

# When the Green Banking Loan Offer Meets the Transition to Green Finance: Evidence Impact from Moroccan Firms

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**Abstract:** This article examines the effectiveness of Morocco's green credit policy. The study investigates whether companies that have improved external environmental disclosure and internal green innovation are more likely to receive bank loans through green finance and green credit. To test our hypotheses, we conducted a direct survey of Moroccan enterprises. The findings indicate that companies with higher-quality environmental disclosure do not receive more loans, while only those with green innovation are able to access green loans. We demonstrate that the green credit policy, along with financial performance and green-environmental quality, play a significant role in limiting loan opportunities for companies with weak environmental disclosure. These results contribute to the existing literature on green credit policy, green business innovation, environmental disclosure, and green-washing. Furthermore, they offer valuable insights for companies, banks, and governments when making decisions in this domain.

**Keywords:** Green credit policy, Bank loan, Morocco, sustainable development, green economy.

## 1. INTRODUCTION

Banks play a crucial role within the Moroccan economy by supporting businesses and projects through a series of financing activities and programs (Barua & Aziz, 2022; Filipava & Murshudli, 2023; Jung & Lee, 2022). Thus, exerting a significant influence on their customers' activities of which carbon-intensive resources are used and/or negative effects are produced on the environment (Ouyang et al., 2023; Y. Zhang, 2022). Taking environmental concerns into account is considered essential for banks, sustainable finance, climate finance and green finance.

To date, debates on sustainability not only focus only on environmental issues, related to climate change, but also on sustainable financing, a conceptually broader process, encompassing in its entirety the meanings of green finance and even climate finance (Amighini et al., 2022; Azad et al., 2022; Bon-Gang, 2018).

The Moroccan financial sector subscribes to the universal definition of sustainability which is instilled as an indispensable standard, the permanent and inseparable trilogy between economic, social, and environmental aspects (Barua & Aziz, 2022; S. Liu & Wang, 2023; Smouh et al., 2022). The construction of sustainability guidelines within the banking financial operation should consider internal and external sustainability. The former deals with the environmental and social responsibilities that fall under a financial institution's operations (Filipava & Murshudli, 2023; Jaiwant & Kureethara, 2023, 2023), while the latter pursues the integration of

sustainability into the core activities of the bank, the integration of environmental and social considerations into the design of products, risk management, internal policies and business strategies (Mohamed, 2023).

Consequently, both the environmental and social economy performance of Morocco, such as the National Strategy for Social Solidarity Economy (ESS)<sup>1</sup> which is focused on developing and promoting the social solidarity economy by and for its actors in the territories, by diversifying the areas of intervention for respond to Morocco's challenges and offer a privileged framework for sustainable development, while guaranteeing economic efficiency in the service of social interest. This turns out to be a much more comprehensive and accurate look at the role of sustainability in financial institutions and banks.

The Moroccan banking sector is in a strategic position to significantly influence environmental protection by directing the flow of capital towards sustainable projects and greener businesses (« Morocco – Boosting the Green Economy », 2021). Commitment and investment are still necessary and important for the financial institutions in environmentally friendly sectors or projects, such as sustainable agriculture, renewable energy, energy efficiency, infrastructure, and sustainable construction, among other things, to achieve a greater positive impact on sustainable development. Financing and investing in these sectors represents a business opportunity in growing markets for financial institutions and banks (Pyka & Nocoń, 2021).

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<sup>1</sup> National Strategy for Social Solidarity Economy (ESS), <https://mtaess.gov.ma/fr/economie-sociale-et-solidaire/strategie-de-leconomie-sociale/>

Morocco's national context has proven the country's persistent commitment to join global efforts to address issues related to climate change. Morocco has set out its own broad-based green economy vision based on its transition to renewable energies (Du, 2023).

The question that is asked is the following: how did Moroccan banks integrating environmental principles into their financial activities and how has developing green finance in Morocco provide a complete overview and contribute to the efforts made to accelerate the process of "greening" the Moroccan banking sector.

Therefore, the main objective of this article is to examine how Morocco has deployed its efforts when transitioning to renewable energies (Berrou et al., 2019; Smouh et al., 2022). Thus, in the framework of the green development proposed by Morocco which aims to answer the following questions: what roles does the Moroccan banking sector play in green financing? How has the Moroccan green finance regulations evolved? And how have they affected the Moroccan banking sector? Would improving the structure of the bank governance help better the level of green credit for the bank? What are the Moroccan banks' advantages and challenges in terms of green credit?

In this study, we analyze and discuss Morocco's green economy that contributes to bridging the research gap on the green economy of a country that is both African (Gupta & Laubscher, 2017). Examining the Moroccan green economy model will provide new insight into building a green economy, as well as add to the literature. This study focuses on the impact of Morocco committing to greening its economy relatively early on compared to other economies. We will quantitatively assess whether Morocco's economic growth has become greener. In addition, this study will follow the impact of green credit in Morocco on Moroccan enterprises that were built on renewable energy (Y. Liu, 2023; Y. Zhang, 2022), and identify the shortcomings of these credits on a practical level. This study will also develop a customized impact measurement framework to track the progress of the transition to green finance in Morocco (Belgacem et al., s. d.; Smouh et al., 2022; Wang et al., 2022). This proposed framework is useful for both understanding the development of its financial transition to green finance and identifying the strengths and weaknesses of its green transition policy.

The remainder of this research is organized as follows. Section two provides a comprehensive overview of the green finance policy in Morocco and outlines the hypotheses. Section three describes the methodology employed in this study and presents the data used. Section four conducts an empirical analysis, presents the results obtained, and discusses their implications. Finally, Section five presents the conclusions drawn from this research.

## 2. BACKGROUND

### 2.1. Literature Review

The term green economy first appeared back in 1989 in a groundbreaking report of the UK Government by a group of leading environmental economists, entitled "Blueprint for a Green Economy" (D. W. Pearce et al., 1989). The report was

commissioned to advise the UK Government on whether there was an agreed definition of the term "sustainable development" and the implications it had for the measurement of economic progress and the evaluation of projects and policies (Bon-Gang, 2018; Brears, 2020; M. Zhang et al., 2022). Other than the report's title, there was no further reference to the green economy and thus, it appears that the term was only used at the last moment by the authors. In 1991 and 1994, the authors published the continuations to the first report entitled "Blueprint 2: Greening the world economy" and "Blueprint 3: Measuring Sustainable Development". While the theme of the first Blueprint report was that economics can and should come to the aid of environmental policy, subsequent parts extended this message to global economic issues - climate change (Amighini et al., 2022), ozone depletion, tropical deforestation, as well as the loss of resources in developing countries and in the world. All the reports made on the research and practice of environmental economics spanned over several decades (D. Pearce, 1992).

In 2008, the term was revived in debates about the policy response to multiple global crises. Against the backdrop of the financial crisis and concerns of a global financial downturn, UNEP has championed the idea of "green stimulus packages" and identified specific areas where large-scale public investment could kick-start a "green economy" (Atkinson & Messy, 2012). It has inspired several governments to implement major "green development" programs as part of their economic recovery efforts.

In October 2008, UNEP launched its Green Economy Initiative to provide analysis and policy support for investing in green sectors and greening environmentally unfriendly sectors. As part of this initiative, UNEP commissioned one of the original authors of the "Green Economy Master Plan" to prepare a new report entitled "Global Green New Deal" (GGND), which was published in April 2009 and proposed a set of policy measures that would boost economic recovery, at the same time improve the sustainability of the global economy. The "Global Green New Deal" asks governments to allocate a significant share of recovery funds to green sectors and sets three objectives: (i) economic recovery; (ii) the eradication of poverty; and (iii) the reduction of carbon emissions and ecosystem degradation; it also proposes a framework for green recovery programs as well as supporting national and international policies (Programme et al., 2011).

In June 2009, ahead of the UN Climate Change Conference in Copenhagen, the UN launched an inter-agency statement in support of the green economy as a transformation to address multiple crises. The declaration includes the hope that the economic recovery could be the turning point of an ambitious and effective international response to multiple crises facing humanity, based on a global green economy.

In February 2010, Ministers and Heads of Delegations of UNEP's Global Environment Ministerial Forum in Nusa Dua acknowledged in their statement that the concept of green economy "can significantly address current challenges and provide opportunities for development economy and manifold benefits to all nations". He also acknowledged UNEP's leadership in defining and promoting the concept of green economy and encouraged it to contribute to this work

through the preparatory process for the 2012 United Nations Conference on Sustainable Development (Rio +20)<sup>2</sup>.

In March 2010, the General Assembly agreed that the green economy in the context of sustainable development and poverty eradication would be one of the two specific themes of Rio+20. This has led to a major agreement that has drawn great international attention to the green economy with its related concepts, and the publication of numerous recent reports and other writings with the aim of defining and demystifying the concept.

One of the main reports was the “Green Economy Flagship Report” published by UNEP in November 2011 as part of its Green Economy Initiative. UNEP has partnered with think tanks and commercial actors (including Deutsche Bank), which has given credibility to its economic analysis (Atkinson & Messy, 2012). More importantly, the report also provides a basic definition of “green economy” which has since been cited in many other publications.

In December 2011, the United Nations Environment Management Group (a system-wide coordinating body of more than 40 United Nations specialized agencies, programs, and bodies) also released a broad and systemic perspective on the green economy: i.e. “Working towards a balanced and inclusive green economy” which identifies and clarifies the use of green economy and other related terms. This report adopts the definition established by UNEP in its Green Economy Report 2011<sup>3</sup>. Several non-governmental organizations and associations have also developed in recent years the objective of promoting the green economy as a concept to apply and carry out research, analysis, and dissemination. Recent publications have identified the internationally accepted definition of green economy, plus at least eight other distinct definitions. The UNEP definition has been cited in several more recent reports, including UNEMG and OECD. Another definition of the green economy, proposed by the Green Economy Coalition (a group of non-governmental organizations, labor groups and others doing grassroots work on a green economy) succinctly defines it as “a resilient economy that offers a better quality of life for all within the ecological limits of the planet”.

## 2.2. Green Finance Background in Morocco

According to the OECD<sup>4</sup>, green finance is a mode intended to achieve economic growth while reducing pollution and greenhouse gas emissions, minimizing waste, and improving efficiency in the use of natural resources. Much like the international community, Morocco is committed to reduce global warming and fight against environmental degradation, at national and international level.

Morocco, with its vision of green and circular finance policy, has been among the pioneering countries in the world in im-

plementing public policies aimed at better environmental protection (Feng et al., 2023). This choice was imposed following the years of recurrent drought experienced during the last century and has resulted in the implementation of bold and avant-garde policies aimed at preserving natural resources. Thus, from the 70s of the last centuries, Morocco included in its development plans formerly designated by the five-year plans, as priorities:

- The construction of dams to capture water and produce energy,
- The construction of wind farms to produce energy,
- The protection of national forest heritage and the establishment of protected natural parks,
- Taking into consideration the environmental impact in public investments, ...

It was therefore natural for Morocco to be the first Mediterranean country and the first African country to host the Conference of Parties (COP)<sup>5</sup> in Marrakech in its 7<sup>th</sup> edition in 2001 and then in its 22<sup>nd</sup> edition in 2016.

Since then, Morocco has pledged to do everything possible to become a platform at the service of Africa. This is done through the sharing of experiences, particularly through the creation of the International Institute for Sustainable Development and through the regular hosting of forums and conferences directly linked to Sustainable Development (Filipava & Murshudli, 2023; Kalaiarasi & Kirubahari, 2023; Smouh et al., 2022). Therefore, Morocco is ranked among the world champions in public policies for Sustainable Development and has been designated in March 2021, by the UN, as a High-Level Champion of Dialogue. This consecration reflects Morocco's strategic choice to pursue its efforts through the establishment, since the beginning of this century, of sectoral policies in line with the commitments made within the framework of the recommendations of the United Nations and the COPs while taking care to integrate, because of its very rich and varied geography, the human, social and territorial dimensions. Thus, Morocco has put in place a battery of regulatory mechanisms, the main ones being those relating to the Energy Sector, Agriculture and activities called AFATs, Water, Waste Recycling, etc. It is important to note that the adjectives Green and Circular are rarely used in the texts of laws drawn up to date in Morocco (Bahbah & Touhami, 2023). As such, the adjective Sustainable has been preferred, with a strong emphasis on the Human, Social and Environmental aspects.

We will content ourselves with briefly presenting the main elements of the legal and regulatory system of the green and circular economy in Morocco:

- 2012: National Charter for the Environment and Sustainable Development
- 2012: Framework Law on the National Charter for the Environment and Sustainable Development The first text was drawn up in 2012 and has been prom-

<sup>2</sup> United Nations Conference on Sustainable Development, Rio+20; <https://sustainabledevelopment.un.org/rio20>

<sup>3</sup> Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication; <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=126&menu=35>

<sup>4</sup> <https://www.oecd.org/>

<sup>5</sup> the parties designating the countries that adopted the United Nations Framework Convention against Climate Change at the Earth Summit in Rio de Janeiro in 1992.

ulgated to contain 7 principles to date: (a) Integration, (b) Territoriality, (c) Solidarity, (d) Precaution, (e) Prevention, (f) Responsibility and (g) Participation. It is the consecration of the National Charter

- 2011: The Moroccan constitution enshrined the ancestral policy of environmental protection by including in its article 31 the right to a healthy environment and sustainable development.
- 1917: Biodiversity Dahir of October 10<sup>th</sup>, 1917 on the conservation and exploitation of forests
- 2010: The law on renewable energies Dahir n°1-10-16 of February 11<sup>th</sup>, 2010 promulgating law n°13-09 relating to renewable energies. This framework has enabled Morocco to implement its ambitious solar and wind energy production policy.
- 2006: Law on Waste Recycling Dahir N° 1-06-153 of November 22<sup>nd</sup>, 2006 promulgating Law N° 28-00 relating to waste management and disposal
- 2010: The law on the use of disposable plastic bags Dahir n°1-10-145 of July 16<sup>th</sup>, 2010 promulgating law n° 22-10 relating to the use of degradable or biodegradable plastic bags and sachets
- 2010: The law on protected areas Dahir N° 1-10-123 of July 16<sup>th</sup>, 2010 promulgating Law N° 22-07 on protected areas

### 2.3. Green finance policy in Morocco

Morocco, for the very first time in October 2019, created a ministerial department in charge of the Green Economy. This department was attached to the Ministry of Economy and Industry which is responsible, through its supervision of the National Morocco SME agency, for the implementation of government policy aimed at Diminutive, Small and Medium Enterprises. This new deal was unfortunately hampered by the Covid 19 Pandemic (Feng et al., 2023), diverting the Ministry's attention to the preservation of the national industrial fabric and the post-Covid 19 economic recovery. Thus, no initiative has been taken for the establishment of an action plan to promote the green and circular economy.

This situation did not last since the year 2021 saw the disappearance of this department in favor of a new one called Sustainable Development which is attached to the Ministry of Energy Transition (Smouh et al., 2022). On the private sector side, companies have sought over the past 2 years to ensure the continuity of their activities even if some old and other new ones have taken up the challenge of taking advantage of this health and social crisis to launch new products and green and sustainable services to meet the requirements of sustainable development, particularly in terms of the recycling of certain waste such as plastic.

Civil society, for its part, tries its best despite the constraints to show ingenuity. We can thus identify several initiatives led by associations that approach the subject of the Green and Sustainable economy with a lot of innovation and creativity. This momentum is hampered by the lack of financial means to enable the deployment and implementation of Green and Sustainable solutions.

In this sense, it should be noted that the best example comes from the various initiatives of the Mohamed V Foundation for solidarity through the Center for Solidarity TPEs and the Mohamed VI Foundation for the environment which have been working in Morocco since 1998 and 2000<sup>6</sup>. Together, these two foundations have greatly contributed to raising awareness on a very large scale of civil society on the various opportunities offered by the Green and Sustainable economy.

The legal framework does not go as far as a ban, as was the case for the use of plastic bags, which Morocco has formally banned since 2016. ...:

- The lack of clarity of public action does not encourage private operators, in particular large companies, to invest more in the green and sustainable economy.
- The absence of an incentive tax framework does not encourage investment by the private sector in Research and Development
- The lack of coordinated actions between the various public stakeholders, in particular the departments in charge of training, skills and support

On the other hand, the last few years have been marked by the launch of 4 important initiatives:

- The launch of the first public program for green start-ups by Maroc PME, just a few weeks before the start of the Covid-19 pandemic: Tatwir Croissance Verte
- The launch of the Green Invest program by Tamwilcom
- The launch of the Generation Green program by the Agricultural Development Agency.
- The launch made by the state of the Intelaka program that is part of the post-Covid 19 economic recovery system.

These programs were reinforced at the end of 2021 with the launch of new programs that are just as ambitious. We can cite in particular:

- **ADA CAM- Intelaka**, a support program encompassing all activities related to agriculture (Services, water, energy, etc.), that was developed by the Agricultural Development Agency in partnership with the Crédit Agricole Maroc Group, it is considered an essential component of the Generation Green program<sup>7</sup>;
- **ARDI and Almoustatmir Alqarawi**, two programs developed by the Crédit Agricole Maroc Group. They are dedicated to Diminutive and Small Enterprises: ARDI targets rural start-ups and Al-

<sup>6</sup> Mohamed V Foundation for solidarity; <https://fm6e.org/en/lafondation/>

<sup>7</sup> ADA CAM- Intelaka; <https://www.creditagricole.ma/fr/almoustatmir-alqaroui>

moustatmir Alqarawi are the variation of the Intelaka program<sup>8</sup>.

These programs offer technical support and a combination of specific financial products: subsidies from the state and/or foreign institutions, honor loans (or repayable advances) and guaranteed or unsecured bank credit (the guarantee may be public or via an International Development Institution).

- **FORSA:** Honor loans guaranteed by the state with a repayment period of up to 10 years and a maximum amount of 100,000 dhs<sup>9</sup>.

All the programs mentioned above, although they are not specific to sustainable entrepreneurship, do not exclude companies operating in the green and circular economy, whether they are start-ups or SMEs.

If the constitutional framework and, to a lesser degree, legislative and macroeconomic, are real assets to the development of a green and circular economy in Morocco, the fact remains that the contribution of the private sector is still very timid in the absence of incentives for the development of financing mechanisms adapted to the needs identified with green entrepreneurs. The choice not to highlight the economic component in the approach adopted to date in Morocco has resulted in a lack of interest from the private sector as well as a lack of anticipation in the adaptation effort necessary for the sustainability of efforts to perpetuate them and ensure their inclusion in a virtuous and progressive circle.

#### 2.4. The Green Credit Policy of Morocco

During the two previous decades, the choice of Morocco, in terms of Green and Sustainable economy, has focused on structuring projects with a strong appetite for capitalization. These are mainly projects related to energy production (Wind, Solar, Hydrogen) and Transport (Rail and Common).

The financial instruments developed to respond to this choice are not likely to meet the needs of green and sustainable policy. Indeed, on one hand the amounts of order are of tens even hundreds of millions of dollars which are of great interest to international financial donors; on the other hand, the state undertakes to ensure and guarantee the profitability of the project through a financial guarantee by above all ensuring easy access to the market through public procurement (Redemption of energy production) (Jaiwant & Kureethara, 2023).

This has not prevented some initiatives by international financial institutions from offering medium and large enterprises sustainable financial products oriented mainly towards the production of green energy (intended for self-consumption) and energy efficiency, and more recently the launch of several national programs, by Moroccan public institutions and public and private economic groups, aimed at diminutive, small and medium-sized enterprises (newly created enterprises up to enterprises whose turnover over

three financial years does not exceed the equivalent in Moroccan dirhams USD 25 million)<sup>10</sup>.

Thus, on the basis of our knowledge, we can distinguish three categories of financial instruments:

- **International donors:** The European Bank for Reconstruction and Development (EBRD)<sup>11</sup>, the European Investment Bank and the French Development Agency through its subsidiary have developed various partnerships with national banks to finance the investment needs of Large and Medium Enterprises. By way of illustration, we can cite:
  - Istidama: the result of a partnership between the French Development Agency and Crédit Agricole, it targets, among other things, activities for the recovery of agricultural and agro-industrial waste.
  - Cap Bleu: 1st line of financing for adaptation to climate change in Africa, in partnership with the AFD and the EIB, 20m euros for financing the optimization of water resources in Morocco.
  - Recovery of residual materials: the result of a partnership between Bank of Africa (BMCE Group), FMO and BEI for an amount of 20 million euros, this line of financing is specific to the recovery of solid waste.

The sectors covered by these programs are agriculture and agro-industry, water, solid waste treatment and energy. The latter monopolizes the largest share of the funding granted. Some of these programs combine bank financing with grants (donations from international donors) and sometimes technical assistance.

- **Moroccan public institutions:** As for Moroccan initiatives, Morocco launched in 2020 the most ambitious program in its history for the attention of VSMEs: Intelaka. This bank financing program benefits from a state guarantee and is distributed by all banking institutions in the country. It is aimed at project leaders in all sectors of activity, including activities and trades related to the green and circular economy.

More recently, in 2021, Morocco launched a new program called FORSA. These are honorary loans guaranteed by the state with a repayment period of up to 10 years and a maximum amount of 100,000 dirhams.

The Agricultural Development Agency, ADA, launched in 2021 a vast entrepreneurship program entitled Generation Green that is intended for young entrepreneurs who wish to invest in the agricultural sector and the various related trades. In this context, it has launched, in partnership with the Crédit Agricole Banking Group of Morocco, a new ADA CAM-Intelaka program. This support program includes all activities related to agriculture (Services, water, energy, etc.).

<sup>8</sup> Almoustatmir Alqarawi; <https://almoustatmir-alqaraoui.com/fr>

<sup>9</sup> FORSA ; <https://www.forsa.ma/>

<sup>10</sup> International support for sustainable energy investments in Morocco; <https://ebrdgeff.com/new-ebd-financing-to-turkeys-isbank-4-2-7/>

<sup>11</sup> EBRD ; <https://www.ebrd.com/>

ARDI and Almoustatmir Alqarawi are also 2 programs developed by the Crédit Agricole Group in Morocco. They are dedicated to Diminutive and Small Enterprises: ARDI targets rural start-ups and Almoustatmir Alqarawi is the variation of the Intelaka program.

Tamwilcom, a new public bank resulting from the transformation in 2021 of a public guarantee fund, the Caisse Centrale de Garantie, has launched the Green Invest program.

MorSEFF-GEFF, the first product specific to EE/RE financing under the Moroccan Sustainable Energy Financing Facility “MorSEFF” Program. Its overall envelope of 55 M euros including free technical assistance and customer subsidy of up to 10%. This is the first Green Bond by public offering, considered a “Positive Impact Bond”.

We can also mention other more specific programs that mainly target green start-ups. They were initiated by public agencies in charge of energy: the Moroccan Agency for Sustainable Energy (Masen), the Moroccan Agency for Energy Efficiency (AMEE) and the Institute for Research in Solar Energy and News (Irsen). These programs offer young project leaders incubation and start-up funding for their activities.

The sectors covered by these programs are, for the most part, energy and agriculture. Some cover circular economy activities (Ex: Tatwir Green Growth covers decarbonization activities).

All these programs offer technical support and a combination of specific financial products: subsidy and/or state guarantee, honorary loan (or repayable advances) and bank credit.

- **Moroccan public and private groups:** The private group Afriquia Group has launched a vast program of support and creation of young companies around the issue of energy and mobility. This program is based on two pillars 1000 Fikra (identification of project ideas) and 50 sprints (support for 50 winners in the creation and start-up of activities).

The Public OCP group through its University UM6P, University Institution, aims to encourage the entire UM6P community (students, teachers, researchers and administrative staff) to propose Sustainable Development projects, to rub shoulders with the reality during their implementation, appeal to their creativity and their imagination, arouse their desire to undertake, show them that it is possible to undertake differently and to develop alternatives by integrating all aspects of sustainable development.

The sectors covered by this category of programs are specific and oriented towards the needs of the groups.

**Table 1. Summary of Morocco's Green Credit Policy.**

Instrumental Financing “Exclusively Sustainable”			
Organization	Main sectors targeted	Drivers	Affiliation
Crédit Agricole du Maroc	Agriculture-Bio energy	Universal bank with a focus on the world	Public

		Rural Hybrid Leasing, Loans, Subsidies	
<b>Bank of Africa</b>	Not available	Hybrid universal bank: Leasing, Loans, Subsidies	Private
<b>Berd Maroc</b>	Agro-Business Manufacturing industry	Targets companies with less than <u>200 Mdhs (20M euros)</u>  large Hybrid companies (Leasing, Loans, Donations, etc.)	Private
<b>Grants and Donations</b>			
<b>Maroc PME Tatwir Green Growth</b>	Renewable Energy / Green Sectors...	Targets start-ups and companies under 200 Mdhs (20 M euros)  Technical assistance	Public
<b>Tamwilcom Green Inverst</b>	All productive sectors excluding real estate development and deep-sea fishing.	Moroccan Law Company	Public
<b>ADA</b>	Agro-Business Agriculture	Targets start-ups and companies under 200 Mdhs (20 M euros)  Technical assistance	Public
<b>AMEE</b>	All sectors	Targets start-ups and companies under 200 Mdhs (20 M euros)  Technical assistance	Public
<b>IRSEN</b>	All sectors	Targets start-ups and companies under 200 Mdhs (20 M euros)  Technical assistance	Public
<b>Masen Green Tech Incubator</b>	Renewable energies	Targets start-ups and companies under 200 Mdhs (20 M euros)  Technical assistance	Public
<b>Divers</b>			

<b>OCP Groupe/UM6P</b>	All sectors	Backed by a university Target start-ups	Public
<b>Afriquia Group</b>	Mobility	Target start-ups	Private
<b>GreenYellow</b>	Energie Solaire Solar Energy	Target SMEs Hybrid (Leasing, Loans,...)	Private

Sustainable financial instruments in Morocco have made it possible to finance Gigantic Green Projects, Green SMEs but also VSEs and Startups, through the Green Invest and Tatwir Green Growth programs. The most frequent examples operate in services in close liaison with programs initiated by the state or by international financial institutions (Advice on energy efficiency, Advice on Bio-agriculture, and Agriculture, etc.).

### 2.5. Hypotheses

To summarize, previous studies have indicated that the primary effect of green loans on enterprises is reflected in the scale of green finance. Furthermore, green bank loans granted to corporations serve as the most direct representation of Morocco’s green credit policy, yet there has been limited research conducted using green bank loans as the dependent variable for bank loan size, firm financial performance and environmental indicator. Hence, the following hypothesis is proposed in line with empirical testing:

**Hypothesis 1.** Morocco’s green credit policy improves the bank loan size.

**Hypothesis 2.** Affected by green bank loans, green finance increases the firm financial performance.

**Hypothesis 3.** The size of firms’ green bank loans affects environmental quality.

## 3. METHODOLOGY AND DATA

### 3.1. Model specification

The green bank loan is likely to reduce a firm's carbon-intensive resources or negative production impacts over the climate change and thus have a positive relationship with environmental quality. Given the expected positive relationship, we aim to test the basic effect of green bank loans on a firm’s carbon intensity, which is constructed as follows:

$$\begin{aligned}
 SizeGBL_{it} = & \alpha + \beta_1 \times GCP_{it} + \beta_2 \\
 & \times FPI_{it} + \beta_3 \times GF_{it} + \beta_4 \\
 & \times (Post_t \times FPI_{it}) + \beta_5 \\
 & \times (Post_t \times Div_{it}) + \beta_6 \\
 & \times Year_t + \beta_7 \times Controls_{it} \\
 & + \epsilon
 \end{aligned}$$

Where;

it: firm (i), end-f-year (t)

SizeGBL : Size of Green Banking Loans.

GCP: Green Credit Policy; information on GCPs or motivation, already beneficial.

FPI: Firm Polluting Industry – between 0 and 1

GF: Green Finance measured using public investment in multiple renewable energy technologies.

$(Post_t \times FPI_{it})$  : which captures the differential change in cash dividends post-policy implementation between polluting and non-polluting firms.

$(Post_t \times Div_{it})$  : which captures the differential change in cash dividends post-policy implementation between polluting and non-polluting firms.

We include a set of control variables that have been identified to potentially affect the size of green Banking loans. These variables include firm size (SIZE), financial leverage (LEV), the return on assets (ROA), and the market-to-book ratio (MTB), we also include year and industry sector in our regression model. The year fixed effects account for national economic conditions, while the industry sector and the year effects help mitigate industry and company-wide eliminating factors that do not change over time, respectively, that affect the size of green banking loans.

### 3.2. Sample construction and data

The sample data of this paper mainly comes from the public information of listed banks, including the Moroccan company’s annual report, company announcement, articles of association. It is obvious that open information channels ensure the compliance and scientific of the research. In order to conduct our survey, we used two kinds of measuring instruments, namely: the semi-structured interview and the questionnaire. These instruments have largely enabled us to understand, control and analyze certain aspects related to our research problem.

We got these results from SPSS. First, we used the responses collected from the questionnaire. Second, we calculated the sum for each of the three headings based on the answers obtained and according to a certain grid for evaluation (1: not at all important, not important, 3: moderately important, 4: important, 5: very important) in order to allow us to rate the items we have selected.

## 4. RESULTS AND IMPLICATIONS

### 4.1. Empirical Analysis and Discussion

This part presents the results and analyzes of the hypotheses tested.

To show the overall efficiency of the model, we examined the regression and also tested the regression correlations using the method of least squares. We will therefore determine the regression for each explanatory variable and the residuals. The linear regression applied will make it possible to determine the links between the explained variables and the explanatory variables.

The description of the variables of our study requires the use of so-called dispersion indicators. The objective is to discover the relationships between the explanatory variables and the explained variables. These indicators are presented in the table below:

**Table 2. Descriptive Statistics.**

	Obs.	Min	Max	Mean	Median	Std. Dev.
<b>GCP</b>	1094	0.000	24.222	17.367	19.978	7.207
<b>FPI</b>	1094	0.0	1	0.371	0	0.483
<b>GF</b>	1094	0.0	3.912	0.887	0.693	1.074
<b>ROA</b>	1094	-13.557	21.443	4.536	3.947	5.305
<b>SIZE</b>	1094	19.953	25.401	22.011	21.844	1.163
<b>MTB</b>	1094	1.526	4.083	2.708	2.023	2.150
<b>LEV</b>	1094	5.535	86.821	42.043	41.757	19.444

Source: The authors calculated this table with the constructed data.

**Table 3. Pearson Correlation Matrix.**

	GCP	FPI	GF	ROA	SIZE	MTB	LEV
<b>GCP</b>	1						
<b>FPI</b>	0.1856	1					
<b>GF</b>	0.6173	0.2977	1				
<b>ROA</b>	0.458	-0.002	0.032	1			
<b>SIZE</b>	0.196	0.751	0.621	0.200	1		
<b>MTB</b>	0.07	-0.025	-0.509	0.09	-0.224	1	
<b>LEV</b>	-0.264	-0.014	-0.073	0.318	0.251	-0.05	1

In Table 1, we present all the descriptive statistics. The variable GCP spans from 0.0 to 24.222, with a mean of 17.367 and a median of 19.978. On contrary, the variable FPI has a mean of 0.371, a median of 0.0, and a standard deviation of 0.483, indicating that firm industry is relatively polluting compared to other sampled enterprises. However, the GF varies significantly between the enterprises, as seen from the mean (0.887) and median (0.693).

Moving on, the variable ROA ranges from -13.557 to 21.443, with a mean of 4.536 and a median of 5.305, highlighting the considerable differences in ROA among the sampled enterprises. The medians of SIZE and MTB are 19.953 and 1.526, respectively, which indicates that more than half of all firms are medium-sized enterprises.

It is evident that there is ample room for improvement concerning green efforts by hard-to-abate enterprises in Morocco, particularly for small and medium-sized companies, in order to achieve green innovation, efficient information disclosure, and better access to bank loans. Notably, the coefficients of LEV are found to be significantly important, as a large number of firms can obtain loans more easily. Companies with high leverage and higher investment expenditures need to raise more capital to sustain their operations.

Table 2 presents the Pearson correlations among the variables used in our main regressions. We observe that the FPI (Firm Polluting Industry) has a positive correlation of 0.1856 with GCP (Green Credit Policy). This suggests that a weak positive relationship exists between the extent of the firm's involvement in polluting industries and its access to green

credit policies. As FPI increases, there is a slight tendency for GCP to do so as well. The GF (Green Finance) has a positive correlation of 0.6173 with GCP (Green Credit Policy). This indicates a moderate positive relationship between the level of green finance, measured by public investment in multiple renewable energy technologies, and the availability or utilization of Green Credit Policy. As GF increases, there is a tendency for GCP to increase as well.

Furthermore, ROA (Return on Assets) has a positive correlation of 0.458 with GCP (Green Credit Policy). This shows a moderate positive relationship between a firm's Return on Assets and its access to or utilization of Green Credit Policy. As ROA increases, there is a tendency for GCP to increase as well.

In addition, SIZE (firm size) has a positive correlation of 0.196 with GCP (Green Credit Policy). This puts forward a weak positive relationship between the size of the firm and its access to or utilization of Green Credit Policy. Larger firms may have a slightly higher tendency to benefit from Green Credit Policy. MTB (Market-to-Book Ratio) has a positive correlation of 0.07 with GCP (Green Credit Policy), which indicates a weak positive relationship between the market-to-book ratio of a firm and its access to or utilization of Green Credit Policy. As MTB increases, there is a slight tendency for GCP to increase as well. LEV (Financial Leverage) has a negative correlation of -0.264 with GCP (Green Credit Policy). As such, it suggests a weak negative relationship between the financial leverage of a firm and its access to utilization of Green Credit Policy. As LEV increases (higher financial leverage), with it comes a slight tendency for GCP



**Table 4. Mean Values of Main Variables in each Year.**

Variable/Year	2008-2010	2010-2012	2012-2014	2014-2016	2016-2018	2018-2020	2020-2022
SizeGBL	14.65	14.9	15.98	16.367	17.09	17.15	17.367
GCP	10.95	11.92	13.55	15.367	15.86	16.50	17.08
GF	0.618	0.658	0.791	0.715	0.708	0783	0.887



**Fig. (1).** CO<sub>2</sub> emissions (metric tons per capita) – Morocco between 1990 and 2020.

to decrease. However, such numbers increased in recent years as shown in Table 3, where the mean values of SizeGBL increase over time (14.65 in 2008 to 17.367 in 2022). This also applies to GCP (10.95 in 2008 to 17.08 in 2022) and GF (0.618 in 2007 to 0.887 in 2022).

The empirical results provide the results of heterogeneity analysis associated with the size of green banking loans and the green credit policy by regressing analysis. Both coefficients of Morocco’s green credit policy, bank loan size and firm size were highly significant. These results prove the Hypotheses 1 and 3 to have been correct. What the presented regression results define is that the lower decrease in financial performance in highly constrained enterprises. In other words, the mix of green finance and banking competition resulted in a stronger decrease of financial performance in less constrained enterprises; thus, Hypothesis 2 is supported.

Furthermore, increased energy consumption in Morocco has also caused an increase in GHG emissions. GHG emissions per capita increased from 1.25 metric tons per capita in 1992 to 2.34 metric tons per capita in 2014 (World Resources Institute, 2019). In addition, CO<sub>2</sub> emissions per capita, which accounts for the majority of total emissions, rose by 75% during the same period, reaching 1.74 metric tons in 2014 as presented in the following (World Bank, 2020).

#### 4.2. Green Policy Implications

Due to the prominent global environmental pollution issue, the urgent need for clean development and sustainable practices in heavily polluting enterprises cannot be overstated. Green credit policies have emerged as a crucial tool for environmental governance,<sup>12</sup> preventing the unchecked expansion of such enterprises. Evaluating and enhancing the effectiveness of green credit policies is a vital theoretical and practical concern in achieving sustainable development goals. Building upon research findings, this article puts forth the following policy recommendations.

Firstly, the implementation of green credit policies can alleviate financing constraints for heavily polluting enterprises and effectively reduce their reliance on bank loans. Consequently, the Moroccan government should bolster the enforcement of green credit policies, incentivize commercial banks to expand their provision of green credit, foster innovation in green credit products, address environmental violations by enterprises, and facilitate the transition of heavily

<sup>12</sup> WORLD BANK, 2023. World development indicators 2020. The World Bank. [viewed 30 June 2023]. Available from: <https://data.worldbank.org/country/morocco>

polluting industries towards green and low-carbon practices. Presently, the proportion of green credit in Morocco's total credit remains relatively low, and the overall volume of green credit is limited. This slightly inadequate contribution of green credit towards bridging the funding gap for green development necessitates attention. Additionally, there is a serious need to establish implementation rules and supporting policies during the initial stages of green credit policy promulgation. To further enhance the environmental governance impact of green credit policies, it is imperative to refine the regulatory framework, conduct comprehensive clean production audits and evaluation certifications, support green technological innovation, and promote clean production.

Secondly, as green credit policies reduce bank loans for heavily polluting enterprises and indirectly curb their non-bank borrowing, green transformation becomes an inevitable choice for these entities. Morocco has demonstrated a strong commitment to energy conservation and emissions reduction in recent years, with local governments intensifying environmental control measures and enacting regulations to curb pollution. The internalization of environmental costs and the rise in penalties for illegal pollution have prompted enterprises to embrace green transformation. The availability of green credit, which offers financial support for upgrading enterprises, incentivizes them to engage in green credit programs based on their own interests. Furthermore, enterprises must prioritize contributing to society and the preservation of the resource environment while pursuing their interests. Embracing corporate social responsibility not only enhances the competitiveness and reputation of enterprises but also presents new development opportunities. Therefore, enterprises should continuously raise environmental awareness among shareholders and managers, establish a corporate image that values sustainability, strengthen the trust between themselves and the government, and cultivate a sense of corporate social responsibility, fostering a mutually beneficial interaction among enterprises, the government, and society.

Thirdly, despite Morocco being in a semi-strong market position, green credit can still effectively transmit signals, guiding investors to divert funds from heavily polluted enterprises to other ventures and reducing the scale of equity and bond financing for heavily polluting enterprises in the capital market. Environmental sustainability has emerged as a fundamental concern for enterprise development. To transform environmental challenges into opportunities, enterprises must further advance clean production and green innovation, necessitating larger-scale investments in green capital. However, the insufficient participation of the public continues to create a funding gap for green financing needs. The further development of green credit calls for substantial investment from the financial and capital markets. The government should establish incentive policies to improve investors' returns on investment in green projects, stimulate active responses to green credit policies in the stock market, and increase the influx of social capital and equity financing.

Lastly, due to the challenges associated with bank loan approvals, commercial credit serves as a preferred source of financing for enterprises. The close business relationships and timely information exchange between upstream and downstream enterprises help alleviate the information

asymmetry problem between banks and enterprises to a certain extent.

Heavily polluting enterprises, which face increased operational risks, will face exclusion from the commercial credit market due to the challenges in obtaining adequate financing support through upstream and downstream enterprises under the green credit policy. Thus, commercial credit assumes a crucial role in promoting green economic development. It is imperative to establish a robust credit system to ensure the smooth functioning of the supply chain. This entails the establishment and enhancement of norms and legal protections for commercial credit, as well as the reinforcement of commercial credit risk management. Furthermore, efforts should be made to enhance the transmission channels of commercial credit among enterprises.

## CONCLUSION

Recently, the economy of Morocco has experienced rapid growth and notable achievements that have garnered global attention. However, this extensive economic development model is increasingly constrained by energy, resources, and environmental concerns. The contradiction between environmental pollution and sustainable economic and social development is becoming more prominent. In response, the Green Generation 2020-2030 initiative has been proposed, urging heavily polluting enterprises to reduce their environmental impact through industrial restructuring and embracing green practices, thus promoting high-quality economic development. Green credit, which combines financial support and environmental considerations, plays a central and pivotal role in reallocating credit resources, transforming the financing methods of heavily polluting enterprises, and guiding their transition towards environmentally friendly practices.

This paper utilizes data gathered from a survey of Moroccan firms to analyze the influence of a green credit policy on the financing decisions of heavily polluting enterprises. The research findings are summarized as follows. Firstly, the paper examines the impact of the green credit policy on bank loans and its dynamic effects. The results indicate that green credit can effectively reduce the magnitude of bank loans granted to heavily polluting enterprises. Furthermore, the policy exhibits characteristics of hysteresis and long-term sustainability. Secondly, the article demonstrates that under the green credit policy, the overall financing and non-bank loan scales of heavily polluting enterprises have significantly decreased. This suggests that alternative financing methods for enterprises do not undermine the efficacy of green credit implementation. Green credit policies effectively facilitate the allocation of funds among heavily polluting enterprises.

Thirdly, the paper examines the influence of green credit on enterprise equity and bond financing, explaining the reasons behind the decline in financing scales in the capital market from the perspectives of market efficiency and signal transmission. Fourthly, the study reveals a considerable decrease in the scale of commercial credit granted to heavily polluted enterprises under the green credit policy. Fifthly, the paper explores the heterogeneous impact of the green credit policy on the loan scale of enterprise banks based on factors such as the intensity of environmental regulation, the nature of en-

terprise equity, and the degree of marketization. It asserts that the effectiveness of the green credit policy is greater in regions with higher levels of marketization. Additionally, the research highlights that the green credit policy can serve as an effective supplement to environmental regulation in areas with relatively weaker environmental regulations.

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