                         | Brown activities quoted in the report                                    |
|---|--|
| Energy Efficiency<br>Renewable<br>Electricity T&D and storage | Fossil fuels extraction and conversion<br>Fossil electricity<br>Hydrogen |

Source: Natixis, Beyond banking, EU Climate benchmarks Reality and consistency check, 2019.

Below, four pilot sectors were selected to test the green weight factor: automotive, real estate, electric and mining. Natixis has defined a few criteria to classify each individual lending operation in each of these four sectors based on its environmental and climate impact, designing a fully operational system that can nowadays be tested on 31% of the portfolio of such lending operations within the bank.

This methodology will gradually refer to the EU taxonomy, i.e. the classification system for environmentally sustainable economic activities, as developed over time by the TEG<sup>46</sup>.

Once the climate impact of the project has been assessed, the GWF:

- provides that all loans with a green rating receive a discount of up to 50% on their risk weights.
- and provides, on the contrary, that all loans indexed with a negative rating in terms of their climate impact, have an increase in the risk weight up to 24%<sup>47</sup>.

In the first case, within the possible revisions to the regulatory framework envisaged above, the granting of green loans might allow a reduction in the weighting of assets, with a consequent reduction in the denominator of the capital ratio and an increase in the ratio itself. This could imply greater capital solidity for the bank.

In the case of granting loans for polluting activities, the risk weighting required of the bank by the revised regulatory framework might be higher. In this case, the denominator of the capital ratio would be greater, and the entire solvency ratio would suffer a reduction, due to the increase in risk-weighted assets (RWA).

Furthermore, by adjusting the expected return on each loan according to its impact on environment and climate, Natixis encourages and favors green financing solutions (for an equivalent level of credit risk).

---

number of banks, insurance companies and investors adopting strategies to decarbonise their portfolios, invest in renewable energy and develop new green financing solutions. Climate Finance Day, 2017.

<sup>42</sup> Natixis, Beyond banking, Brown industries - the transition tightrope.

<sup>43</sup> Gagiuc A., Natixis introduce il fattore di ponderazione verde, Commercial property executive, 2019.

<sup>44</sup> Gagiuc A., Natixis introduce il fattore di ponderazione verde, Commercial property executive, 2019.

<sup>45</sup> Natixis, Beyond banking, EU Climate benchmarks Reality and consistency check, 2019.

<sup>46</sup> Natixis, Beyond banking-Natixis innovates on climate action by introducing the first green weighting factor for its financing deals to comply with Paris Agreements goals, 2018.

<sup>47</sup> Natixis, Universal Registration Document and Financial Report, Sez. 6, Green growth: financing the energy transition and combating climate change, 2019.

The GWF methodology will be able to incorporate the criteria included in the EU classification system, the so-called taxonomy, as the European Commission's Technical Expert Group progresses in completing it<sup>48</sup>. Although the GWF initiative was initially announced at the Climate Finance Day in Paris on 11 December 2017, the methodological development took 18 months to be completed and involved an independent review, implemented by KPMG in 2020<sup>49</sup>.

Natixis' tool is replicable and could be adopted by other banks engaged in the transition of their portfolios. To this end, the French bank will progressively share the details of its approach with other banks, including banks which signed the Principles for Responsible Banking, established as part of the United Nations environmental program<sup>50</sup>.

## 6. Conclusions

This paper tackled the introduction of a green supporting factor (GSF), a way suggested by the EU Action Plan on Sustainable Finance to incentivize the expansion of green loans – and through that promote the sustainable transition – by reducing banks' minimum capital requirements on such loans. In particular, we addressed two specific research questions. First, we surveyed the literature on whether it is possible to introduce a GSF – or, on the opposite, a brown penalizing factor (BPF) – to improve the allocation of bank capital, making it more responsive to loan risks. Second, by examining real examples, we evaluated the usefulness of experimental applications to verify the effectiveness in terms of cost of capital and ecological transition by means of a GSF.

Our survey of the literature on the subject and of assessments by industry and opinion makers, highlighted that the introduction of a GSF, applied to the weightings of assets subjected to risk, contributes in different ways to improving the capital profile of financial intermediaries. Such contribution hinges on the size of the GSF and it must be explained and accompanied by a correct quantification of the ESG risks of those assets, to avoid stability risks and negative effects on "prudent management". In response to the first research question, we can therefore argue, in light of the study carried out, that it is possible to introduce corrective systems that favor green loans or penalize brown loans to support the ecological transition. Furthermore, in response to the second research question, to check the actual effectiveness of the GSF and to correctly calibrate its extent following an assessment of ESG risks (significantly climate risks), we highlighted how the experimental applications carried out by two financial intermediaries prove particularly useful. Such banks are fully aware of the risks, but also of the benefits that could originate from the application of the GSF, both in relation to the capital burden and in view of the development of the green finance sector. Moreover, these banks are willing to invest time and resources to assess the effectiveness of the introduction of an innovative and challenging mechanism, both at the single bank level and for the entire financial system.

These trials, conducted internally but monitored by the supervisory authority, should therefore be encouraged and followed in order to prevent any distorting effects and to evaluate their future application on a larger scale. A recent and particularly significant initiative on the GSF, which sustains the experiments implemented by single banks and works towards a systemic application, was taken by the European Banking Federation (EBF), which has proposed a support factor for sustainable finance (SFSF, Sustainable Finance Supporting Factor) as an interim measure, pending the development of new methodologies for incorporating ESG factors into the supervisory framework. The goal of the EBF refers to the possibility, suggested by the EBA, of introducing the SFSF for activities that are classified as sustainable by the EU taxonomy and which also display a lower risk associated with their sustainability profile<sup>51</sup>. ABI, the Italian Banking Association, also contributed to define the SFSF proposal presented during the Cop25 in Madrid in 2019, along with other forms of non-prudential incentives. The proposal stems from a series of EBF considerations including the possibility of introducing activities that are well positioned with respect to the taxonomy objectives through a correct adaptation of RWAs. In fact, the proposed SFSF can only be applied to Eligible exposures, i.e. to single exposures having two characteristics at the same time they must be connected to:

1. the classes of economic activities/projects mentioned in the EU taxonomy for which a reduction in the credit risk profile has been assessed as highly probable precisely by virtue of their sustainability. They are Eligible economic activities (sometimes also defined Eligible asset classes) identifiable at institutional level with forward-looking methods<sup>52</sup> or with partly innovative approaches.
2. economic activities that individually comply with the criteria and other provisions of the taxonomy.

In the second characteristic, the future can be read: at the moment, the taxonomy only considers the two environmental objectives relating to mitigation and adaptation to climate change, but the mechanism of the SFSF may extend to consider the other environmental objectives, as well as the social objectives that are particularly relevant nowadays, given the problems linked to inequalities, poverty and unemployment related to the Covid-19 pandemic and the Ukraine war. The next challenge for Europe seems to identify, with the same methodology already applied to sustainable assets from an environmental perspective, assets that are sustainable from a social point of view, in order to pursue the objective of reorienting financial resources in a correct and conscious manner even towards activities that pursue objectives of common good, human dignity and respect for rights. And such future should not be delayed.

<sup>48</sup> Natixis, Universal Registration Document and Financial Report, Sez. 6, Green growth: financing the energy transition and combating climate change, 2019.

<sup>49</sup> Gagiuc A., Natixis introduce il fattore di ponderazione verde, Commercial property executive, 2019.

<sup>50</sup> Di Lernia H., Natixis, i finanziamenti si giudicano in base all'impatto sul clima, Bluerating, 2019.

<sup>51</sup> European Banking Federation, Sustainable Finance Supporting Factor; Schieppati M., La sostenibilità? Deve essere davvero sostenibile, Bancaforte, 2021.

<sup>52</sup> "While the traditional retrospective approach does not capture risk, it appears that the forward-looking technique captures the long-term nature of environmental risks, but it emerges that these are not available on a large scale, so it could be difficult to incorporate them into the prudential framework given the different time horizon ..." AIFIRM, Italian Association of Financial Industry Risk Managers, 2020, position paper n° 20.

## Bibliography

- ABI, La sostenibilità sempre più un fattore di competitività -ABI BusinESsG 2019.
- ABI, Le banche italiane impegnate per uno sviluppo sostenibile- ABI Esg Benchmark 2015.
- AIFIRM, Associazione Italiana Financial Industry Risk Managers, 2020, position paper n° 20.
- Alliance HQE, Il progetto EeMAP- Verso i mutui verdi in Europa, 2020.
- Banca d'Italia, The Bank of Italy values sustainability in its financial investments, 2019.
- Berenguer M. et al., Integrating Climate-related Risks into Banks' Capital Requirements, I4CE Institute for Climate Economics, 2020.
- Bernardini E., Faiella I., Lavecchia L., Mistretta A. e Natoli F., Banche centrali, rischi climatici e finanza sostenibile, Banca d'Italia, Questioni di Economia e Finanza, Occasional Papers, 2021.
- Climate Finance Day, 2017.
- D'Orazio P., Popoyan L., Fostering Green Investments and Tackling Climate-Related Financial Risks: Which Role for Macroprudential Policies? RUHR Economic Papers, 2018.
- Dafermos Y., Nikolaidi M., How can green differentiated capital requirements affect climate risks? A dynamic macrofinancial analysis, Post-Keynesian Economics Society, Working paper 2105, 2021.
- Dankert J., Van Doorn L., Reinders H.J. and Sleijpen O., "A Green Supporting Factor - The Right Policy?" SUERF "The European Money and Finance Forum" De Nederlandsche Bank N.V., 2018.
- Di Lernia H., Natixis, I finanziamenti si giudicano in base all'impatto sul clima, Bluerating, 2019.
- EBA, Reporting on SMEs and SME supporting factor, 2016.
- EeDaPP, The initiative.
- EeMAP, Creating an energy efficient mortgage for Europe, 2018.
- EeMAP, Energy Efficient Mortgages Action Plan, 2018.
- Energy Efficient Mortgages Action Plan & Energy Efficiency Data Protocol and Portal, 2019.
- Enria A., Banking Supervision, Regulation, proportionality and the sustainability of banking, Speech at the Retail Banking Conference "Creating sustainable financial structures by putting citizens first" of European Savings Bank Group, Brussels, European Central Bank, 21 November 2019.
- European Banking Federation, Towards a green finance framework, [www.ebf.eu](http://www.ebf.eu).
- European Commission, Action Plan to finance sustainable growth, 2018. [Consob.it](http://Consob.it), Il Piano d'Azione per la finanza sostenibile.
- European Parliament and Council, Taxonomy Regulation 2020/852 of 18 June 2020 on the establishment of a framework that favors sustainable investments and amending regulation (EU) 2019/2088.
- European Parliament and Council, Regulation (EU) 2019/2088 of 27 November 2019 on sustainability-related disclosures in the financial services sector.
- Ferri G., Intonti M., "Crescita sostenibile: l'Europa ha un Piano", Rivista MyAdvice, luglio-agosto 2018.
- Ford G., Un fattore di sostegno verde indebolirebbe le banche e farebbe poco per l'ambiente, Finance Watch, 2018.
- Gagiuc A., Natixis introduce il fattore di ponderazione verde, Commercial property executive, 2019.
- Grünewald S., Climate change as a systemic risk – Are macroprudential authorities up to the task? European Banking Institute, Working Paper Series, 2020.
- Gruppo Intesa San Paolo, Environment and climate change, "Green Economy", 2019.
- Hafner S. et al., "Closing the green finance gap – A systems perspective", 2019.
- Intonti M., "Verso Basilea 3: limiti e problematiche in tema di adeguatezza patrimoniale nelle banche" in Il ruolo del capitale tra regole bancarie e disciplina societaria, a cura di A. Dell'Atti e G. Giannelli, Egea, Milano, 2012.
- KPMG, Bilanci dei gruppi bancari italiani- Trend e prospettive, 2020.
- Manninen O., Tiirilä N., Could the Green Supporting Factor help mitigate climate change? Bank of Finland Bulletin, 2020.
- Meager E., What to expect from the EU's renewed sustainable finance strategy, Capital monitor, 2021.
- Natixis, Beyond banking, Brown industries - the transition tightrope, 2019.
- Natixis, Beyond banking, EU Climate benchmarks Reality and consistency check, 2019.
- Natixis, Beyond banking, Green & Sustainable Hub, 2019.
- Natixis, Beyond banking, Green Weighting Factor, 2019.
- Natixis, Beyond banking, Natixis innovates on climate action by introducing the first green weighting factor for its financing deals to comply with Paris Agreements goals, 2018.
- Natixis, Universal Registration Document and Financial Report, Sez. 6, Green growth: financing the energy transition and combating climate change, 2019.
- Pope Francis, Encyclical Letter Laudato Si, 2015.

- PRI, Principles for Responsible Investment, Action 8: Incorporating sustainability in prudential requirements, 2018.
- Sabatini G., Resolution 7-00851 Taranto, relating to the initiatives for the maintenance of the instrument of the support factor for small and medium-sized enterprises (SME Supporting factor) regarding the capital requirements of credit institutions, ABI Hearing, 2016.
- Schieppati M., La sostenibilità? Deve essere davvero sostenibile, Bancaforte, 2021.
- Signorini L.F., Rischi climatici e regolamentazione prudenziale, Convegno Sviluppo sostenibile, finanza e rischio climatico, 2019.
- Sustanaibonds – Green Social Sustainability, Green supporting factor could weaken banks, says Moody's, 2017.
- Thomä J. and Gibhardt K. (2019), "Quantifying the potential impact of a green supporting factor or brown penalty on European banks and lending", Journal of Financial Regulation and Compliance, Vol. 27 No. 3, pp. 380-394.
- Thomä J., Hilke A., The green Supporting factor. Quantify the impact on European banks and green finance", 2nd Investing Initiative, 2018.
- Unione Europea, Accordo di Parigi, ratifica, 2016.
- Viviani A., SME Supporting Factor- una spinta per i prestiti alle PMI, Studio Eidos, 2016.