Imset, Kristoffer Fangberget
Udland, Anders Martinius

Syndicator or Sinner

An Assessment of Regulatory Arbitrage of Climate Policies on Cross-Border Lending in the Norwegian Syndicated Loan Market

Master's thesis in Financial Economics
Supervisor: Yabin Wang
June 2023

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Table of Contents

List of Figures

List of Tables

Preface Anders Martinius Udland

Here we are, at the end of the journey. I foremost send my thanks towards my friend and partner Kristoffer, which during challenging times have continued the hard work on this thesis. I would extend my gratitude towards Yabin Wang, for offering us valuable perspectives and great feedback. To everyone in the climbing community, who have uplifted my spirits and offered much-needed insights into life's true priorities. Trondeim Buldresenter; we shall never see its like again. I would like to extend a special thanks to my roommates throughout my time in Trondheim, as well as my dearest friends in Gætta. Finally, I would like to thank my family for all the support and love, and of course the one that has made this last year perfect, Aurora.

In the end, it all comes down to this amazing quote from my wise friend and roommate, Mathias:

Det viktigste er å kose seg

Preface by Kristoffer Fangberget Imset

First off I would like to thank Anders Martinius Udland for great cooperation throughout the five years in Trondheim, and especially during the last semester working on the thesis. I would also like to express my gratitude to Yabin Wang for providing invaluable assistance in shaping the perspective of the thesis and insightful feedbacks on our drafts. Furthermore, I would like to offer my appreciation to the Faculty for a quick solution regarding a misunderstanding of a subject I chose, which potentially could have led to a postponement of my masters degree. Additionally I would like to thank Kristian Øyen for great teamwork and friendship throughout the masters degree. I would also like to thank all my roommates over the last five years for great memories and experiences, especially during Covid-19. Finally, I want to thank my family for the constant support over the years. Altogether, I have learnt a lot about assets and liabilities during my master degree in Finance. However, the infamous Sylvia Ostry puts it the best: "We have one asset, and that's people."

Abstract

In this paper, we study how climate policy stringency affects cross-border lending in Norway. Using syndicated loan data from Norway and Climate Change Performance Index for both Norway and recipient countries from 2007 to 2017, we find two stylized results. First, our aggregate-level analysis reveal that a more stringent domestic climate policy in Norway tends to reduce the proportion of loans that Norwegian banks extend to foreign borrowers. Second, when looking at cross-country evidence, our results indicate that Norwegian banks cross-border lending amount does not seem to respond to changes in international climate policy regulation stringency. Altogether, our results point to no evidence of regulatory arbitrage in the Norwegian syndicated loan market.

Sammendrag

I denne artikkelen evaluerer vi hvordan strengere klimapolitikk påvirker norske lån til utlandet. Ved å benytte syndikerte lånedata fra Norge og klimaindeksen fra Germanwatch for både Norge og mottakerlandene i perioden 2007 til 2017, finner vi to stiliserte resultater. Først avdekker vår analyse på aggregatnivå at en strengere innenlands klimapolitikk i Norge fører til en reduksjon i andelen lån som norske banker utsteder til utenlandske låntakere. For det andre indikerer våre resultater at strengere klimapolitikk i mottakerlandet ikke påvirker størrelsen på utenlandslån fra norske banker. Samlet sett peker våre resultater på mangel på bevis for regulatorisk arbitrasje i det norske markedet for syndikerte lån.

1 Introduction

Countries around the world are increasingly focusing on sustainable growth and policies that help to address climate challenges (Madden 2014; Kirk 2020; Kuhlman and Farrington 2010). One particular interest of the policy makers is to facilitate financial measures that incentivize energy-efficient and climate-friendly firms to drive the transition to a net-zero emission society (UNFCC n.d.). In the absence of regulation, capital tends move to regions and sectors with greater probability of profits. Climate policy affects capital allocation by directly imposing restrictions on businesses and by using price mechanism as a tool.

Yet, international climate policies exhibit significant heterogeneities, both in timing and stringency, creating potential regulatory arbitrage opportunities for the capital market. The concern of the lack of global coordination in climate policy has spurred growing research interest in the area of international climate policy and the behavior of bank lending (Benincasa et al. 2022; Demirguc-Kunt et al. 2022). While existing literature focuses on global market underpinned by cross-country studies, its scope often limits an indepth and comprehensive analysis of an individual country. As observed capital market behavior is closely based on the country's economic structure, credit market landscape and policy institution, a closer look at a singular economy in this area of study is warranted and can provide insightful policy implications.

In this paper, we present the Norwegian economy as an interesting academic case. Norway's economy is characterized by a large exposure to natural resources through oil and gas, which makes it a vulnerable to sustainable growth. Meanwhile, Norway is also recognized as one of the most prepared countries to undertake a fully green transition (Kaly UL 2004; Chen C et al. 2015). In light of this, we explore the conditions for which the Norwegian banking sector choose to invest in markets in other jurisdictions than that of its own, and whether, and to what extent, Norwegian banks exploit judiciary differences in its lending practice. Our analysis uses cross-border lending data from Norwegian banks to 35 recipient countries in the syndicated market from 2007 to 2017, paired with detailed panel data on Climate Change Performance Index during the same period. We adopt a variety of econometric setups and our findings suggest no presence of regulator arbitrage of Norwegian banks regarding the stringency of climate policies.

1.1 Hypothesis

This thesis draws on economic theory of regulatory arbitrage and regulations to explore mechanisms that Norwegian banks undertake when determining investments in the syndicated loan market. Implicitly, such mechanisms may provide indicative evidence that Norwegian banks exploit regulatory differences, and engage in regulatory arbitrageur's behavior. The backdrop is a two-part problem. Initially, we undertake an examination of the potential impact of domestic climate policy stringency on cross-border lending, followed by an analysis of the heterogeneity in climate policy stringency in foreign markets and its potential implications for Norwegian cross-border lending. From this notion, we formulate the following hypothesis:

> *How does the climate policy stringency in Norway affect Norwegian banks' cross-border lending, and to what extent does heterogeneity in international climate policy influence the magnitude of these cross-border loans?*

1.2 Method and Estimation

We conduct an analysis of Norwegian cross-border lending within the syndicated market, examining a set of 35 recipient countries during the period from 2007 to 2017. Our approach adopts a similar framework to that employed by Benincasa et al. 2022, with the exception that we exclusively investigate lending from Norway as a single source country. We construct two research questions, and provide two primary models. First, we model how Norwegian climate policy impacts domestic lending, before modeling foreign country's climate policies impact on foreign lending. Our intention is to investigate whether the Norwegian lending market exploit regulatory differences in climate policies between Norway and its foreign counterparts.

The hypothesis is addressed through the use of panel data with 903 observations on syndicated loans. Granular syndicated loan data provide an ideal universe to observe bank behaviour, as up to a third of cross-border lending is done in this market (Cerutti, Hale et al. 2015).[1]

We construct our data set using Refinitiv (formerly Thomas Reuters) Eikon, World Bank Development Indicators, SSB and Germanwatch. The purpose is to provide a clear causal relationship between cross-border lending of Norwegian banks in the syndicated loan market, and climate policy actions aimed to oblige with commitments from the 2015 Paris Agreement. If we find evidence that support the notion that Norwegian banks exploit regulatory differences caused by climate policy between Norway and recipient countries, we can state that climate friendly regulations have a negative effect on domestic lending.

1.3 Scope

While existing literature focus on global market underpinned by cross-country studies, it omits the analysis of individual countries' relationships with global markets. As the global syndicated loan market is rapidly growing, a closer look at singular nations tendencies and exposure can be viewed with increased importance.

The Norwegian economy stands out due to its unique characteristics, particularly its reliance on natural resources. To the best of our knowledge, there is a gap in the existing literature regarding the analysis of cross-border syndicated lending, specific to the economic traits of the source country. This makes the Norwegian economy an intriguing subject for academic investigation. Additionally, Norway is considered both vulnerable to climate change, according to various estimations, and one of the most prepared countries to transition to a greener economy. However, the exposure to fossil fuel is seen as a potential transitional risk, given the implications of climate policy and technological developments in achieving a low-emission society (NOU 2018 s.22; Kaly UL 2004; Chen C et al. 2015).

Norway, being a small-open economy heavily reliant on natural resources, experi-

[1]Bank behavior is defined as the banks lending strategy on aggregated level. The strategy consist then of the trade-off between domestic lending vs. foreign lending. We assume a limited pool of resources in the bank that is allocated in either the domestic or foreign market

ences significant impacts from major geopolitical events, such as wars. As part of its national climate action plan, Norway has committed to reducing greenhouse gas emissions by at least 45% of non-ETS emissions by 2030, and aligning the carbon-taxation of EU-ETS with non-ETS goals.[2] This entails substantial price incentives for industries to curb their emissions. Consequently, the demand naturally declines (NOU 2020 p.11; NOU 2020 p.27).

We illustrate Norwegian export exposure in figure 1. It illustrates the substantial economic reliance on oil and gas with exports accounting for 14% of GDP in 2019 and representing a significant portion of the nation's wealth. Fossil fuel contributes to 73.4% of the country's total exports. (SSB 2023a; SSB 2023b)

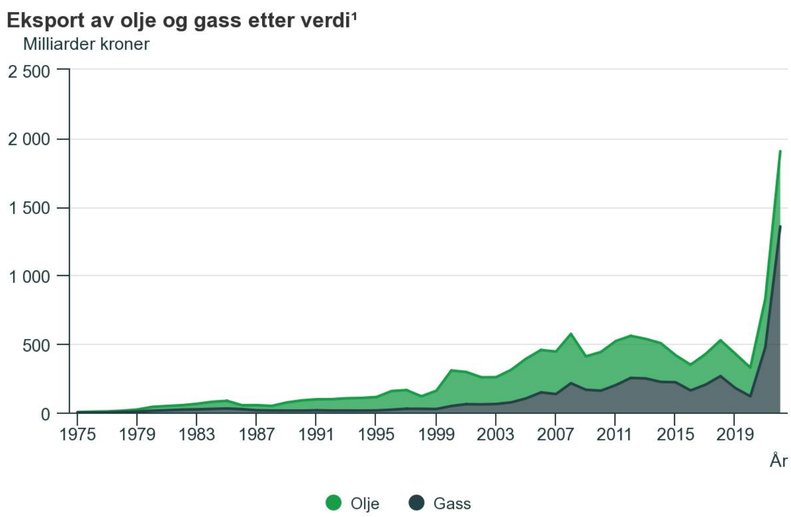

Figure 1: Norwegian export in terms of value from fossil fuel given in Norwegian Kr.

The recent war in Ukraine serves as a notable example highlighting that oil contracts are influenced by factors beyond price mechanisms. While figure 1 does not provide direct evidence of a causal relationship, it depicts a significant increase in the value of Norwegian exports as Germany enforces an embargo on Russian gas. To complement this observation, figure 2 displays the Russian export of gas to Germany (Council 2023; EuroStat 2023).

The future implication on investment in Norway, is assumed to be dependent on the

[2] EU-ETS is the European emission trading system. Defined by (Hub 2020) to be: *A market mechanism that allows those bodies (such as countries, companies or manufacturing plants) which emit (release) greenhouse gases into the atmosphere, to buy and sell these emissions (as permits or allowances) amongst themselves.*

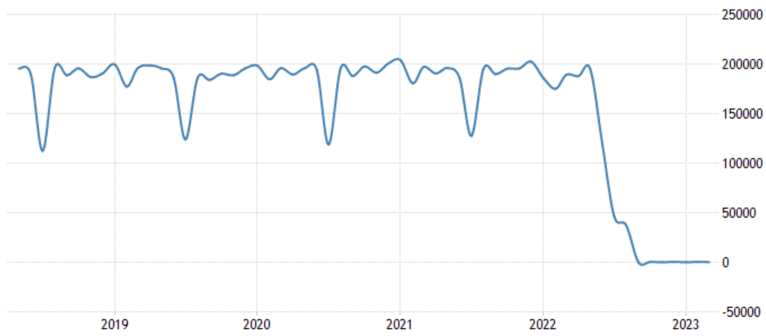

Figure 2: German import of Russian Gas from 2019 - 2023.

conditions to which natural resources are traded, and the stability of international corporation. Hence, we give a reasonable argument to further explore bank-behavior in highly climate unfriendly exposed economies, that is in transition to comply with its Paris accord commitments.

The thesis begins by providing an introduction to existing literature, before presenting a theoretical framework. Section 4 presents the data and descriptive statistics, section 5 consists of the empirical model and expected results, followed by the empirical findings presented in section 6. Furthermore, section 7 present extensions to assess the robustness, followed by a discussion in section 8. Finally, we present concluding remarks in section 9.

2 Literature

We present relevant literature which have examined similar questions and hypotheses. Existing literature explores several aspects of investments strategies, including fund-allocation, lending, and stock trading. Bank behavior in light of climate policy heterogeneity is covered excessively to a greater extent than just its lending strategies. Overall, there exists no clear consensus in the literature on banks' exploitation of regulatory arbitrage, but rather its dependency on the asset of interest. The interest in heterogeneity in climate policy across nations is not new. However, its importance in risk analysis and reallocation of capital to further investments, is still vital in any banks profit maximization strategy.

One of the primary articles we draw on is Benincasa et al. 2022, which supports De Haas and Van Horen 2013 and adopt their method of using syndicated loans as a measure of cross-border lending. They study the causal effect of the home country's climate policy stringency on cross-border lending between 2007 and 2017. With the purpose of investigating heterogeneity across governments in terms of climate policy stringency, the article analyzes whether banks use cross-border lending as a reaction to a change in their source country's climate policy. To do so, they investigate how a source country's climate policy stringency may impact the share of the cross-border syndicated loan. To mitigate potential biases, increased loan demand and omitted variable bias, the study controls for and collects information on loan-specific features and country-level characteristics, such as economic conditions, culture, and demographics to include in their model. The paper provides evidence suggesting cross-border lending enables lenders to exploit the lack of global coordination in climate policies, as *climate policy stringency decreases loan supply to domestic borrowers with high carbon risk while increasing loan supply if such borrowers are abroad.*

Furthermore, the use of CCPI as a tool for quantitative analysis of climate policy stringency is adopted by a variety of existing literature from the same period as we adopt and is regarded to be the industry standard for reporting on cross-nation climate policy action (Bernauer and Böhmelt 2013).

The World Bank published in December an article by Demirguc-Kunt et al. 2022, which examines the impact of climate policy on global bank lending and the role of carbon pricing mechanisms in influencing this relationship. Using a sample of 80 countries from 2010-2018, it concludes climate policy to be significantly effective on bank lending. More specifically, policies aimed at reducing greenhouse gas emissions leads to a decrease in lending to carbon-intensive industries. They find that initiatives such as carbon pricing mediate the relationship between climate policy and bank lending. In countries with high carbon pricing, banks are more likely to shift their lending portfolios towards low-carbon industries and away from high-carbon industries. Unlike Benincasa et al. 2022 who examines the syndicated loan market, Demirguc-Kunt et al. 2022 primarily focuses on bank lending by subsidiaries of international banks to the largest corporations within a country, and their response to climate policy stringency in their source country. Since foreign subsidiaries represent a large share of the lending portfolio of global banks, the focus is to understand how credit responds to climate policies aimed to mitigate emissions.

According to Mueller and Sfrappini 2022, achieving a sustainable and greener future requires the alignment of long-term social goals, such as emission reduction, with short-term economic goals, such as profit maximization. This alignment can be facilitated through a robust framework that incentivizes both goals, utilizing national and international regulations. The implications of these policies vary across sectors, as the demand for financial funding depends on the extent of positive or negative exposure to climate policy stringency. Consequently, firms and banks will encounter regulatory risks associated with the implementation and removal of climate policies.

Given that climate change is considered a significant systemic risk, mitigating its impact on society is both in the interest and responsibility of banks. Therefore, it is crucial for financial institutions to recognize and address these risks to ensure the well-being of society.

Ben-David et al. 2021 closely examines the impact of environmental policies on polluting activities in large multinational firms, both in their source countries and foreign locations, over the last decade (2010s). They combine firm-level data on CO_2 emissions and aggregate it at the country level, while controlling for country-level regulations and enforcement. They find that a firm's policy regarding pollution allocation is primarily driven by environmental policies in the source country, rather than by the opportunities available to pollute elsewhere. The results are consistent with the pollution haven hypothesis, which suggests that firms prefer to conduct polluting activities in countries with lenient environmental policies. This finding aligns with the results of Benincasa et al. 2022 and Demirguc-Kunt et al. 2022. The study indicates that the 'push' effect of climate policy in the source country is the primary motivator for firms in determining their emissions and that they increase their pollution abroad in response to stricter regulations in the source country. The paper highlights that environmental policies and climate change actions can be particularly costly for firms in pollution-intensive industries.

3 Theoretical Framework

Both arbitrage and the reallocation of capital are complex notions that will be explained and finally presented as groundwork for the theoretical model. The empirical model is rooted in the concept of arbitrage pricing theory, APT, where financial actors within efficient markets will expect assets return to be a linear function of its covariance with the market portfolio. Any asset that deviates from this relationship could be exploited by arbitrageurs to generate riskless profits (Ross 1976). We follow an expansion on the theory, called regulatory arbitrage theory, where agents in a given universe are exploiting loopholes in jurisdiction to circumvent prudent regulations and take excessive risks (Houston et al. 2012). Firstly, we present a framework for investment strategy conditioned on maximization of returns and reallocation of capital, before describing regulatory arbitrageur's behavior. Furthermore, we present two research questions to structurally approach our hypothesis.

3.1 Resource Allocation

The reallocation of capital refers to the process of redirecting financial resources from one area or industry to another. It involves shifting investments, loans and other forms of capital from one market to another based on changing market conditions, economic opportunities, and risk considerations (Cerutti, Claessens et al. 2017). The reasoning behind reallocation of capital stems from the pursuit of, among others, maximizing returns, managing risks, and adapting to evolving economic dynamics. We name the reallocation of capital within credit markets to be credit capital flow. Hence, cross-border lending measured in syndicated loans is the credit capital flow between Norway and foreign countries.

3.1.1 Market Conditions

One of the primary drivers for credit capital flow is the response to changing market conditions and investment opportunities influenced by government policies and regulations. The economic landscape is a dynamic environment characterized by periods of growth, decline, and transformation, shaped by various factors including technological advancements, consumer preferences, and notably government interventions. Governmental measures, such as subsidies or tax incentives for renewable energy projects, play a significant role in incentivizing the reallocation of credit capital towards green industry.[3] Motivated by the creation of favorable economic environment for investments in sustainable and green projects, the objective is to induce investors to allocate capital towards climate friendly projects. This can, ceteris paribus, lead to the expansion and development of sustainable non-fossil fuel investments (Green 2021; Pretis 2022; Bruvoll and Larsen 2004). Norway has implemented a range of policies to achieve its climate policy goals including carbon tax, emissions trading scheme and support for renewable energy sources (NOU 2020). The economic state of affair in a small open-mixed economy such as Norway, richly endowed in natural resources, is highly susceptible to international demand through its exporting industries.[4] The involvement of Norwegian banks in syndicated loans are therefore expected to variate across domestic demand.

Market conditions are defined as CCPI in our model, which defines the level of stringency in government interference. Ben-David et al. 2021, stringency will work as a push effect on cross-border lending, implying a inverse relationship between CCPI and cross border lending.

3.1.2 Economic Opportunities

We define economic opportunities at the country-level to be closely connected to the cyclical pattern of economic conditions in each country. The cyclical nature of economics is driven by a complex interplay of factors, including changes in consumer spending, business investments, economic policies, and global economic conditions. These factors interact and influence each other, shaping the phases of economic expansion and contraction. During an expansionary phase, various positive indicators tend to align. As more people become employed and experience increased income, consumer confidence improves, encouraging individuals to spend more on

[3]We do not go in depth on the magnitude of different policies. However, we find most literature to assume 0-2% decrease in CO_2 equivalents annually as a result of carbon taxation

[4]See chapter 1.3

goods and services. This surge in consumer spending further stimulates businesses, motivating excessive investments in new ventures, expanding operations and hiring additional workers. The expansionary phase of a business cycle is characterized by optimism, as economic conditions appear favorable for growth and prosperity. The literature support the fact that local economic growth is a strong pull factor of international capital flows and increased real investment during expansionary periods (Choi, Furceri and Yoon 2021; Choi and Furceri 2019; Kleimeier et al. 2013; Minoiu and Reyes 2013). However, Biswas and Zhai 2021 discover syndicated lending and real investment to increase during political instability and uncertainty, meaning the picture is complex and dependent on asset classes.

The behavior of banks and lending institutions has a significant influence on the cyclical patterns of the economy. During expansionary phases, banks may adopt more relaxed lending practices, particularly when regulatory conditions are lenient. This can result in increased availability of credit and loans to both businesses and individuals, thereby stimulating economic activity. With easier access to capital, businesses can undertake more ambitious projects. This heightened lending activity contributes to aggregate fluctuations and reinforces the expansionary phase of the economic cycle (Asea and Blomberg 1998; Peersman et al. 2011; Tabak et al. 2011). Consequently, we anticipate that the cyclical conditions in recipient countries' economic state will act as a pull factor in cross-border lending, positively impacting the flow of credit capital. We expect that the activity in the source country will have a negative resonance on credit capital flow.

3.1.3 Risk Considerations

Cross-border lending strategies are influenced by loan-level considerations and attributes, which play a significant role in assessing the associated risks and returns. Loan terms primarily represent the price element of the supply side, defining the condition to which every loan is accepted (Biswas and Zhai 2021). The underlying risk-return trade-off experienced by lending is significantly important in risk assessments, and whether climate policy stringency is not confounded by differences in underlying risk profiles.

Cross-border lending involves additional complexities and risks compared to domestic lending. These risks stem from various factors such as differences in legal and regulatory frameworks, political and economic instability, currency fluctuations, and cross-cultural challenges. These unique elements can affect the ability of borrowers to repay their loans and increase the likelihood of default. High default rates can result in financial losses and impact the overall profitability of lending portfolios. The risk involved in cross-border lending can be attributed to several factors that influence default rates. Jiménez and Saurina 2002 explore the potential for loan characteristics to impact default rates, measuring the potential risk factors on specific loan features. Concluding with significant impact of loan characteristics on the probability of default.[5]

This lead us to the first research question. We investigate domestic climate policy stringency as a potential driving force in resource allocation strategy between domestic and foreign market and explore the potential correlation between foreign climate policy stringency and the lending magnitude to the respective country. and ask our self the first research question:

How does climate policy stringency in Norway affect Norwegian banks' cross-border lending?

3.2 Regulatory Arbitrage

Regulatory arbitrage in the lending sector occurs when banks take advantage of differences in regulations between jurisdictions to achieve a competitive advantage (Hayes 2021). In the context of climate policy, regulatory arbitrage occurs when banks seek to avoid the costs associated with more stringent regulations by investing in jurisdictions with more lenient regulations (Bremus and Fratzscher 2015).

One theoretical explanation for regulatory arbitrage in the lending sector is the concept of regulatory competition. Regulatory competition occurs when jurisdic-

[5]Long-term lending (over five years) implies a lower credit risk than medium-term lending (1 to 5 years) or very short-term lending (less than 3 months) and secured credit operations have a higher probability of default.

tions compete with one another to attract businesses by offering more favorable regulatory environments.[6] This competition is assumed to be a potential driver for a "race to the bottom" in which jurisdictions lower their regulatory standards to attract foreign investments. Race to the bottom is what Nouy 2017 define as a case where banks seek the least-cost jurisdiction to book their exposures.

Houston et al. 2012 find regulatory differences between countries are positively related to transnational capital flow, indicating engagement in regulatory arbitrage to optimize profits. Specifically, the paper find banks to be more likely to expand cross-border lending activities to countries with lower regulatory standards, and banks are more likely to invest in countries with weaker legal institutions, suggesting that regulatory arbitrage is facilitated by weaker governance structures.

Furthermore, banks engaging in regulatory arbitrage take on more risk by lending to riskier countries and investing in riskier assets Houston et al. 2012. This suggests that regulatory arbitrage not only affects the distribution of international bank flows, but also has implications for financial stability. Overall, there are evidence suggesting the prevalence of regulatory arbitrage in the international banking system and its potential implications on financial stability is considerable. Houston et al. 2012 emphasizes the importance of regulatory harmonization across countries to mitigate the adverse effects of regulatory arbitrage on international bank flows and financial stability.

Benincasa et al. 2022 provides evidence that banks increase cross-border lending in response to higher climate policy stringency in their home countries compared to their borrowers' countries as a regulatory arbitrage tool. Illustrated as a correlation-diagram between home country climate policy and cross-border bank lending in figure 3. The findings are in line with a race to the bottom behavior, documenting one adverse effect of the lack of national coordination in climate policies.

The literature is, however, ambiguous regarding a race to the bottom theory. Frame et al. 2020 finds the cause of regulatory arbitrage to be consistent with "race to the bottom" competition in developing markets. Houston et al. 2012 find mitigating

[6] We note the complex universe of regulatory conditions to not only be affected by climate policies, but also the potential of other policies. We isolate climate policy to simplify

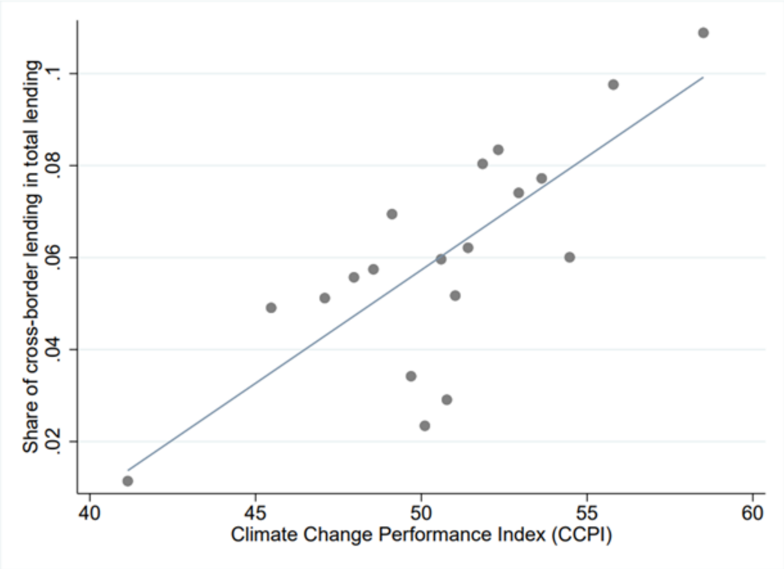

Figure 3: Correlation between CCPI score and Loan share from Benincasa et al. 2022.

factors that suggest low regulations alone are not sufficient to attract capital. However, they also identify a potential approach to enhance foreign direct investments in developing countries, which involves reducing regulations.[7] Furthermore, they find strong evidence that banks transfers funds to markets with fewer regulations.

Carruthers and Lamoreaux 2016 discuss that regulatory races may not be the cause of a race to the bottom scenario, but rather the possibility that governments face similar problems and independently adopt similar solutions.[8] The the threat of migration of businesses because of increased regulatory supervision is seldom realized in practice. With one exception being the generalized case for flexible firms that can select new parent nations without physically moving operations. It is a reasonably assumption that the financial sector is flexible in moving investments, which increases the potential to exploit regulatory differences.

Finally, regulatory arbitrage in the lending sector can be rooted in the concept of regulatory capture. Regulatory capture occurs when regulatory agencies become influenced or controlled by the industries they are supposed to regulate. Potentially resulting in regulations that are less stringent than they should be to protect the

[7]Foreign Direct Investment (FDI) is defined as investors that create a lasting interest in and a significant degree of influence over an enterprise resident in another economy (OECD 2023)

[8]This refers to a potential homogeneity problem when observing countries with equal states of development. We discuss the problem in later parts

public interest. Regulatory capture leads to situations in which banks choose to invest in jurisdictions with weaker regulations, which results in negative environmental outcomes (Carpenter and Moss 2013; Dal Bó 2006). It is, however, not the scope of this thesis to explore the potential of regulatory capture, but will acknowledge its potential to impact a race to the bottom scenario.

With the basis in economic theory, preventing arbitrageurs' behavior is in the interest of judiciaries such as sovereign nations or regional entities. The consequence of regulatory arbitrageurs' behavior is the reallocation of capital to markets with favorable interventions, consequently resulting in less effective domestic regulation. Climate policy is highly heterogeneous across sovereign nations, increasing accessibility for banks and firms to engage in regulatory arbitrage. Climate policy is inherently determined domestically, ensuring international cooperation to be paramount to mitigate regulatory arbitrage.

This leads us to construct the second research question, where we investigate whether recipient country's climate policy stringency is a mean to exhibit regulatory arbitrageur's behavior. We present first research question:

To what extent does heterogeneity in international climate policy influence the magnitude of these cross-border loans

The research questions presented in this chapter will be guiding in the analytical solution in later parts. We will construct two models, that each gives an indication on whether we reject or fail to reject the hypothesis.

4 Data

In this section, we present the raw data from which the analysis is based upon. We collect information on Norwegian syndicated loans and country level climate policy stringency. Furthermore, we collect macroeconomic indicators and loan level specifics. By using Refinitiv Eikon database, we collect 903 syndicated loans stretching from 2007 to 2017, with according climate policy score of recipient country for each observation from Germanwatch.[9]

4.1 Syndicated Loan

According to the US Federal Reserve, a syndicated loan refers to a loan provided by a group of financial institutions to a single borrower (FED 2023). The loan involves a consortium of banks, known as arrangers, with each syndicated loan having multiple arrangers and one or more mandated arrangers who assume financial responsibility and initiate contact with the borrower (Sufi 2007). Syndicated loans enable individual lenders to diversify risks by limiting exposure to specific borrowers and enable banks to access borrowers that might otherwise be challenging to reach (Cerutti, Hale et al. 2015). Each observation is based on the Norwegian part of a syndicated loan with its ultimate parent organization registered in Norway.[10][11]

Table 1 presents the top 10 countries that received the highest amount of loans from Norway in the syndicated loan market during the time period. Others are denoted as the rest of nations in the data set and Norway represents the total syndicated loans to Norway in the same period. It is noteworthy that all the top 10 countries are classified as OECD countries with highly advanced economic conditions. In order to control for important factors highlighted in existing literature, such as the economic

[9]We retrieve 902 observations for our second research question, as one of the countries in the data set, Bulgaria, was omitted due to missing observations for all macroeconomic and regulatory control variables

[10]Ultimate parent organization is defined in Eikon as the final firm with majority ownership private or stock in the chain of owners. Parent nation is determined as the country this ultimate firm is registered in.

[11]The Norwegian share is defined as an average part of the syndicated loan ($\frac{SyndicatedLoanAmount}{NumberofArrangers}$). In the case of two or more Norwegian banks in same syndicated loan, we multiply the amount by number of Norwegian banks

Table 1: Top ten nations Norwegian banks lend to in the syndicated loan market.

Ranking	Nation	BankFlow
1	United States	52 404.695
2	Sweden	18 875.683
3	United Kingdom	12 772.445
4	Canada	8910.180
5	Denmark	5550.584
6	Singapore	3693.023
7	Switzerland	3013.578
8	Australia	2820.524
9	Germany	2556.975
10	Finland	2396.330
11	Others	19 168.522
12	Norway	30 770.880

state of affairs, loan-level characteristics, and regulatory conditions, we anticipate a certain degree of homogeneity among recipient countries, as they tend to be at similar stages of development. Additionally, among the 903 observations in our data set, approximately 880 of the observations have registered Den Norske Bank (DnB) as the Norwegian participant in the syndicated loan.

The availability of comprehensive time-series loan data within our research scope is advantageous. Delis et al. 2019 argue that the corporate loan market, especially the syndicated loan market, offers an ideal setting in observing credit capital flow, as lead arrangers are well-informed and incentivized to monitor their actions. The data on syndicated loans are well documented and is therefore easily accessible. This suitability aligns with our thesis, where we analyze loan data at a granular level.

Focusing the scope of cross-border lending, we restrict the thesis to only assess the flow of capital through syndicated loans. From Eikon, the financial burden of each arranger is undisclosed, restricting access to independently assess how large portion of the total loan Norwegian banks are responsible for. Hence, in accordance with existing literature, we derive each participants loan amount by dividing the total loan amount on the number of participants. We provide data on 1717 observations, representing all the foreign syndicated loans a Norwegian bank participated in between 2007 to 2017. After removing duplicates, loans with no origin date (financial close date), maturity date, and countries without CCPI score in all the years of the time period, the number of observations was reduced to 903. All loans are denominated in millions of US dollars. Additionally, we provide data representing syndicated loans from Norwegian banks to Norwegian firms in the same period.

4.2 Dependent Variable

We construct two dependent variables to observe the magnitude of cross-border lending by collecting the syndicated loan amount from Eikon. We use loan amount as dependent variable in both models we produce, however, with different characteristics and name. Loan amount is restrained to syndicated loans where at least one bank with ultimate parent organization registered in Norway, participates in the syndication. If there exist two or more Norwegian banks in the loan, the average is weighted accordingly. This provide us with the observed Norwegian activity in the international syndicate market. Firstly, we construct the dependent variable $ForeignShare_{s,t}$. Secondly, we construct the dependent variable $LoanAmount_{r,t}$.

4.2.1 ForeignShare

ForeignShare$_{s,t}$ represents the foreign share of total syndicated loans from source country s in year t. It is the ratio of sum of foreign loans over total loans in the syndicated market for each year t. $ForeignShare_{s,t}$ is represented by a number between 0 and 1, where 1 indicates that 100% of all Norwegian loans in year t was allocated to foreign markets.

Figure 4 illustrates the trend lines of $ForeignShare_{s,t}$ and $CCPI_{s,t-1}$. We can see that the foreign share of cross-border lending has a positive trend, indicating Norwegian banks allocate more resources to foreign countries. However, in 2009, we observe an outlier representing a substantial drop in foreign lending.[12] Furthermore, the figure reveals a declining trend in Norwegian CCPI, indicating a decrease in climate policy stringency during the time period.[13]

[12]Following the credit crisis of 2008, funding through credit received quite the blow.
[13]See chapter 4.3

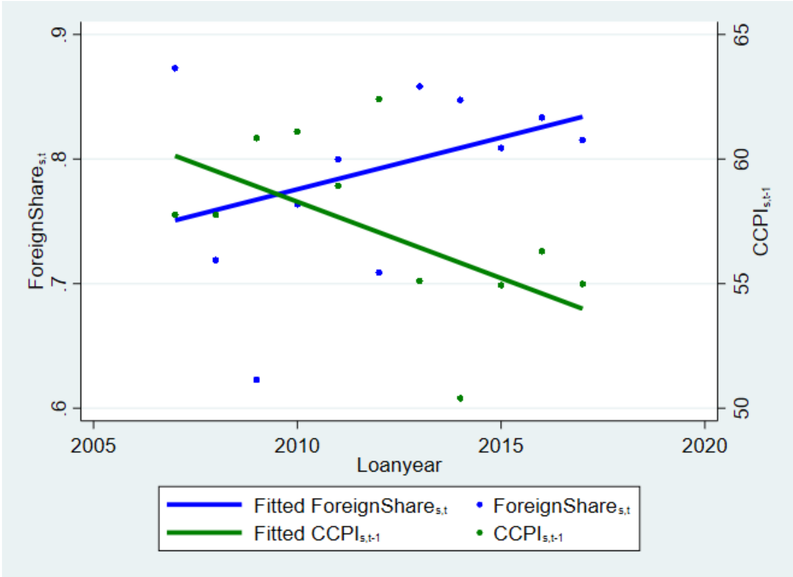

Figure 4: Trend lines of $ForeignShare_{s,t}$ (left y-axis) and $CCPI_{s,t-1}$ (right y-axis) over the time period.

4.2.2 Log(*LoanAmount*)

We further illustrate our second dependent variable, $LoanAmount_{r,t}$. We intend to explore its statistic properties to give support on the empirical modeling later.

$LoanAmount_{r,t}$ denotes total loan amount provided to recipient country r in year t. It is calculated by summing all observed loans granted to the recipient country during that year, enabling us to obtain a singular observation representing the total aggregated capital lent to country r for each year t within the data.

Figure 5 illustrates the distribution of $LoanAmount_{r,t}$, with density on the y-axis and the loan amount represented by the x-axis. We see a clear left skewed distribution, where the magnitude of its outliers to the right greatly impacts the average, as the largest loan we observe is 1475 million dollars, with average being 149 millions, as referred to in table 4. We account for the skewness by taking the natural logarithm of $LoanAmount_{r,t}$, denoted as "Log$(LoanAmount)_{r,t}$".

Figure 6 illustrates the trend lines of Log$(LoanAmount)_{r,t}$ and $CCPI_{r,t-1}$. Left Y-axis is given in million dollars, illustrating the total amount of money transacted from Norway to foreign countries in the syndicated market. Right Y-axis represents the averaged CCPI score to the recipient countries in the corresponding year. The

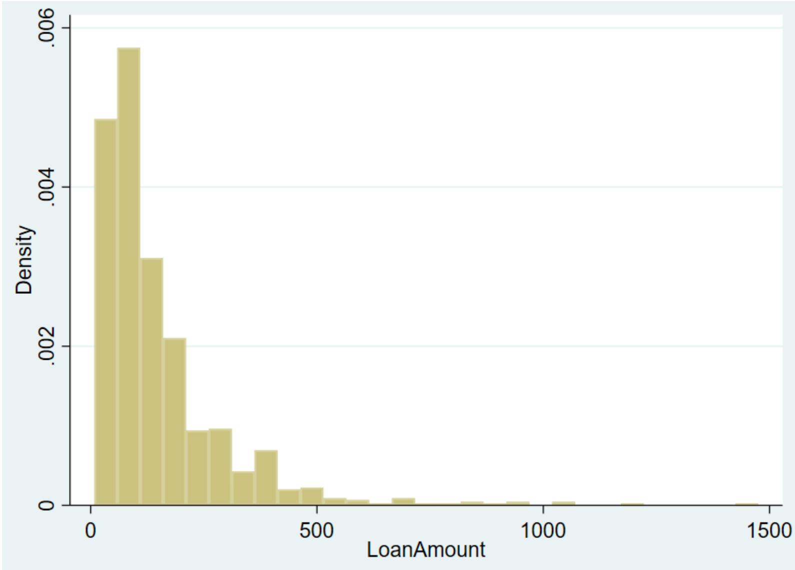

Figure 5: Histogram illustrating the distribution of total loan amount towards foreign countries.

x-axis represents all the years in the time period. Similarly to figure 4, we observe significantly less lending to foreign markets in 2009 compared to the other years.

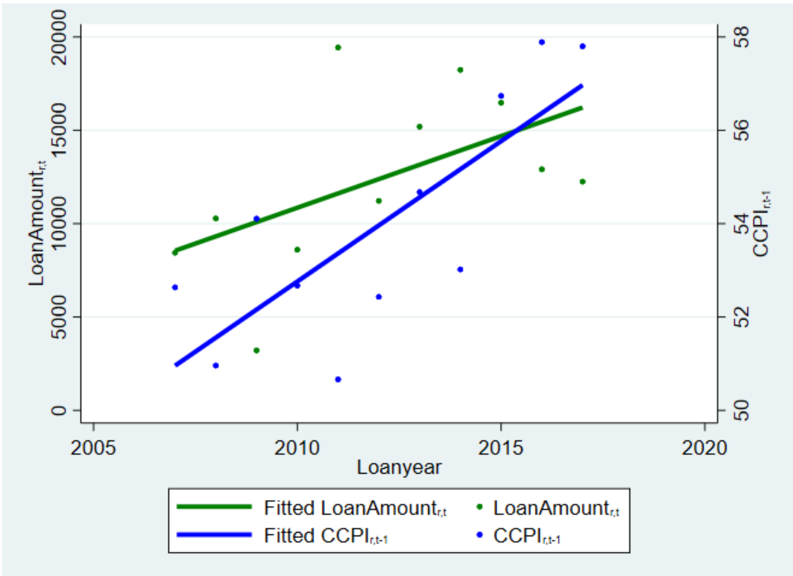

Figure 6: Trend lines of Log$(LoanAmount)_{r,t}$ (left y-axis) and $CCPI_{r,t-1}$ (right y-axis) over the time period.

Existing literature provide similar dependent variables, but rather with a closer look at the price mechanism with All-in spread drawn as dependent variable.[14] The pricing mechanism is restricted in our access to Eikon.

[14] All-in Spread Drawn is defined by Eikon as: *The amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group.*(Eikon n.d.)

4.3 Climate Policy Stringency

The quantification of climate policy stringency and its relative level across nations is not straight forward. There are several suppliers of climate policy indices; OECD provides a comprehensive index with EPS indicators but only considers OCED countries, and Yale provides the EPI index for every country in the world but is restricted to 2012 and forward. We therefore choose the CCPI index from Germanwatch, with time-series back to 2002 for 59 countries. CCPI is consistent with the current literature and yields a precise image of four categories with 14 indicators that define an overall score in the specific countries related to reaching its obligations in the Paris Agreement. The CCPI is an instrument designed to enhance transparency in international climate politics. The four categories are: Climate policy (20%), Energy use (20%) Renewable energy (20%) and GHG emissions (40%) (Burck et al. 2017). The weighted description of the indicators in the CCPI index can be seen in figure 7 below:

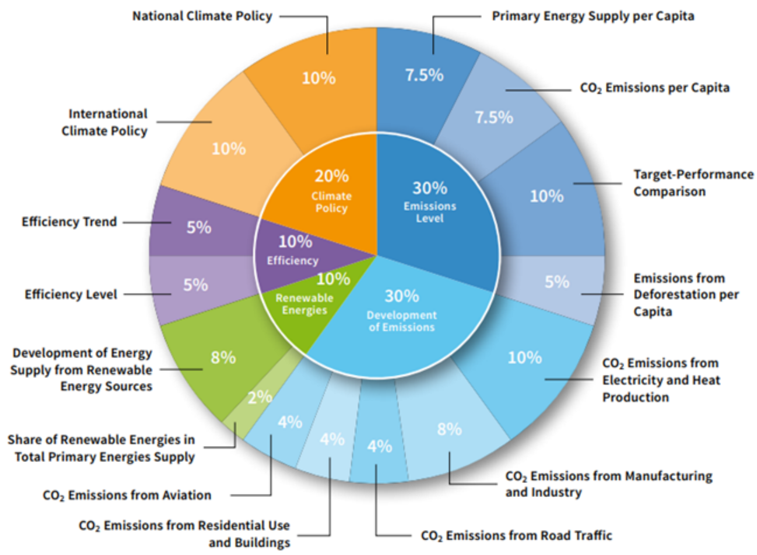

Figure 7: The four indicators of CCPI, with 14 subindicators defining the weight of each indicator.

The main explanatory variable, denoted as $\text{CCPI}_{s,t-1}$, represents the lagged CCPI score of Norway in year $t-1$. Similarly, will $\text{CCPI}_{r,t-1}$ denote the lagged CCPI score of the recipient country. According to Benincasa 2021, incorporating lagged CCPI values acknowledges the influence of previously implemented policies on financing decisions. Since we only have access to CCPI data from Germanwatch for the years

2007 to 2017, we use the CCPI score for 2007 as a proxy for both 2007 and 2008 to create lagged CCPI scores for subsequent years. CCPI represents an overall score derived from the CCPI index, which combines scores from four categories on a scale of 0 to 100. Due to methodological changes in the CCPI in 2017 to better align with the outcomes of the Paris Agreement, data from years prior to and including 2017 is not directly comparable to more recent years. Therefore, our research utilizes data spanning from 2007 to 2017. A higher CCPI score represents a more stringent climate policy. The objective of $\text{CCPI}_{s,t-1}$ is to examine the potential impact of stricter climate policies in the lending country in year $t-1$ on the loan share to foreign countries in year t.

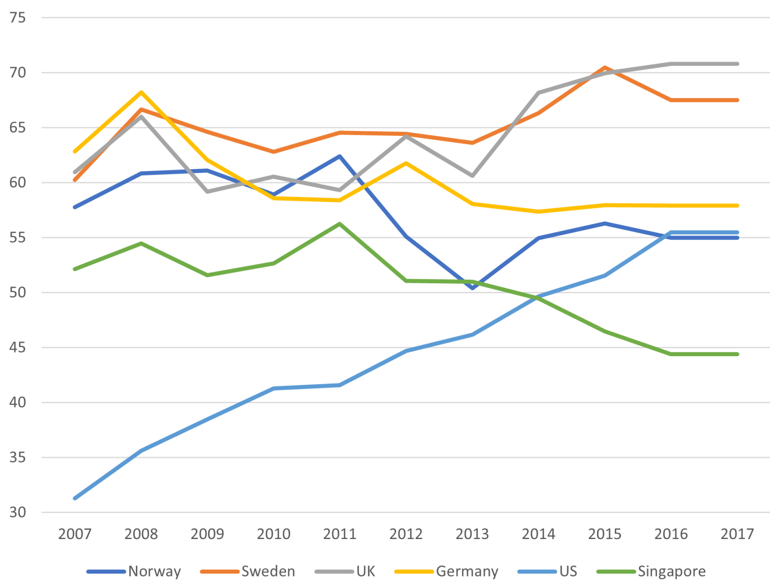

Figure 8: Time-series of selected group of countries with high cross-border lending with Norway

Figure 8 shows the annually CCPI scores to a set of frequent countries in the syndicated market where Norwegian banks are active participants. The graph reveals a large heterogeneity in climate policy stringency in the respective countries. For instance, Sweden and the US has an upward trending curve, in opposition to Norway and Singapore. Interestingly enough, none of the countries have a noticeable shift in its curve following the implementation of the Paris Agreement in December 2015.

From figure 6 in section 4.2, we observe a drop in 2008-2009, following the financial crisis of 2008. Interestingly, figure 6 illustrates a positive trend in $CCPI_{r,t-1}$ over the time period, in contrast to the Norwegian trend shown in figure 4.

4.4 Explanatory Variables

We collect a number of loan-level control variables, including: Maturity period, origin of year, number of candidates (arrangers), the presence of at least one covenant (indicated by a binary variable), the inclusion of collateral (represented by a binary variable) and the borrower's country of origin. They are created taking the average of each loan-level variable for each country r in year t, respectively. Additionally, we generate a variable called CountryID, which represents a country by a unique ID between 1 and 35 for the 35 countries included in our data set. This will serve as the panel variable in our data set.

Furthermore, we collect country-level characteristics for Norway and the borrowing countries from the World Development Indicators.[15] We collect: The annual inflation rate, Inflation, the annual interest rate, InterestRate, the annual GDP growth rate, GDPgrowth and the regulatory quality in a country, ReqQuality. ReqQuality captures the ability from the government to implement regulations permitting and promoting private sector investment. From the original data set, regulatory quality was given as a constant between -2.5 and 2.5. In order to manipulate the variable and take the natural logarithm, we added it up by 2.5 and multiplied it by 20 to get it on a scale between 0 and 100.[16] Additionally, we collect the crude oil price for the date the loan originated, namely lOil, from SSB. A description of all variables can be found in table 2.

[15] World Development Indicators (WDI) is the World Bank's premier compilation of cross-country comparable data on development (Bank 2023).

[16] ReqQuality is not a measurement of stringency in governmental interference, but rather the quality of its regulations

Table 2: Variable Definition

Variable Name	Definition	Source
$\text{ForeignShare}_{s,t}$	The share of Norwegian syndicated loans to foreign countries in year t.	Eikon
$\text{Log(LoanAmount)}_{r,t}$	The natural logarithm total amount Norway lends to country r in year t.	Eikon
$\text{CCPI}_{s,t-1}$	CCPI score for Norway in year t-1.	Germanwatch
$\text{CCPI}_{r,t-1}$	CCPI score to the borrowing country r in year t-1.	Germanwatch
$\text{AverageCCPI}_{r,t-1}$	The Average CCPI score to all recipient countries in year t-1.	Germanwatch
$\text{CCPIDifference}_{r,t-1}$	Difference in CCPI score between recipient and Norway in year t-1.	Germanwatch

Table 3: Variable Definition

Variable Name	Definition	Source
Loanyear	The year of the financial close date to a syndicated loan.	Eikon
CountryID	The unique ID for each borrowing country in the period 2007-2017.	Eikon
lMaturity	The natural logarithm of Maturity.	Eikon
lNoCan	The natural logarithm to number of participants.	Eikon
Collateral	The inclusion of collateral. Binary variable.	Eikon
Covenant	The presence of at least one covenant	Eikon
lOil	The natural logarithm of crude oil price.	SSB
Inflation	The inflation rate in year t.	World Development Indicators (World Bank)
InterestRate	Interest rate in year t.	World Development Indicators (World Bank)
GDPgrowth	GDP growth in year t.	World Development Indicators (World Bank)
lRegQuality	The natural logarithm of regulatory quality in recipient country in year t.	World Development Indicators (World Bank)

4.5 Descriptive Statistics

We provide descriptive statistics of primary variables used in the empirical analysis later in this subsection. Presented in table 4 is a summary table of dependent, main explanatory and control variables. The reasoning behind is the intricate variable of $ForeignShare_{s,t}$ rooted in loan amount. Eikon provides several tranches within each syndicated loan, and duplication on each loan is a major source of bias in its raw state. Hence, we match the explanatory variable to each recipient country of the loan. However, we observe less observation on GDPgrowth and RegQuality. This is due to some missing observations on annual basis. More specifically, GDPgrowth experience 8 missing observations, while RegQuality experience 17 missing observations out of 902 observations when investigating factors in the recipient countries.

Table 4 illustrates a possible bias and threat to identification. The standard deviations for a substantial portion is clearly low , and is tightly clustered around its mean. Meaning the variance in the data is quite low, which can limit the ability to detect meaningful patterns. On the other hand, Log($LoanAmount)_{r,t}$ exhibit quite high variance, which is in line with what is expected. The value of each loan have a large variability as we construct no restriction on the magnitude of the syndicated loan in the data set. The smallest syndicated loan observed is 8,3 million dollars, while the largest observed loan is 1475 million dollars. Hence, considering we aggregate Log($LoanAmount)_{r,t}$ for each recipient country annually, the data presents some observations with significantly larger Log($LoanAmount)_{r,t}$ than the average for some countries, such as United States and Sweden as shown in table 1.

Table 4: Summary Table

Variable	Obs	Mean	Std. dev.	Min	Max
Dependent variable					
$\text{ForeignShare}_{s,t}$	903	.800	.0576	.622	.872
$\text{LoanAmount}_{r,t}$	902	151.067	155.818	8.333	1475
Main Explanatory					
$\text{CCPI}_{r,t-1}$	902	53.363	10.423	31.18	76.62
$\text{CCPI}_{s,t-1}$	903	56.664	3.408	50.399	62.408
$\text{CCPIDifference}_{r,t-1}$	902	-3.247	11.464	-29.920	41.88
$\text{AverageCCPI}_{r,t-1}$	903	53.378	3.671	47.262	60.099
Split CCPI recipient country					
Emissions	902	35.022	5.206	16.078	45.324
Renewables	902	2.499	1.892	.316	8.094
EnergyEffiency	902	5.674	1.689	2.273	9.124
ClimatePolicy	902	10.166	4.411	0	20
Split CCPI source country					
Emissions	903	32.157	3.069	27.857	38.265
Renewables	903	2.421	.597	1.748	3.860
EnergyEffiency	903	6.571	.437	6.091	7.346
ClimatePolicy	903	15.513	1.276	12.743	19.217
Loan-level controls					
Collateral	902	.245	.430	0	1
Covenant	902	.101	.302	0	1
NoCan	902	7.638	5.560	1	46
Maturity	902	5.175	3.061	.315	28.517
Economic/ regulatory controls recipient country					
GDPgrowth	894	2.055	2.208	-10.149	14.519
Inflation	902	1.873	1.729	-1.735	11.989
InterestRate	902	1.050	1.898	-.5	14.25
RegQuality	885	80.413	8.568	40.382	95.106
Economic controls source country					
OilPrice	903	84.539	27.845	28.82	143.95
Inflation	903	2.064	.861	.696	3.753
GDPgrowth	903	1.453	.945	-1.727	2.994
InterestRate	903	1.542	1.055	.5	5.25

We provide descriptive histograms on the distribution of the independent variables with skewed distribution. Maturity experience heavy frequency of 5 year maturity. NoCan is heavily right skewed, with much of the syndicated loans only consisting of less than 10 arrangers. ReqQuality illustrate the need for adjustment.

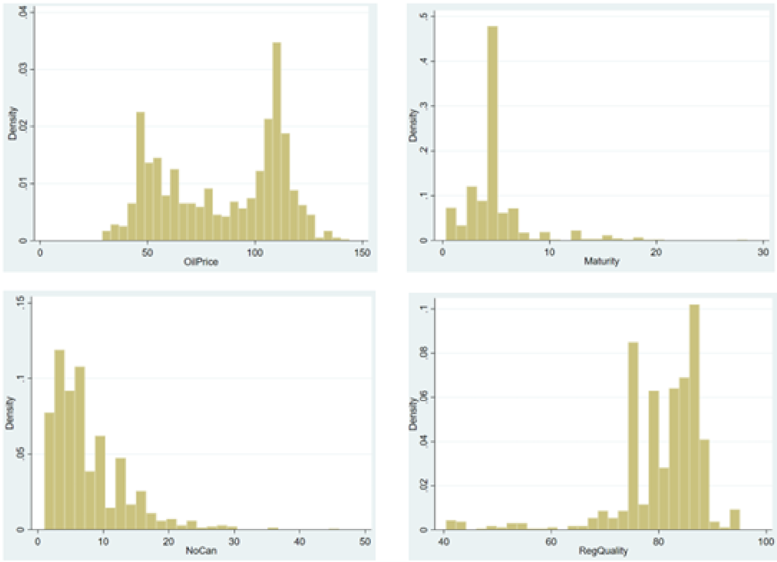

Figure 9: Histogram illustrating independent variables with skewed distribution before applying the natural logarithm.

We apply the natural logarithm on most of the variables in our model for a number of reasons. Firstly, relevant literature (Mueller and Sfrappini 2022; Demirguc-Kunt et al. 2022; Benincasa et al. 2022) applies the natural logarithm to either the dependent variable, numerous explanatory variables or both when analyzing cross-border lending. Secondly, logging the variables helps capturing potential non-linear relationships between the variables (Wooldridge 2009). Thirdly, by applying the natural logarithm on the variables, the relationship between the dependent and independent variables can be interpreted as elasticities. Thus, an increase of an independent variable changes the dependent variable by a constant percentage (Wooldridge 2009).

We do this to all variables not containing zeroes or negative numbers. However, the variables InterestRate, Inflation and GDPgrowth have multiple observations with negative values or zeroes, which would result in missing observations if the natural logarithm were applied. Consequently, we avoid logging these variables. In line with relevant literature that employs CCPI, we do not apply the natural logarithm on CCPI. Taking the natural logarithm of proportions can become very large in magnitude opposed to its original value between 0 and 1 (Wooldridge 2009). Thus, proportion variables in the model, such as $ForeignShare_{s,t}$, are not subjected to logarithmic transformation.

We examine the trend of Norwegian GDP growth and crude oil prices in figure 10. We provide a moving average regression line between the annual GDP growth data points. The measurement of GDP growth is given on the last day of the year, indicating a lagged similar trend to the crude oil price. The trends of the variables indicate that the Norwegian economy still experience exposure to the production and consequently export of crude oil and gas.[17]

Figure 10: Trend lines of the crude oil price and GDP growth for each year in the time-series.

[17]See section 4 for further discussion of the exposure Norway experience from natural resources

5 Empirical Model and Method

In this section we present our empirical model and choice of method. We present the analytical relationship from the research questions. We apply $ForeignShare_{s,t}$ as a measure of total lending routed to foreign markets in section 5.1. In section 5.2, we use Log($LoanAmount)_{r,t}$ as the dependent variable to examine the impact of climate policy stringency in recipient countries on the loan amount they receive from Norway.

5.1 Research Question One: Source Country

In this section we will investigate the first part of our hypothesis. We recall the first research question: *How does climate policy stringency in Norway affect Norwegian bank's cross-border lending?* We construct the following relationship:

$$ForeignShare_{s,t} = \beta_0 + \beta_1 CCPI_{s,t-1} + \beta_2 \mathbf{X}_{s,t} + \beta_3 CCPI_{r,t-1} + \varepsilon_{s,t} \tag{1}$$

The subscript t denotes time period, s denotes source country and r denotes recipient country, respectively.

Regarding the assumption of profit maximization and the negative externality of governmental interference on profit, we expect that an increase in domestic climate policy stringency will lead to a reduction in lending in the domestic syndicated market. Previous studies, such as Benincasa et al. 2022, have provided evidence of regulatory arbitrage, where lenders increase cross-border lending in response to domestic climate policy stringency across multiple source countries. Additionally, Houston et al. 2012 has found strong evidence of banks transferring funds to markets with fewer regulations.

However, since our study focuses on a single source country, the relationship between domestic climate policy stringency and cross-border lending may differ from existing literature. In section 4.2, figure 4 illustrates an increase in cross-border lending over time, while Norwegian climate policy stringency decreases during the same period.

Although the figure alone does not establish a correlation between the variables, it presents a trend that contradicts previous literature.

Thus, based on existing literature, we would expect β_1 to be less than 0, suggesting that domestic climate policy stringency has a positive impact on cross-border lending. However, based on the data we have analyzed thus far, we anticipate β_1 to be greater than 0, indicating a negative influence on cross-border lending. If β_1 is indeed less than 0, it would suggest a regulatory arbitrage effect in the syndicated market in which Norway participates.

We include several control variables to account for the economic conditions in Norway. The vector $\mathbf{X}_{s,t}$ captures the state of the Norwegian economy. Specifically, lOilprice represents the natural logarithm of the crude oil price on the loan origination date. As discussed in section 1.3, investments in Norway are influenced by the conditions of natural resource trade. Therefore, we anticipate that an increase in the crude oil price will lead to higher domestic lending.

The variable Inflation reflects the consumer price index in year t. The impact of inflation on investments can be both positive and negative. However, we expect the primary effect on $ForeignShare_{s,t}$ to be positive.

We also consider GDPgrowth, which represents the GDP growth in year t. Since a growing economy in Norway is likely to result in increased domestic lending, we anticipate a negative impact of GDPgrowth on $ForeignShare_{s,t}$.

Furthermore, InterestRate denotes the interest rate in year t. Higher interest rates indicate higher profitability in terms of interest, leading us to expect a negative influence of InterestRate on cross-border lending.

In conclusion, we expect the coefficient β_2 to be less than 0, indicating an increased willingness for domestic investment. However, Cerutti, Hale et al. 2015 find that country characteristics such as economic size and capital account are less significant in driving syndicated loans compared to non-syndicated loans. Therefore, the expected relationship between country characteristics and cross-border lending is weaker than that of climate policy. Given that $\beta_1 < \beta_2 < 0$, this suggests a stronger influence of climate policy on cross-border lending compared to country characteristics.

To account for the difference between Norwegian and foreign climate policy stringency, we introduce $CCPI_{r,t-1}$ into our model. This variable represents the lagged average CCPI score of all recipient countries in year $t-1$ and is denoted as $\textbf{AverageCCPI}_{r,t-1}$ in the model presented in section 6.1.

Based on previous research, such as Benincasa et al. 2022, we anticipate that β_3 is less than 0, indicating that foreign climate policy stringency has a negative impact on cross-border lending. However, since our study focuses on a single country, the relationship between climate policy stringency and cross-border lending may differ from existing literature.

Additionally, as discussed in section 4.3, figure 6 illustrates a positive trend in foreign climate policy stringency over time, indicating an increase in the recipient countries' CCPI scores. Based on the data analyzed thus far, it suggests an increase in both $ForeignShare_{s,t}$ and $CCPI_{r,t-1}$. Therefore, based on the figures and observed time trends, we expect β_3 to be greater than 0, implying that an increase in foreign climate policy stringency leads to an increase in cross-border lending.

However, it is important to note that an increase in climate policy stringency in a recipient country does not necessarily result in increased lending to that country. Analyzing the relationship between loan size and the increase in $CCPI_{r,t-1}$ solely based on domestic factors is challenging. Therefore, in the next section, we will go into a country-level analysis to assess to what extent CCPI influences the magnitude of credit capital flow to each respective recipient country over time.

5.2 Research Question Two: Recipient Countries

We create Log*(LoanAmount)*$_{r,t}$ to analyze whether loan amount from Norway to recipient countries is affected by the climate policy stringency in the recipient country. We recall the second research question: *To what extent does heterogeneity in international climate policy influence the magnitude of these cross-border loan?* We explore the research question by constructing the following relationship:

$$Log(LoanAmount)_{r,t} = \beta_0 + \beta_1 CCPI_{r,t-1} + \beta_2 \mathbf{X}_{r,t} + \beta_3 \mathbf{Z}_{r,t} + \beta_4 \mathbf{Regulation}_{r,t} + \varepsilon_{r,t} \tag{2}$$

$\mathbf{CCPI}_{r,t-1}$ is the main explanatory variable, representing the CCPI score in recipient country r in year $t-1$. The purpose of $\text{CCPI}_{r,t-1}$ is to analyze whether a stricter climate policy in the recipient country in year $t-1$ affects the magnitude of capital credit flow from Norway in year t. Based on the findings of Benincasa et al. 2022, an increase in the recipient climate policy stringency is expected to reduce the lending to the respective country, indicating $\beta_1 < 0$. However, as discussed in 5.1, considering we are examining a singular country the results may differ from existing literature. Additionally, figure 6 from section 4.2 illustrates a positive trend in both $CCPI_{r,t-1}$ and *(LoanAmount)*$_{r,t}$. Thus, based on the descriptive statistics of $CCPI_{r,t-1}$ and *(LoanAmount)*$_{r,t}$, we expect $\beta_1 > 0$. This indicates that an increase in the climate policy stringency of the recipient country will increase their loan amount received from Norway. However, if we find evidence of $\beta_1 < 0$, it indicates a regulatory arbitrage effect where Norway reallocates more capital in the syndicated loan market to countries with more lenient climate policy.

$\mathbf{X}_{r,t}$ is a vector of macroeconomic indicators, representing the economic state of affair in each recipient country r at time t, namely Inflation, GDPgrowth and InterestRate. The expectations of the macroeconomic indicators reflect the discussion from 5.1, indicating a growth in the economy of the recipient country to positively influence the magnitude of the lending to the respective country. Thus, we expect β_2 >0.

The vector $\mathbf{Z}_{r,t}$ comprises averaged loan-level variables that reflect the risk of default, as indicated by the findings of Jiménez and Saurina 2002. These variables include Maturity, NoCan, Covenant, and Collateral. Based on the research conducted by Delis et al. 2019, we anticipate that loan-level conditions will align with their findings. Specifically, longer maturity periods are expected to have a stronger impact on the relationship between fossil fuel reserves and loan spread. This expectation holds for $\text{Log}(LoanAmount)_{r,t}$ as well, given that Norway's industry is still largely connected to oil and gas. Therefore, we expect the averaged loan-level factors to have a positive impact on the lending amount, resulting in β_3 being greater than 0.

The variable $\mathbf{Regulation}_{r,t}$ corresponds to the variable RegQuality, which measures the government's ability to implement regulations that support and facilitate the private sector. We anticipate that higher regulatory quality, as captured by this variable, would be favorable for investment. It encompasses various factors, including a country's capacity to uphold private property rights. Therefore, we expect $\mathbf{Regulation}_{r,t}$ to have a positive impact on $\text{Log}(LoanAmount)_{r,t}$ for the recipient country. In other words, we anticipate that β_3 is larger than 0. The results for both models, including the impact of $\mathbf{Regulation}_{r,t}$, are presented in sections 6.1 and 6.3, respectively.

5.3 Robustness Analysis

To help reduce omitted variable bias and improve the accuracy of the estimates, we apply country-fixed effects on $\text{Log}(LoanAmount)_{r,t}$, to account for time-invariant characteristics between countries, such as cultural similarities and historical factors. This also align with relevant literature applying borrower FE on cross-border lending, considering we analyze the borrower at country-level.

Furthermore, we apply time-fixed effects on $\text{Log}(LoanAmount)_{r,t}$ which help to control for time-varying factors in each recipient country that might affect the overall loan demand. For instance, global factors as the pandemic, recession of 2008, or oil crisis of 2012 affect the data over time, which cannot be captured by country-fixed effects.

Heteroskedasticity refers to the situation where the variance in the error term is non-constant (Wooldridge 2009). As a result, OLS estimators will remain unbiased and consistent, but they are no longer BLUE.[18] Moreover, the presence of heteroskedasticity in the model can potentially lead to invalid test statistics and standard errors. Hence, we conduct tests for heteroskedasticity in our models and employ appropriate methods to address any identified heteroskedasticity as discussed in section 6.

Since our data set includes multiple observations for the same country in a specific year, it is important to address potential issues of underestimation of standard errors and inefficiency. To account for this, we employ clustered standard errors in our Log$(LoanAmount)_{r,t}$ model, clustering the standard errors at the recipient country-year level, which serves as the unit of treatment (Abadie et al. 2017).

[18]BLUE stands for *Best Linear Unbiades Estimator*, defined as the Gauss-Markov theorem when the model we apply satisfies the assumptions of OLS.

6 Results

This section presents the main results for the two models. Furthermore, additional analysis is applied to account for potential heteroskedasticity and serial correlation in the models.

6.1 Norwegian Market

Derived from equation 1, we present our primary regression on $ForeignShare_{s,t}$ in table 5 below. $ForeignShare_{s,t}$ is the dependent variable with $CCPI_{s,t-1}$ as main explanatory variable. The table covers the regression using Pooled OLS (POLS) in column (1) - (3), Random Effects (RE) in column (4) and Fixed effects (FE) in column (5), all in the time period 2007-2017.

Table 5: Baseline model and model choice for $ForeignShare_{s,t}$

	ForeignShare$_{s,t}$				
Variables	(1)	(2)	(3)	(4)	(5)
$CCPI_{s,t-1}$	-0.013***	-0.012***	-0.011***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
lOil		-0.017**	0.079***	0.079***	0.087***
		(0.008)	(0.012)	(0.012)	(0.014)
Inflation		-0.006	-0.008**	-0.008**	-0.009**
		(0.004)	(0.003)	(0.003)	(0.004)
GDPgrowth		0.018***	-0.006	-0.006	-0.009**
		(0.004)	(0.004)	(0.004)	(0.004)
InterestRate		0.009***	0.044***	0.044***	0.045***
		(0.003)	(0.004)	(0.004)	(0.004)
$AverageCCPI_{r,t-1}$			0.019***	0.019***	0.020***
			(0.002)	(0.002)	(0.002)
Constant	1.507***	1.530***	0.018	0.018	-0.063
	(0.055)	(0.074)	(0.162)	(0.162)	(0.185)
Observations	205	205	205	205	205
R-squared	0.452	0.626	0.752	0.748	0.749

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We observe $\text{CCPI}_{s,t-1}$ has a negative effect on $\textit{ForeignShare}_{s,t}$. It indicates that a 1 point increase in the Norwegian climate policy stringency decreases foreign lending by 1,1 %, with significant results.[19] Thus, the results suggest that Norwegian banks may be actively pursuing environmentally sustainable investment opportunities within the syndicated loan market.

$\text{AverageCCPI}_{r,t-1}$ has a significant and positive effect on $\textit{ForeignShare}_{s,t}$. This indicates that a more stringent climate policy regulation in the recipient country leads to increased lending from Norway. The results may indicate Norwegian banks seeking green investment opportunities when allocating resources abroad.

Of the economic variables, Inflation has a significant and negative impact on $\textit{ForeignShare}_{s,t}$, when all control variables are included. lOil and InterestRate have a significant positive effect on $\textit{ForeignShare}_{s,t}$, when all control variables are included, while GDPgrowth is significant and negative.

6.1.1 Model Choice

To obtain the most accurate estimations, we need to apply the estimator with the smallest variance (Wooldridge 2009). Table 5 includes POLS, RE and FE estimators. In this section we will analyze the different estimators and choose the best fit for our model. Furthermore, we will test for the presence of heteroskedasticity, serial correlation and collinearity.

We assume no correlation between the unobserved, time-invariant factors and the independent variables, as the data has been aggregated annually without accounting for recipient country-specific factors. Consequently, the Fixed Effects estimator may not be the appropriate choice considering it explicitly accounts for observed, time-invariant factors. Furthermore, under the same assumption, there is no evidence to suggest that potential unobserved, time-invariant factors induce serial correlation in the error term. As a consequence, the Random Effects estimator may not be the most appropriate choice for our analysis. POLS, however, does not account for observed, time-invariant factors, as it pools all observations from different groups,

[19] We apply a critical value of α=0.05 = 5% throughout the thesis.

in this case, countries, and estimates a single regression model for the entire pooled data set. Given our research context, we believe the POLS estimator to be the best option for obtaining the most accurate estimations.

Most applications in economics since the 1980s have made the choice between the RE and FE estimators based upon the standard Hausman test (Baltagi et al. 2003). Thus, we perform a Hausman test between the Random Effects and Fixed Effects estimator to test which estimator is the best fit for our model. From table 14, we cannot reject the null hypothesis.[20] This indicates that Random Effects estimator is a better fit than the Fixed Effects estimator. Furthermore, we perform a Breusch and Pagan Lagrangian multiplier test to verify whether Random Effects are present in the model, as shown in table 15. If no Random Effects are present, it suggests that POLS is a better fit than RE. The null hypothesis for the test claims that there is no significant evidence of random effects in the data set. The p-value of the test statistics suggests that we cannot reject the null hypothesis on any significance level.[21] This finding supports the belief that no unobserved, time-invariant factors induce serial correlation in the error term, suggesting the Pooled Ordinary Least Squares (POLS) estimator to be the most suitable choice among the three estimators.

We perform the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity in table 15 where the null hypothesis assumes homoskedasticity. Based on the results from the test, we fail to reject the null hypothesis at any significance level and conclude with the variance of the error term being constant.[22]

Serial correlation can lead to incorrect standard errors and test statistics (Wooldridge 2009 p. 493). We test for serial correlation in our model using the Jochmans portmanteau test in table 16 for within-group correlation. Based on the results from the test we find no serial correlation in our model.[23]

We obtain the variance inflation factor (VIF) table, a tool used to measure the degree of collinearity present for each factor (Craney and Surles 2002). The results are reported in table 18 and indicate a high VIF score for $AverageCCPI_{r,t-1}$, which

[20] We get a Chi-squared of 7.13 and we fail to reject the hypothesis at all significance levels.
[21] We get a Chi-squared of 0, thus we fail to reject the null hypothesis at any significance level.
[22] We get a Chi-squared value of 0.30, which suggests we fail to reject the null hypothesis
[23] We get a Chi-squared value of 29.00, indicating no serial correlation at any significance level.

potentially inflates the standard errors of the coefficients.[24] Wooldridge 2009 state that "If, say, our main interest is in the causal effect of x_1 on y, then we should ignore entirely the VIFs of other coefficients." Thus, we choose to keep $AverageCCPI_{r,t-1}$ in the extension of the model as we are mainly interested in the effect $CCPI_{s,t-1}$ has on $ForeignShare_{s,t}$.

6.2 Recipient Countries

When controlling for factors in the recipient countries, we analyze the cross-border lending on a country-year-level. Hence, unobserved, time-invariant factors between the countries may be present. We apply borrower-level fixed effects to our base model, except for column (5) where we apply Random Effects. From equation 3, we present the estimates including control variables as shown in table 6 below. Column (1) include the main explanatory variable, $CCPI_{r,t-1}$, column (2) the loan-control variables, column (3) economic state of affair, column (4) regulation-control variable and column (5) includes all control variables using RE estimator.

[24] $AverageCCPI_{r,t-1}$ has a VIF value of 9.85. Though the cutoff value for VIF which we conclude as multicollinearity is arbitrary, a VIF value of 9.85 indicates some multicollinearity may be present in the model.

Table 6: Baseline model with Log*(LoanAmount)*$_{r,t}$ as dependent variable

	Log(LoanAmount)$_{r,t}$				
Variables	(1)	(2)	(3)	(4)	(5)
$CCPI_{r,t-1}$	0.011	0.008	0.012	0.013	0.005
	(0.012)	(0.012)	(0.013)	(0.013)	(0.011)
Collateral		0.378***	0.350**	0.371**	0.353**
		(0.139)	(0.141)	(0.145)	(0.147)
Covenant		-0.151	-0.090	-0.099	0.092
		(0.149)	(0.149)	(0.153)	(0.158)
lNoCan		0.215*	0.309**	0.321**	0.185
		(0.117)	(0.125)	(0.129)	(0.118)
lMaturity		0.001	-0.063	-0.067	-0.042
		(0.153)	(0.159)	(0.163)	(0.159)
GDPgrowth			0.015	0.017	-0.009
			(0.026)	(0.028)	(0.027)
Inflation			0.066*	0.066	0.046
			(0.039)	(0.042)	(0.041)
InterestRate			0.122**	0.113**	0.156***
			(0.050)	(0.050)	(0.052)
lRegQuality				2.225	2.815***
				(2.138)	(0.678)
Constant	4.997***	4.547***	4.020***	-5.707	-7.716**
	(0.668)	(0.717)	(0.757)	(9.376)	(3.152)
Observations	204	204	196	188	188
R-squared	0.004	0.061	0.128	0.140	0.115
Number of CountryID	34	34	32	31	31

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We have $CCPI_{r,t-1}$ to be statistically insignificant with low coefficients across all columns. Hence, based on the current model, there is no evidence that the climate policy of the recipient country influences the amount of loan to the respective country in year t. Out of the four loan-variables, Collateral and lNoCan are significant when all control variables are included. They both have a positive impact on Log*(LoanAmount)*$_{r,t}$, indicating that if at least one collateral is included in the loan, and the number of participants increases, the loan amount to country r in year t is expected to increase in magnitude. Among the three indicators measuring the economic state of affair in the country, only InterestRate is significant. InterestRate has a positive effect on Log*(LoanAmount)*$_{r,t}$, indicating an increase in the interest rate of the recipient country increases the loan amount received from the lending country. lRegQuality has a positive coefficient, but is insignificant at all significance levels.

6.2.1 Model Choice

When employing POLS, one assumption is that the independent variables are uncorrelated with the residuals. Our Log*(LoanAmount)*$_{r,t}$-model is panel data, with the panel variable being CountryID and the time variable being Loanyear. We need to account for the time-invariant unobserved factors between each recipient country that may affect the dependent variable Log*(LoanAmount)*$_{r,t}$. Thus, we set up the error term as the composite error, dividing in to the following two components:

$$v_{r,t} = \alpha_r + u_{r,t} \tag{3}$$

Where α_r represents the country-specific, individual unobserved fixed effects and $u_{r,t}$ represents the idiosyncratic error. If α_r is correlated with at least one explanatory variable in our model, the pooled OLS estimator will be biased caused from omitting a time-constant variable (Wooldridge 2009 p. 460), and the fixed effects estimator will be the best choice. However, it is difficult to test for this directly. Thus, we perform a Hausman test between the FE and RE estimators from table 6 represented in column (4) and (5) above, to test which estimator fits the data best. The Hausman test can be seen in table 19. We reject the null hypothesis and confirm that FE is a better fit than the RE estimator.[25]

Furthermore, we test for heteroskedasticity by performing a Modified Wald test. The results suggest heteroskedasticity is significantly present.[26] As previously discussed in section 5, repeated observations for the same groups can be accounted

[25]We get a Chi-squared value of 27.03. Thus, we reject the null-hypothesis at all significance levels, indicating country-specific, individual unobserved time-invariant factors are present.

[26]We get a Chi-squared of 199.38, and we reject the null hypothesis at all significance levels.

for by applying clustered standard errors. Thus, as heteroskedasticity and repeated observations within clusters are present in our model, we cluster the standard errors on CountryID to provide valid inference.

Table 7 below presents the FE model by progressively introducing clustered standard errors and time-fixed effects in column (2) and column (3). $CCPI_{r,t-1}$ remains insignificant, and the loan-variable Covenant becomes insignificant when including time-fixed effects. However, the R-squared increases to 0.279 which indicates a stronger explanatory power of the variance in the model in general. Additionally, we perform a Jochmans portmanteau test for serial correlation. The results indicate no serial correlation is present at any significance level, as shown in table 21.[27] However, should serial correlation be identified, it would be addressed through the implementation of clustered standard errors.

[27] We get a Chi-squared value of 27.00, indicating no serial correlation at any significance level.

Table 7: Log$(LoanAmount)_{r,t}$ including clustered standard errors and Time Fixed effects

Variable	(1)	(2)	(3)
$CCPI_{r,t-1}$	0.013	0.013	0.019
	(0.013)	(0.015)	(0.014)
Collateral	0.371**	0.371**	0.359**
	(0.145)	(0.149)	(0.163)
Covenant	-0.099	-0.099	-0.202
	(0.153)	(0.184)	(0.164)
lNoCan	0.321**	0.321*	0.287*
	(0.129)	(0.172)	(0.164)
lMaturity	-0.067	-0.067	-0.149
	(0.163)	(0.222)	(0.240)
GDPgrowth	0.017	0.017	-0.011
	(0.028)	(0.028)	(0.026)
Inflation	0.066	0.066**	0.106***
	(0.042)	(0.028)	(0.033)
InterestRate	0.113**	0.113	0.115*
	(0.050)	(0.071)	(0.064)
lRegQuality	2.225	2.225	2.375
	(2.138)	(2.371)	(1.898)
Constant	-5.707	-5.707	-6.329
	(9.376)	(10.582)	(8.528)
Country fixed effect	✓	✓	✓
Cluster		✓	✓
Time-fixed effect			✓
Observations	188	188	188
R-squared	0.140	0.140	0.279
Number of CountryID	31	31	31

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7 Robustness

In this section we presents several extensions of our two original models presented in section 6.1 and 6.2, to assess the robustness of our data.

7.1 Extensions Source Country

Giannetti and Yafeh 2012 find that the collapse of international markets during financial crises can be partly explained by a flight home effect, where banks prefer the risk and return profile associated with domestic loans after experiencing a negative shock in their net wealth. As discussed in section 4.2, figure 4 shows that $ForeignShare_{s,t}$ dropped drastically in 2009, presumably due to the financial crisis. To analyze whether the negative shock in $ForeignShare_{s,t}$ affects our results, we extend the model by running a POLS where all observations for the year 2009 are dropped, as shown in table 8 below. The results suggests the same as our original model, with a marginally lower coefficient.

Table 8: $\text{ForeignShare}_{s,t}$ 2009 is dropped

Variables	(1)
$CCPI_{s,t-1}$	-0.014***
	(0.001)
$AverageCCPI_{r,t-1}$	0.011***
	(0.001)
lOil	-0.023**
	(0.010)
Inflation	-0.046***
	(0.003)
GDPgrowth	-0.050***
	(0.004)
InterestRate	0.033***
	(0.003)
Constant	1.246***
	(0.129)
Observations	195
R-squared	0.847

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As discussed in section 4.3, the CCPI score for 2007 were used for both 2007 and 2008 to make lagged variables available for all years in the period 2007-2017. This can potentially lead to collinearity in the data, causing the conditional variances to be high, leading to decreased precision (Belsley 1980). Hence, we control for this by dropping all observations in 2007, removing the potential duplicates of CCPI across years in our model as shown in table 9 below. The results maintain consistent, implying domestic climate policy having a negative effect on cross-border lending.

Table 9: ForeignShare$_{s,t}$ 2007 dropped

VARIABLES	(1)
$CCPI_{s,t-1}$	-0.009***
	(0.001)
$AverageCCPI_{r,t-1}$	0.013***
	(0.002)
lOil	0.117***
	(0.014)
Inflation	0.010**
	(0.005)
GDPgrowth	-0.006
	(0.004)
InterestRate	-0.013
	(0.013)
Constant	0.067
	(0.162)
Observations	190
R-squared	0.751

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CCPI is built upon four main components: Emissions, Renewables, Energy Efficiency and Climate Policy. For a greater insight in the fundamental dynamics of CCPI, we examine the individual components of CCPI and its effect on $ForeignShare_{s,t}$. Given that *ClimatePolicy* measures the stringency of environmental regulations in the respective country, we regard this component as the main determinant among the four categories.

In table 10 below, we present the findings of the four indicators of CCPI as main explanatory variables. In column (1) through (4) we see that all the categories have significant negative effect on *ForeignShare*$_{s,t}$, except for *Renewables*. Column(5) contains all the categories combined. *Emissions*, *Renewables* and *EnergyEfficiency* have a significant negative effect on *ForeignShare*$_{s,t}$, while *ClimatePolicy* have a positive effect on *ForeignShare*$_{s,t}$. This indicates that if the climate policy stringency in Norway increases by 1 point, cross-border lending is expected to increase by 2,1% in the syndicated loan market. However, with an R-squared of 0.941, a degree of collinearity is expected to be present in the regression. Hence, we present a VIF table for the regression and discover presence of collinearity in numerous independent variables. GDPgrowth has the highest VIF score of 46.13, and the indicator of interest, *ClimatePolicy*, has a VIF score of 20.72. Despite the evidence of collinearity in the model, it suggests a potential positive correlation between Norwegian climate policy and cross-border lending. On the other hand, when *ClimatePolicy* is the sole main explanatory variable in column (4), we can see the coefficient is negative and significant.

Table 10: Split test with indicators of CCPI using ForeignShare$_{s,t}$ as dependent variable

	ForeignShare$_{s,t}$				
	(1)	(2)	(3)	(4)	(5)
Emissions	-0.016***				-0.018***
	(0.001)				(0.001)
Renewables		-0.009			-0.051***
		(0.009)			(0.006)
EnergyEfficiency			-0.103***		-0.116***
			(0.009)		(0.005)
ClimatePolicy				-0.023***	0.021***
				(0.003)	(0.004)
Control variables	✓	✓	✓	✓	✓
Observations	205	205	205	205	205
R-squared	0.745	0.502	0.703	0.603	0.941

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.2 Extensions Recipient Countries

Similarly to table 10, we explore the potential influence the four categories of CCPI have on Log*(LoanAmount)*$_{r,t}$, shown in table 11 below. Out of the four categories of CCPI, only *Emissions* is significant. *Emissions* is positive and significant individually and collectively with the three other categories included in the model, as shown in column (1) and (5). This indicates that if the recipient country performs better in reducing emissions, the lending from Norway to the respective country will increase in magnitude. Our main variable of interest, *ClimatePolicy*, is insignificant both individually and collectively. Thus, with regard to clustered standard errors, time- and country-fixed effects, there is no evidence of climate policy in the recipient country affecting the magnitude of Norwegian cross-border lending to the respective country.

Table 11: Split test with indicators of CCPI using Log(LoanAmount$_{r,t}$) as dependent variable

Variables	(1)	(2)	(3)	(4)	(5)
Emissions	0.035*				0.046**
	(0.018)				(0.022)
Renewables		0.036			0.046
		(0.050)			(0.052)
EnergyEfficiency			0.026		-0.099
			(0.096)		(0.120)
ClimatePolicy				-0.002	0.001
				(0.021)	(0.019)
Controls and Fixed effects:					
Control variables	✓	✓	✓	✓	✓
Time-fixed effect	✓	✓	✓	✓	✓
Country fixed effect	✓	✓	✓	✓	✓
Clustered standard errors	✓	✓	✓	✓	✓
Observations	188	188	188	188	188
R-squared	0.285	0.272	0.271	0.270	0.290
Number of CountryID	31	31	31	31	31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We follow the same procedure as Benincasa et al. 2022 and want to test whether the difference in CCPI between the recipient country and Norway may influence the capital credit flow to the recipient country. Hence, we create a variable called $CCPIDifference_{t-1}$, which represents the difference between the CCPI in the foreign country, $CCPI_{r,t-1}$, and the Norwegian CCPI, $CCPI_{s,t-1}$, for each corresponding year. We report the estimates with Log*(LoanAmount)*$_{r,t}$ as dependent variable and $CCPIDifference_{t-1}$ as main explanatory variable in table 12 below. Loan-level attributes, recipient country economic state of affair and lRegQuality are included as control variables progressively in the table. The regression results indicate $CCPIDifference_{t-1}$ have statistically insignificant and low coefficient across all columns. Hence, based on the current model, there is no evidence that the difference in CCPI score between the recipient and lending country influences the magnitude of lending to the respective country in year t.

Table 12: Differences in CCPI between Norway and recipient country

Variables	(1)	(2)	(3)	(4)
$CCPIDifference_{t-1}$	0.013	0.014	0.019	0.019
	(0.012)	(0.013)	(0.013)	(0.014)
Loan controls		✓	✓	✓
Economic controls			✓	✓
Regulatory controls				✓
Time-fixed effect	✓	✓	✓	✓
Country-fixed effects	✓	✓	✓	✓
Clustered standard errors	✓	✓	✓	✓
Observations	204	204	196	188
R-squared	0.121	0.178	0.265	0.279
Number of CountryID	34	34	32	31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, we report the estimates with Log*(LoanAmount)*$_{r,t}$ as the dependent variable and $CCPI_{r,t-1}$ as the main explanatory variable. In this extension, all observations where the value of $CCPI_{r,t-1}$ is higher than that of $CCPI_{r,t-1}$ are excluded. The purpose of this is to investigate the impact of climate policy stringency on Log*(LoanAmount)*$_{r,t}$, specifically in cases where the climate policy in the recipient country is more lenient compared to the lending country, following the procedure of Benincasa et al. 2022. Loan-, economic state of affair- and regulation variables are the control variables included in the regression. Column (1) represents the results with country fixed effects, column (2) includes time-fixed effects. Clustered standard errors on country-level are included for both regressions. If there is any regulatory arbitrage effects present, $CCPI_{r,t-1}$ should have significant negative influence on Log$(LoanAmount)_{r,t}$. However, both regressions indicate insignificant coefficient for $CCPI_{r,t-1}$. Hence, the results remain consistent with our original model presented in section 6.2, showing no signs of any regulatory arbitrage opportunities being exploited.

Table 13: Removing recipient countries with higher CCPI than Norway

Dependent variable	(1)	(2)
Log$(LoanAmount)_{r,t}$	$\text{CCPI}_{Recipient}$ <	CCPI_{Lender}
$CCPI_{r,t-1}$	0.030	0.016
	(0.023)	(0.020)
Control variables	✓	✓
Time-fixed effect		✓
Country-fixed effects	✓	✓
Clustered standard errors	✓	✓
Observations	105	105
R-squared	0.167	0.351
Number of CountryID	26	26

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

8 Discussion and Further Work

This section provides a brief discussion of the research questions and presents some considerations for further work.

From our first research question, the identified negative association between the Norwegian Climate Change Performance Index score and foreign lending, suggests that an increase in domestic climate policy stringency trigger a reduction in cross-border credit flow. This has implications for policymakers, as they need to consider the potential trade-offs between stringent climate regulations and the flow of cross-border credit. Moreover, this reflects a trend where Norwegian banks find green economies with strong environmental regulations more attractive for investment, signaling a shift in the global economic landscape. Furthermore, the positive correlation between averaged foreign climate policy stringency and cross-border lending implies that a greater commitment to climate policy in foreign countries increases cross-border lending from Norway.

Our second research question concentrate on the potential to profit on regulatory differences in climate policy between nations. We establish a non-significant relationship between climate policy stringency in recipient country and cross-border lending from Norway. This suggests credit capital flow to be invariant over climate policy stringency, indicating that Norwegian banks do not exploit differences in climate policy stringency to maximize their profits.

These findings collectively suggest no underlying dynamic of regulatory arbitrage in cross-border lending behaviors. The fact that Norwegian banks are more attracted to green economies with strong environmental regulations, signals the growing importance of sustainable investments.

We lay a foundation for further exploration into the dynamics of international lending, climate policy, and regulatory arbitrage. Future researchers could extend this analysis in several directions. Firstly, the relationship between climate policy and international lending could be investigated in more depth, perhaps through a comparative study across multiple countries with varying levels of environmental regulation. This could uncover whether the observed effects are specific to Norway or represent a broader global trend. Further, an in-depth time-series analysis could provide insights into whether the relationships observed are stable over time or subject to fluctuations based on changing economic or political conditions. Moreover, by implementing an instrumental variable for the climate policy index, a causal relationship between the climate policy stringency and cross-border lending can be further investigated. Additionally, the dominant presence of a single Norwegian lending bank, DNB, in the data set may lead to weakened robustness and generalizability, which must be considered in further work. Lastly, the influence of other factors such as political stability, governance quality, or cultural differences on international lending could also be explored to provide a more comprehensive understanding of the complex factors influencing cross-border lending.

9 Concluding Remarks

Domestic Climate policies experience large heterogeneities across countries, which potentially provides opportunities for the capital market to exploit these discrepancies in their pursuit of profit maximization. In this paper, we focus on the Norwegian syndicated market, with the objective of determine whether domestic and international climate policies influence the magnitude of cross-border lending.

We discover that Norwegian climate policies have a negative impact on cross-border lending. In greater details, the results indicate that cross-border lending decreases by 1,1% when the domestic CCPI increases by 1 point. To lessen the concerns about omitted variable bias, we include control variables that affect cross-border lending, such as macroeconomic variables representing the economic state of affair in Norway. To establish that the effect is not driven by a flight home effect caused by the financial crisis, we receive the same results when removing the year 2009 from the regression. Both domestic and international climate policies appear to positively influence lending from the Norwegian capital sector when analyzing the cross-border lending on an aggregated level. The results suggest no evidence of regulatory arbitrage.

Our findings suggest that climate policy in the recipient country does not have a significant effect on the magnitude of the cross-border lending to the respective country. We incorporate control variables that could potentially influence the loan amount, including macroeconomic factors, averaged loan-details and regulatory measures. After evaluating the results with time- and country-fixed effects, as well as clustered standard errors, the results remain consistent. Furthermore, we investigate whether the difference in climate policy between the lending and recipient country may impact loan amount, but the findings maintain their consistency. Finally, we analyze how the stringency of a recipient country's climate policy influences the loan amount it receives, focusing exclusively on the recipient countries with climate policies that are more stringent than those of the lending country. The results continue to indicate no significant correlation between climate policy and loan amount.

Upon conducting a thorough analysis of the Norwegian capital market's engagement in the syndicated loan market, our findings suggest no presence of regulatory arbitrage with regard to the stringency of climate policies, both in the domestic context and in the recipient countries.

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Appendix

Table 14: Hausman test ForeignShare

H_0: RE is preferred H_1: FE is preferred				
Variable	FE	RE	Difference	Std. err.
$\text{CCPI}_{s,t.1}$	-.0113352	-.0112659	-.0000693	.0002512
$\text{AverageCCPI}_{r,t-1}$	.0203711	.0193642	.001007	.0007947
lOil	.0868847	.0787875	.0080971	.0053447
Inflation	-.0090798	-.0084608	-.000619	.0008346
GDPgrowth	-.0091605	-.0062821	-.0028785	.0011717
InterestRate	.0448407	.0437218	.0011189	.0013538
Results:	Chi2 = 7.13		Prob > chi2 = 0.3090	

Table 15: Breusch and Pagan Lagrangian multiplier test for random effects (ForeignShare)

H_0: No random effects present in the model H_1: Random effects present in the model	Number of observations: 205 Number of panels: 35
Results: chi2(1) = 0.00	Prob > chi2 = 1.00

Table 16: Test for heteroskedasticity (ForeignShare)

H_0: No heteroskedasticity in the model H_1: Heteroskedasticity present in the model	Number of observations: 205 Number of panels: 35
Results: chi2(1) = 0.30	Prob > chi2 = 0.5845

Table 17: Serial Correlation test (ForeignShare)

H_0: No serial correlation present	Number of observations: 205
H_1: Serial correlation present in the model	Number of panels: 35
Results: chi2(1) = 29.000	Prob > chi2 = 0.9979

Table 18: $\text{ForeignShare}_{s,t}$ VIF table

Variable	VIF	1/VIF
$\text{AverageCCPI}_{r,t-1}$	9.85	0.101482
InterestRate	4.58	0.218536
lOil	3.50	0.285873
GDPgrowth	3.20	0.312201
Inflation	1.88	0.531325
$\text{CCPI}_{s,t-1}$	1.45	0.690857
Mean VIF	4.08	

Table 19: Hausman test $\text{Log}(LoanAmount)_{r,t}$

H_0: RE is preferred
H_1: FE is preferred

Variable	FE	RE	Difference	Std. err.
$CCPI_{s,t-1}$	.0129279	.0052108	.007717	.0087088
Collateral	.3707826	.3530046	.017778	.0504245
Covenant	-.0990914	.0916689	-.1907603	.0428944
lNoCan	.3213884	.1853196	.1360688	.0718263
lMaturity	-.0668797	-.0415363	-.0253434	.0737348
GDPgrowth	.016534	-.0089011	.0254351	.0136341
Inflation	.0659324	.0461337	.0197987	.0169087
InterestRate	.1128797	.1556435	-.0427638	.0125427
lRegQuality	2.225332	2.814562	-.5892305	2.184932
Chi2 = 27.03		Prob > chi2 = 0.0014		

Table 20: Modified Wald test for heteroskedasticity (LoanAmount)

H_0: No heteroskedasticity in the model	Number of observations: 188
H_1: Heteroskedasticity present in the model	Number of panels: 31
Results: chi2(1) = 199.38	Prob > chi2 = 0.0000

Table 21: Serial Correlation test Log(LoanAmount)$_{r,t}$

H_0: No serial correlation present	Number of observations: 188
H_1: Serial correlation present in the model	Number of panels: 31
Results: F(1, 21) = 0.994	Prob > F = 0.330

Table 22: VIF for categorical CCPI ForeignShare$_{s,t}$

Variable	VIF	1/VIF
GDPgrowth	46.13	0.021679
AverageCCPI$_{r,t-1}$	43.85	0.022804
InterestRate	35.73	0.027987
ClimatePolicy	20.72	0.048254
Renewables	13.90	0.071956
Emissions	10.75	0.093052
lOil	5.49	0.182278
EnergyEfficiency	3.63	0.275855
Inflation	3.48	0.287225
Mean VIF	20.41	

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