

# **Identifying the Institutional, Stakeholder, and Behavioral-Level Drivers and Barriers for Scaling the Green Bond Market**

by

Vasundhara Saravade

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## **Examining Committee Membership**

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

**External Examiner**

**Dr. Jan Mahrt-Smith**

Associate Professor

Joseph L. Rotman School of Management

University of Toronto

**Supervisor(s)**

**Dr. Olaf Weber**

Adjunct Professor

School of Environment, Enterprise, and Development

University of Waterloo

Professor, CIBC Chair in Sustainable Finance

Schulich School of Business

York University

**Dr. Jason Thistlethwaite**

Associate Professor

School of Environment, Enterprise, and Development

University of Waterloo

**Internal Member**

**Dr. Jeffery Wilson**

Assistant Professor

School of Environment, Enterprise, and Development

University of Waterloo

**Internal-External Member**

**Dr. Adam Vitalis**

Associate Professor

School of Accounting and Finance

University of Waterloo

**Other Member**

**Dr. Geoff McCarney**

Assistant Professor, Environment and Development

School of International Development and Global Studies

University of Ottawa

## Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## Statement of Contributions

I, Vasundhara Saravade, am the sole author of Chapters 1 and 5, which were written under the supervision of Dr. Olaf Weber and were not written for publication.

This dissertation consists of three co-authored manuscripts, Chapters 2, 3, and 4, which were written for publication. I am the lead author of those manuscripts and chapters.

Chapter 2 on the impact of regulatory policies on green bond issuances in China was based on a research article published in *Climate Policy* and co-authored with Dr. Xingxing Chen, Dr. Olaf Weber and Dr. Xianzhong Song. Chapter 3 on the growth of drivers and barriers of the Canadian green bond market was based on a research article published (acceptance date: 06-Jan-2024) in *Sustainability Accounting, Management and Policy Journal*<sup>1</sup>, with Dr. Olaf Weber as the co-author. Chapter 4 on the retail investors perception of green bonds was based on an experimental survey done with Dr. Olaf Weber and Dr. Adam Vitalis as co-contributors. I was the lead author for all three research articles with Dr. Olaf Weber, Dr. Xingxing Chen, Dr. Adam Vitalis and Dr. Xianzhong Song as co-authors.

For all the co-authored works, I hereby state, that as the lead author, I was responsible for the conceptualization of research and theoretical framework, methodology design, data collection, formal analysis, manuscript writing and visualization. For Chapter 2 or the article examining the impact of regulatory policies on Chinese green bond issuances (published in *Climate Policy*), my co-author Dr. Chen managed the retrieval of the data (in part due to the language restrictions with Chinese data repositories) and co-contributed to the analysis. My co-authors in other articles undertook a supervisory and support role throughout all the research stages, including providing critical feedback, data validation, methodological guidance, and review of all original and revised drafts. I was the corresponding author for all the articles and was responsible for the submission, revisions, and peer-review responses.

Exceptions to sole authorship of material and their bibliographic details are as follows:

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**Chapter 2.** Saravade, V., Chen, X., Weber, O., & Song, X. (2022) Impact of regulatory policies on green bond issuances in China: policy lessons from a top-down approach, *Climate Policy*, Vol. 23 No. 1, pp. 96-107, DOI: 10.1080/14693062.2022.2064803. Reprinted by permission of Informa UK Limited, trading as Taylor & Taylor & Francis Group, <http://www.tandfonline.com>

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**Chapter 4.** Saravade, V., Weber, O., & Vitalis, A. (2024). To Label or Not? A Discrete Choice Experiment Testing Whether Labelled Green Bonds Matter to Retail Investors.

## Abstract

The green bond market is one of the most public faces of sustainable finance around the world. Not only has it had an inter-, multi-, and transdisciplinary level of impact on how financial markets operate and addressing climate-related opportunities and challenges, but it has also instilled a sense of hope among stakeholders when it comes to climate action. However, with a growth of this market at an exponential rate, the reality of how stakeholders are adapting and rising to various challenges related to market development and scale are still under examined within the current academic literature. Using a multi-theoretical lens of institutional, stakeholder and behavioral theories, this dissertation addresses these literature gaps by evaluating the linkages between the “how”, “what” and “why” of green bond market growth. To do so, it employs a mix of methodological approaches and research designs. This dissertation undertakes a quasi-event-study approach and uses a difference-in-difference (DID) design to understand the direct impact of various green bond policies on the growth of this market – namely the “how” of market scale-up. To pinpoint “what” various market factors for scale-up are, this dissertation uses a concurrent mixed-methodological research design by triangulating various stakeholder or legitimacy-linked drivers and barriers of this market, using an expert-based survey as well as semi-structured interviews. To identify the motivations behind “why” this market is so highly in demand, this dissertation uses a discrete choice experimental survey among retail investors. By employing paired samples t-tests of differences and multivariate analysis of variance, this stage focuses on the influence of green bond framing effects as well as the mediating effects of behavioral norms and personal traits on investor preferences for green bonds. The results find that green bond markets are a complex ecosystem where a confluence of stakeholder engagement and policy approaches are required to effectively target current and future market growth. Furthermore, these approaches should be context specific in nature and tailored to the type of institution or country-level dynamics that already exist. Our results are also novel in its finding of the

behavioral level biases and drivers in green bond investment decision-making and hence create a new theoretical framework by which we need to examine this market as well as other sustainable finance products. The main contribution of this work comes in the form of identifying the institutional, stakeholder, and behavioral-level drivers and barriers for scaling green bonds. More specifically, the growth of this market depends on the use of context-specific institutional coercive pressures and top-down policy approaches, fostering bottom-up market growth through stakeholder salience and legitimacy as well tapping into the individual level behavioral biases and heuristics in decision-making. The dissertation directly contributes to the fast-emerging body of academic literature on this market as well as provides a new institutional-, stakeholder- and behavioral-based theoretical framework by which to assess the impact of green bonds on a global scale.



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## Table of Contents

<b>Examining Committee Membership</b> .....	<b>ii</b>
<b>Author’s Declaration</b> .....	<b>iv</b>
<b>Statement of Contributions</b> .....	<b>v</b>
<b>Abstract</b> .....	<b>vii</b>
<b>Acknowledgments</b> .....	<b>ix</b>
<b>Dedication</b> .....	<b>xii</b>
<b>List of Figures</b> .....	<b>xvi</b>
<b>List of Tables</b> .....	<b>xvii</b>
<b>List of Abbreviations</b> .....	<b>xviii</b>
<b>Chapter 1: Introduction</b> .....	<b>1</b>
1.1. Research Background and Rationale .....	1
1.2. Green Bonds: Governance Challenges.....	4
1.3. Green Bonds and Climate Finance: An Overview and Research Rationale .....	5
1.4. Research Gaps in the Green Bond Market.....	8
1.5. Research Objective and Questions.....	10
1.6. Organization of the Dissertation and Sub-Research Questions .....	11
1.7. Contribution to Theory and Knowledge .....	15
<b>Chapter 2: Impact of regulatory policies on green bond issuances in China: policy lessons from a top-down approach</b> .....	<b>18</b>
2.1. Introduction .....	19
2.2. Green Bond Policies in China .....	21
2.2.1. Literature on Institutional Support for Green Bonds .....	24
2.3. Methods and Sample .....	25
2.4. Results .....	27
2.4.1. Descriptive Results .....	27
2.4.2. Difference-in-Difference Tests .....	27
2.4.3. Impact of regulations on issuances of different types of issuers.....	31
2.4.4. Impact of regulations on corporate green bonds .....	33
2.5. Discussion and Policy Recommendations .....	34
2.6. Conclusion.....	36
<b>Chapter 3: Catalyzing the growth of green bonds: A closer look at the drivers and barriers of the Canadian green bond market</b> .....	<b>39</b>

3.1. Introduction .....	40
3.2. Accounting-Related Drivers and Barriers for Green Bonds .....	44
3.2.1. Stakeholder Perspectives in the Green Bond Market.....	45
3.2.2. Transition-related Legitimacy in the Market .....	47
3.3. Methods.....	49
3.4. Results .....	54
3.4.1. Quantitative Results .....	54
3.4.2. Qualitative Results .....	58
3.4.3. Triangulation of results .....	62
3.5. Discussion .....	64
3.5.1. Analysis of the Market Barriers.....	64
3.5.2. Analysis of the Market Drivers .....	66
3.5.3. Policy Recommendations.....	68
3.6. Conclusion.....	69
<b>Chapter 4: To Label or Not? A Discrete Choice Experiment Testing Whether Labelled Green Bonds Matter to Retail Investors.....</b>	<b>71</b>
4.1. Introduction.....	72
4.2. Theory and Research Questions.....	77
4.2.1. Unique Framing Effects of Green Bonds.....	77
4.2.2. Behavioral Norms and Personal Traits in Socially Responsible Investment Decision-Making.....	79
4.2.3. Research Objectives and Questions .....	81
4.3. Methodology .....	84
4.3.1. Experimental Design.....	84
4.3.2. Experimental Task .....	86
4.3.3. Implementation .....	90
4.3.4. Data Characteristics and Missing Value Analysis. ....	91
4.3.5. Analytical Approach .....	92
4.3.6. Measuring Behavioral Norms .....	95
4.3.7. Personal Experience Questionnaire (PEQ) Section .....	97
4.3.8. Data Cleaning and Addressing Missing Values.....	99
4.3.9. Addressing Multivariate Assumption Violations.....	101
4.3.10. Models.....	103

4.4. Findings.....	108
4.4.1. Respondent characteristics.....	108
4.4.2. Research Question 1.....	115
4.4.3. Research Question 2.....	121
4.4.4. Research Question 3.....	137
4.5. Discussion .....	146
4.6. Conclusion.....	149
<b>Chapter 5: Conclusion .....</b>	<b>151</b>
5.1. Contributions to Theory .....	154
5.2. Key Practical and Knowledge Contributions of the Research .....	156
5.3. Limitations .....	158
5.4. Future Research Directions .....	159
<b>References .....</b>	<b>161</b>
<b>Appendices .....</b>	<b>173</b>
Appendix A .....	173
Appendix B .....	176

## List of Figures

Figure 2.1: Increase of green bond issuances (Author’s construction).....	27
Figure 2.2: Yearly comparison of the issue amount of green bonds and non-green bonds ....	30
Figure 3.1: Triangulation Approach for Understanding Barriers and Drivers of the Canadian Green Bond Market (Authors’ Construction).....	51
Figure 3.2: Survey Response Drivers and Barriers of the Canadian Green Bond Market (Authors’ Construction).....	55
Figure 3.3: Overview of Key Factors Affecting the Canadian Green Bond Market (Authors’ Construction).....	56
Figure 3.4: Motivations for Involvement in the Canadian Green Bond Market (Authors’ Construction).....	57
Figure 3.5: Triangulation Results (Authors’ Construction).....	59
Figure 4.1: Predictive validity framework for retail investor’s labelled green bond preferences (Source: Author’s construction) .....	83
Figure 4.2: Mean investment across bonds and bond types (Authors’ Construction) .....	118
Figure 4.3: Estimated marginal means of Bonds D, E and F based on the interaction effect of the above average enhanced benefits perception for Bond E with the below average perception for Bond F. ....	126
Figure 4.4: Estimated marginal means of Bonds G, H and I based on the interaction effect of the equals expectation performance of Bond G’s reporting with the exceeds expectations’ perception of Bond H’s reporting. ....	132



## List of Tables

Table 2.1: Green bond policies and their subsequent regulators in Mainland China .....	23
Table 2.2. Test of impact of green bond policies on green bond issuance in mainland China	29
Table 2.3: The impact of green bond policies on the size of green bonds .....	31
Table 2.4: Regression for issuer type.....	32
Table 2.5: Regression results of CSRC guidelines .....	33
Table 4.1: Unique bond framing wording and bond descriptions across all three scenarios..	86
Table 4.2: Independent and dependent variables implemented in our survey. ....	92
Table 4.3: Steps taken to address data cleaning and missing values. ....	99
Table 4.4: Summary statistics .....	109
Table 4.5: Paired Samples T-Test Results Across Scenarios and Bond Types .....	118
Table 4.6: MANOVA results for environmental benefits perception.....	124
Table 4.7: MANOVA Results for disclosure reporting performance.....	135
Table 4.8: MANOVA Results for Predictive Personal Traits.....	137
Table 4.9: Common Highly Significant Parametric and Non-Parametric Test Results for Baseline and Hybrid Green Bonds.....	141

## **List of Abbreviations**

CAD: Canadian Dollar

CBI: Climate Bonds Initiative

CDP: Climate Disclosure Project

CDSB: Climate Disclosure Standards Board

CSRC: China Securities and Regulatory Commission

ESG: Environmental, Social and Governance

ETF: Exchange Traded Funds

GBP: Green Bonds Principles

GRI: Global Reporting Initiative

IPCC: Intergovernmental Panel on Climate Change

ICMA: International Capital Markets Association

IIRC: International Integrated Reporting Council

LCR: Low-Carbon Climate-Resilient

MF: Mutual Funds

MANOVA: Multivariate Analysis of Variance

NDRC: National Development and Reform Commission

NGFS: Network for Greening the Financial System

OSFI: Office of the Superintendent of Financial Institutions

PBC: People's Bank of China

SDG: Sustainable Development Goals

SASB: Sustainability Accounting Standards Board

TCFD: Task Force on Climate-related Financial Disclosures

USD: United States Dollar

USA: United States of America

UN: United Nations

UNFCCC: United Nations Framework Convention on Climate Change

# Chapter 1

## Introduction

### 1.1. Research Background and Rationale

If current growth patterns are maintained, we will be living in a “hot house world”, where climate policies are implemented in only a few jurisdictions and global efforts to halt significant global warming are insufficient (NGFS, 2024). This would entail exceeding critical temperature thresholds and leading to severe physical risks and irreversible climate impacts like sea-level rise (NGFS, 2024) – creating millions if not billions of vulnerable people across the world. To maintain our current “orderly” world, there is a need to implement early climate policies and redistribute large volumes of financial capital in time. However, this requires a major shift in our financial valuations and an overhaul of business-as-usual across both public and private sectors. Achieving this scale of transformation to avoid the “hot house world” scenario requires a multi-, inter-, and transdisciplinary level of global collaboration among key stakeholders like policymakers, scientists, businesses, financial industry, and civil society actors that has never been seen before.

To effectively do so, the first step is to understand the physical<sup>2</sup> and transition risks<sup>3</sup> we face when it comes to climate change and identify ways to mitigate them. One way to address such risks has been through shifting financial capital into low carbon and climate resilient (LCR) projects, assets, and activities. The reclassification or transition of financial

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<sup>2</sup> Physical risks are defined as the environmental events (acute risks like extreme weather severity found in cyclones, hurricanes, or floods) or the longer-term shifts (chronic risks like higher temperatures or sea-level rise and chronic heat waves) in climate patterns and its impact on the world. They can have large-scale and direct impacts on socio-economic aspects like food security or employee safety as well as disrupt global supply chains.

<sup>3</sup> Transition risks are those that affect the ability to transition to a low-carbon economy. These risks can comprise of extensive policy, legal, technology and market changes to address the climate mitigation and adaptation requirements related to climate change. Depending on the nature, speed and focus of these changes, the transition risks can pose a varying level of financial and reputational risk to the economy and organizations or market actors (TCFD, 2017).

capital towards a more LCR economy is broadly called sustainable finance. This setting presents the perfect opportunity to study how a large-scale transition can effectively occur if there is sustained collaboration among various levels and scales of stakeholders, most of whom seem to be driven by a motivation to address climate risks as well as tap into new growth opportunities. Such climate risks and opportunities are also shifting risk perceptions and behavior within the global financial sector in ways that challenge existing paradigms about finance and its governance (Thistlethwaite, 2014). The urgency for reaching low-carbon growth within this decade (IPCC, 2019) has now created this need to leverage the growth of sustainable finance in a manner that not only shifts traditional financial capital towards decarbonization of the global economy, but also requires a trans-disciplinary type of collaboration among its stakeholders.

However, sustainable finance is an umbrella term that comprises of various market segments, including environmental, economic, social, and governance-related, as well as encompass various types of sustainability objectives. Furthermore, each of these market segments are made up of various mix of intermediaries and sources of finance (such as public and private sources) as well as instruments (such as debt, equity, or project finance among others) that are then used to deploy the capital into relevant projects, assets, and activities. One of the most well-known and fastest growing sustainable finance market segments is that of climate finance, and more particularly the green bond market – both of which focus on climate change mitigation and adaptation. Even though there is a big emphasis on addressing global warming and climate change impacts through climate finance flows, a big financial gap remains in terms of the capital redirection needed to achieve this outcome.

According to the Climate Policy Initiative’s Global Landscape of Climate Finance report (2023), public and private flows for climate-related finance were approximately USD 1.265 trillion in 2021-2022. To put this number in context, the global spending on fossil fuel subsidies in 2022 was USD 7 trillion (Buchner, Naran, Padmanabhi, Stout, Strinati, Wignarajah, Miao, Connolly & Marini, 2023) – almost six times the amount spent on climate action in the same year. Given that the annual global climate finance needs are upwards of

USD 8.6 trillion until 2030, the current climate finance flows fall drastically short of this target. However, a big driver of growth within sustainable finance and climate finance markets has always been green bonds. Green bonds have grown exponentially over the last decade, with cumulative financial flows reaching USD 2.2 trillion and dominating the global capital flows in terms of the sustainable finance debt instruments category (Climate Bonds Initiative, 2022). This signals the big potential that the green bond market has on effectively bringing in more mainstream capital into sustainable finance.

To avoid the “hot house world” scenario, there is a need to address how sustainable finance instruments, like the green bond, can be tapped more effectively into shifting the flows of capital towards LCR alternatives. However, even though green bonds are a big driver of climate-related sustainable finance, there is still a big gap when it comes to financing of the LCR economic transition at the country and regional-level. To fill the global gap of USD 8.6 trillion per year, it signals a stark need for market interventions in the form of various strategies and policy tools needed to achieve this outcome over the next five years. This dissertation argues that the green bond market is a key setting for examining the various types of stakeholder-linked interventions as well as policy and behavioral-linked tools that might be useful in creating the necessary shift in incentives. Given its potential to attract financial capital and capture the attention of mainstream financial actors globally, it provides a type of a ‘sandbox’ setting when it comes to understanding what works within sustainable finance, and what might not. However, before identifying the strategies and policies that might have a positive effect, it imperative to understand and evaluate the key governance challenges that currently restrict the market’s ability to grow or become more mainstream in nature.

Based on a review of literature, the following sub-sections showcase the ongoing governance challenges as well as highlight the research rationale for this dissertation to examine the various key aspects of growth within the green bond market.

## 1.2. Green Bonds: Governance Challenges

Governance in the green bond market not only plays an important role in guiding the smooth transition towards a LCR economy, but also helps ensure common objectives that can further align strategies of governments, financial institutions, and corporations (Thistlethwaite, 2014). However, due to the nature of an evolving governance structure within the green bond market, several challenges are emerging, such as the potential for greenwashing or the lack of identifiable additionality (especially environmental impact-related) of green bonds (Monahan, Zvan, Saravade, Stewart & Dafoe, 2020). This has led to a behavior-action gap among the financial sector players and delayed the involvement of mainstream financial actors on a larger scale (Saravade & Weber, 2020).

To further understand why this behavior-action gap exists, it is important to pinpoint the various drivers and barriers of market growth. For instance, in certain contexts and institutional settings where top-down regulatory approaches are successful, this market has grown exponentially over the last few years. This raises our first research question: “how” can effective regulations or policymaking in a specific institutional setting help drive further growth of green bonds. The next research and governance-related gap emerges with the need to understand the types of barriers and drivers that are affecting market growth. Currently, there is not enough research that analyzes these factors at the country-level green bond markets, and much less using a stakeholder and legitimacy-focused lens. This raises our second research question: “what” are the various drivers and barriers that affect a green bond market and how are they linked to its stakeholders and their perception of market legitimacy. Finally, understanding the motivations behind “why” this market is so popular among investors can help us understand another aspect of “what” drives stakeholder participation and “how” its stakeholders can further leverage this unique motivation to help bridge the climate financing gap.

Given that there is an investor-driven push to establish governance trust mechanisms like green labelling, third-party certifications, and regulatory oversight (Ameli et al., 2019), it has already hinted to the existing behavioral biases and risk perceptions of various market

players (Monahan et al., 2020). For instance, emerging corporate social responsibility (CSR) disclosure trends are making investors savvier to sustainable finance lexicon, including how climate-related financial disclosures of impacts get framed and what criteria is used to support the labelling of these products (Martin & Moser, 2016; Johnson, Theis, Vitalis & Young, 2020). In addition, climate risks are making investors and issuers more likely to reduce their portfolio exposure to stranded assets and increase exposure to resilience- and mitigation-linked sustainable finance products like green bonds. Such risk and behavior-related shifts are not just linked to green bonds but can also be seen with various other financial products like green loans or green equity – which underscores a major challenge faced by decision-makers on whether to invest, issue or even regulate such sustainable finance products that help contribute towards rapid growth of sustainable finance markets.

Hence, this thesis looks to address the three problems involved in the governance and scale-up of the green bond market, namely, the institutional and regulatory forces that help drive market growth more directly; the organic and country-level drivers and barriers that engage and inhibit the participation of key market stakeholders to invest, issue or rate green bonds in this market; and finally, the individual-level behavioral biases and framing effects of this market and its potential to encourage action-oriented investing.

### 1.3. Green Bonds and Climate Finance: An Overview and Research

#### Rationale

When it comes to documenting recent climate finance flows, Buchner *et al* (2023) show that public financing was slightly higher (USD 640 billion compared to USD 625 billion annual average of private flows) and mostly driven by governments, state-owned enterprises, and national development finance institutions (USD 448.3 billion or 70.05%). On a geographic scale, 84% of climate finance flows in 2021-22 came from China and from developed markets like the United States of America (US), Canada, and Western Europe (Buchner et al., 2023). More importantly, China was the largest country-level mobilizer of climate finance flows and contributed to almost 51% of all global domestic flows (Buchner et al., 2023). A big driver of

the Chinese success story has been its top-down regulatory approach in stimulating green finance and redirecting investment at an early stage into its LCR economy (Weber, 2017). Based on the key role of public institutions and the power of the Chinese top-down approach, it begs the question of how institutional settings and regulatory policies can be more helpful in scaling the growth of sustainable finance more effectively, especially given the big financing challenges that inhibit our ability to transition in time. This thesis further explores this question (in Chapter 2) in the case of the Chinese green bond market where regulatory policies have been at the forefront of scaling country-level sustainable finance markets and can help provide some contextual lessons for policy development in other countries as well.

On the other hand, Buchner *et al.*, (2023) also found that private actors (located in predominantly developed countries) contributed to almost 49% of total climate finance flows in 2021-22. Hence, sustainable finance stakeholders in countries like Canada and US are a key point of interest when it comes to redirecting the flows of global financial capital. For instance, North American private stakeholders like institutional investors or even those within the corporate sector, tend to hold a vast amount of capital at their disposal. In contrast to public stakeholders (like policymakers or regulators), who tend to prioritize the flow of public capital to fit within national investment priorities, private actors are less likely to base the investment of capital on political agendas. Hence, it begs an important question of what the role of private sector actors is (such as institutional investors and corporations based in developed economies) on helping scale climate finance more effectively. In contrast to the Chinese system of top-down governance, the North American system is rather linked to bottom-up market facilitation (Larsen, 2023). It is important to understand the dynamics at play for the bottom-up market growth because it allows us to adapt the findings across more countries and regions (like the European Union and others), which are more likely to work on social or mimetic-level institutional pressures rather than the coercive ones found in the top-down approach.

A big driver in such settings has also been extensive stakeholder engagement and stakeholder pressures that have enabled the necessary market conditions required to successfully scale a market (Deschryver and de Mariz, 2020; Ameli *et al.*, 2020). The green



bond market is a useful setting to analyze the key role of stakeholders, based on its fast-growing and ever-evolving market architecture. The literature highlights the role of stakeholders in this market as contributing to the growth of accountability mechanisms – including voluntary environmental disclosures, second opinion on issuers’ green bond frameworks, and even key performance metrics to track environmental impact of bonds (Saravade *et al.*, 2021; Saravade and Weber, 2020; de Sousa and Moredo Santos, 2022; Deschryver and de Mariz, 2020). However, no study has focused on a country-level case study to understand how this influences market actors on-the-ground, and especially given the context of a low-carbon transition setting. This raises the next question about how to tap into effective stakeholder engagement in a manner than helps scale green bonds without the need for a top-down strategy. This thesis explores this query in Chapter 3, in the North American context, and builds a case study around the Canadian green bond market, where sustainable finance has a ‘bottom-up’ origin rather than a top-down approach.

According to Buchner *et al.* (2023), another big indicator of exponential growth in private climate flow (2021-22) has been growth in household spending (31% of all private finance) on electric vehicle (EV) sales. Given that individual awareness about climate impacts and the subsequent worldview shift towards pro-climate action has really expanded in the last decade (Sullivan & White, 2019; Sparkman, Geiger & Weber, 2022), it is not surprising to see the sudden boom in individual-level interest and household spending in this arena. When looking at the make-up of the global financial sector, we also see that individual or retail-level financial investors account for almost 52% of global assets under management in 2021 and are poised to grow to almost 61% by 2030<sup>4</sup>. This not only signals the huge implications of expanding access of green bonds at the retail or individual level, but it also provides a window into why financial decisions are made towards green or sustainable finance investment.

Although there is a narrow strand of sustainable finance literature that examines the retail investor perspective and traits when it comes to socially responsible investing (Dreyer,

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<sup>4</sup> For more information, see here: <https://www.weforum.org/agenda/2022/10/a-fresh-look-at-how-to-empower-retail-investors/>

Sharma & Smith, 2023; Díaz-Caro, Crespo-Cebada, Goenechea, Mirón Sanguino, 2023; Andrews, Delton & Kline, 2018; Diouf, Hebb & Touré, 2016), no study has connected this to the green bond market or to the individual level behavioral norms and heuristics that drive climate finance decision-making. This research gap that incorporates a more holistic understanding of individual level behavioral constructs as it relates to the green bond market, is a key motivator for this dissertation to examine the retail investor setting and its potential to help in scaling up this market. Furthermore, the question is also raised on the type or personal traits of a retail investor that would prefer such an investment, especially if they had the ability to access this market. This dissertation explores this query and research gap in Chapter 4, where a hypothetical discrete choice experiment is undertaken to document the interest, behavioral norms, and personal traits of a retail investor in the green bond market setting.

The following section examines the green bond literature-linked research gaps that are then further explored in this thesis and engaged with as policy recommendations related to Chapters 2 to 4.

## 1.4. Research Gaps in the Green Bond Market

Although there has been a range of literature that looks at the top-down impact of a regulatory policy to help financial markets grow and expedite the adoption of new products (Dikau & Volz, 2018; Yao & Zadek, 2017; Weber, 2017; Zhang, 2020; Cui, Geobey, Weber, & Lin, 2018), none have focused on applying this to the context of the green bond market. Similarly, several studies (Monasterolo & Raberto, 2018; Azhgaliyeva & Liddle, 2020; Park, 2018) have also focused on documenting the role of institutional support for growing the green bond market. However, none have examined the direct impact of coercive institutional pressure on the green bond market. Hence, the first research gap emerges on understanding the direct impact of green bond regulations on the growth of the green bond market. Chapter 2 addresses this gap and focuses on the context of the Chinese green bond market. For a more detailed overview of how the market developed in contrast to the rest of the world and any major events (like the introduction of Green Bond Principles), please refer to Chen, Weber & Saravade (2022).

When it comes to evaluating the growth of this market in a more bottom-up setting, especially where country-level dynamics are in play, the extant literature focuses on identifying barriers more than drivers (Deschryver and de Mariz, 2020; Zadek, 2019; Cheung *et al.*, 2022; Mustaffa *et al.*, 2021). Although certain market drivers like ‘greenium’ have been examined more prominently in the literature (Agliardi and Agliardi, 2021; Duarte, 2021; Karpf & Mandel, 2018; Henide, 2022; Hyun, Park & Tian, 2021; Gianfrante & Peri, 2019), there is still no research that identifies barriers and drivers of this market at the country-level. Furthermore, in the context of a developed economy like Canada, where the legitimacy of green bonds and sustainable finance faces some push back due to the nature of its resource-intensive and fossil fuel focused economy, the research on the role of green bonds in addressing the low-carbon transition agenda is missing. This is where the second research gap emerges, in terms of understanding the drivers and barriers for facilitating the bottom-up growth in the green bond market, especially in a setting where the country-level dynamics might not be in favour of this market’s scalability. Chapter 3 addresses this gap and uses the Canadian green bond market to explain the role of stakeholder and legitimacy-linked drivers and barriers in contributing to the bottom-up facilitation of this market.

Finally, the broader green bond literature is relatively silent on the behaviour-action<sup>5</sup> gap that occurs when trying to scale this market. To better understand this gap, there is a need to identify the individual level norms and heuristics that are driving green bond investing. Although several studies have examined the role of norms related to socially responsible investing among retail or individual level investors (Azad, Devi & Mishra, 2024; Dreyer, Sharma & Smith, 2023; Diouf, Hebb & Touré, 2016; Bassen, Gödker, Lüdeke-Freund & Oll, 2019), only Azad, Devi & Mishra (2024) have identified the role of norms like investment attitude in influencing retail level green bond investing. However, no study has identified the role of both behavioral norms and personal traits when it comes to preferences for green bonds. Furthermore, the role of framing effects in this market (based on its unique label and

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<sup>5</sup> For instance, the behaviour-action gap is seen with the lack of appropriate or significant levels of financial support for this market by several institutional investors and other mainstream actors, who have made public climate commitments.

disclosures) and its behavioral influence on the investor is also missing in the literature. This is where a research gap emerges, as it shows the lack of understanding of individual characteristics as well as behavioral level norms and heuristics that may be driving green bond investing. Chapter 4 addresses this gap by using a hypothetical and an experimental context of retail investors, and then proceeding to identify their behavioral norms and personal trait-based drivers and barriers for investing in green bonds.

## 1.5. Research Objective and Questions

Based on the highlighted literature and governance gaps, our research objective is three-fold, executed through studies covered in the three chapters. Firstly, it aims to understand *how* a top-down regulatory-driven approach of green bond policies from major financial regulators can have a direct and positive impact on the growth of this market. This allows us to document the nature of the green bond market as well as address broader literature gaps on whether a top-down regulatory approach can be useful for reducing market transaction costs and allow for market growth. From a theoretical perspective, it allows us to identify how coercive institutional pressures and isomorphic drivers are successful in scaling this market.

The second objective is to understand *what* the motivations and concerns are of various green bond market stakeholders, especially in a more organically developed setting (without the use of mandatory regulations) in affecting this market's growth. In looking at the comparative approaches for market interventions (i.e., top-down, and bottom-up market growth), this dissertation highlights how a one-size-fits-all approach may not be useful when scaling a green bond market at the country level. By doing so, it allows for the interconnection of theoretical concepts like green bond market stakeholders and institutions with theoretical constructs like stakeholder salience or legitimacy and institutional isomorphism, respectively.

The third objective is to document the behavior-level biases and heuristics as well as individual level traits in influencing green bond investment decision-making. By doing so, it

allows us to answer *why* green bonds are so popular among sustainable finance investors, and further contribute to the behavioral finance literature on the types of biases and norms in play in this market as well as address the potential of individual retail investors in scaling this market effectively. From a theoretical perspective, the findings have important implications for identifying how green bond framing effects are influential in decision-making and whether individual-level traits and norms matter when it comes to their green bond investments. To address the objectives, the dissertation asks the following main research questions:

**RQ [1]: How do specific green bond regulatory policies have an impact on the issuances of green bonds in China?**

**RQ [2]: What is the stakeholder-and legitimacy-linked drivers and barriers of the green bond market in Canada?**

**RQ [3]: Does the green bond label influence the investment choices of a retail investor? And what are the behavioral norms and personal traits of a green bond retail investor?**

## 1.6. Organization of the Dissertation and Sub-Research Questions

This dissertation is organized on the manuscript-based format, composed of three manuscripts. Chapter 1 and 5 are the introduction and conclusion chapters respectively, which highlight the summary and key conclusions of the dissertation. Chapters 2, 3 and 4 present the three manuscripts that address the dissertation's overarching research objective and questions. Section 1.7 describes the interconnections of the three manuscripts and the contributions of this dissertation to various theories. A summary of the five chapters is provided below.

**Chapter 1** introduces the dissertation and provides a brief overview of the sustainable finance landscape, with a focus on the climate finance and green bond markets. It provides the context and motivation for undertaking this research and highlights why the green bond market is the perfect setting to examine the interaction of various stakeholders, impact of

policymaking and individual level perceptions on sustainable finance. It then defines the dissertation's overall research objective, questions, and scope. The chapter also outlines how the operationalization of this research through various stages and research methods. This chapter provides the basis for looking at the three pillars of green bond market growth – namely, role of public actors like regulators and governments, role of market stakeholders like issuers, investors, and rating agencies, as well as role of individuals. This chapter serves as a standalone overview and summary of the research presented in Chapters 2 to 4 of this dissertation.

**Chapter 2** is aligned with the first research objective and question and uses a quasi-event study approach that looks at the effects of specific green bond-focused regulations on the monetary value of Mainland China's green bond issuances before and after its introduction. To do this, it looks at total bonds issuance (except government bonds) by Chinese institutions from 2012 to 2019 (to keep a balance in the sample period before and after the first green bond policy release in 2015). Using a difference-in-difference (DID) model, the study finds a direct and positive influence of green bond regulatory policy on the Chinese green bond market. The secondary research question for this study is to identify whether the policy issuance had a significant positive impact on specific issuer characteristics like industry, sector, and ownership of these green bond issuers. To do this, the paper uses the 2019 Green Industry Guidance Catalogue to classify the issuer sample into those that fell into the green versus non-green industries, as well as grouped them based on ownership (state-owned or government owned versus private owned issuers) and sector categories (financial versus non-financial issuers). The DID model examining the issuer characteristics found that ownership type (government-owned), industry type (green industry), and sector type (financial issuer) have a stronger significant reaction to policy announcements and subsequently led to the issuance of more green bonds. This chapter demonstrates the importance of government and regulatory policy and its impact on the development of the green bond market, especially in the case of China. Even though this is a unique institutional

context, policy lessons are transferrable to other countries and regulators when it comes to issuances of green bond policies.

**Chapter 3** looks at the bottom-up growth of this market in the Canadian context to understand the various stakeholder- and legitimacy-linked drivers and barriers of green bonds. Using a concurrent mixed methodological approach, it undertakes online surveys and semi-structured interviews with critical Canadian green bond market stakeholders. The findings suggest that the most significant stakeholder-related driver for Canadian green bonds is their reputational benefit, or the ability to meet the high demand for sustainable finance and the marketing potential of its green credentials. The major market barriers are legitimacy-linked and include transactional costs such as additional tracking required for reporting purposes, lack of market liquidity and proving environmental impact or additionality. Another key finding is that Canadian green bonds are more likely to be evaluated on their green impact than their global market peers. This chapter presents an accounting based conceptual framework that has identified several stakeholder- and legitimacy-linked drivers and barriers that affect financial decision-making regarding a green bond market. It is also one of the first papers to provide a case study of the Canadian market for the academic literature on green bonds. This chapter demonstrates the importance of market-linked drivers and barriers for the bottom-up development of a country-level green bond market. Even though it highlights the Canadian green bond context, the conceptual framework connects stakeholder theory concepts (of normative and instrumental approaches in stakeholder disclosure reporting) as well as legitimacy theory concepts (presentation and action-centric legitimacy) to drivers and barriers based in the green bond market, thereby providing key policy lessons for other country-level markets.

**Chapter 4** is based on the notion that retail investor participation (or individual level involvement) in this market can help to fill the sustainable finance gap, by helping drive more capital into this market. To study the potential interest of retail investors, the paper uses a quantitative discrete choice experimental survey to understand how 1105 Amazon Mechanical Turk workers (who also self-identify as retail investors) invest across three

different scenarios, where they are offered a choice between a baseline labelled green bond, a hybrid green bond, and a non-green bond – with both the green bonds having disincentivizing financial returns compared to the non-green bond. This study’s research scope was to examine whether a green bond label matters to retail investors and if so, whether this is based on their behavioral norms like pro-environmental personal norm preferences or strong injunctive norms related to disclosure reporting. It also goes further along and measures whether personal traits have a mediating effect on identifying potential retail green bond investors. By undertaking paired-sample t-test of differences for evaluating differences in the investment amounts across each bond and the three types, the study finds significant influence of the ‘green label effect’ on the overall investment preferences of retail investors. For identifying whether behavioral norms matter in influencing their investment choices, a multivariate regression model is used and finds that appropriate activation of behavioral norms can in fact lead to higher preference for enhanced performance green bonds, even if it is antithetical to retail investor’s economic interests. However, most retail investors cannot distinguish between the performance-framing green bonds and hence tend to invest based on anchoring heuristics and Systems 1 thinking, rather than on framing effects. To further identify personal traits among green bond investors, the study uses multivariate regression model and finds that those having a *higher risk tolerance* (individual for baseline green bonds and institutional risk for hybrid green bonds), a great deal of *investment experience with bonds*, and a little to a high amount of *experience with term deposits* (for hybrid green bonds only) – can predict higher investment into green bonds. Alternatively, we find that those having a higher *individual risk tolerance* (for hybrid green bonds), a *shorter-term horizon*, *low education levels* (not finishing high school education), *not consulting financial experts* as a source of knowledge, or a *lot of experience with stocks, mutual funds*, or a *little to moderate experience with term deposits* (for baseline green bonds only)– will be less likely to prefer green bonds. By contributing to the literature on behavioral finance as well as retail investor perception on this market, this study provides practical and policy recommendations for future market growth through the retail investor market segment.



## 1.7. Contribution to Theory and Knowledge

While each of the three manuscripts aims to answer a set of pre-defined questions, the entire dissertation aims to contribute to the literature on green bonds, top-down regulatory policy impact, stakeholder engagement and legitimacy theory as well as behavioral finance theories and constructs. Although the first manuscript does not directly touch upon theory, it focuses on the top-down regulatory approach found in this market and its effectiveness in helping it scale using coercive institutional pressures. Institutional theory is the more appropriate theory to explain why this is successful within the green bond market context, and the unique institutional setting of China is a good example to exhibit coercive institutional pressures at work. The manuscript provides key policy and academic insights on how to effectively drive issuances among green bonds using a regulation-driven approach. The contribution of this paper is based on its documentation of the direct effect of regulation on the growth of green bonds in China. Furthermore, the conclusion section of this dissertation further ties in the contribution of this research in context of all three manuscripts.

The second manuscript's contribution to theory comes in the form of its identification of stakeholder and legitimacy theoretical constructs as they relate to the green bond market drivers and barriers, especially in a more organically developed market like Canada. By introducing its unique accounting-based conceptual framework, it contributes to the mixed methods literature on how data triangulation processes work when analyzing qualitative and quantitative data from a small but highly expert-based stakeholder group related to this market. The findings from this study contribute to the vast green bond academic literature by identifying country market-level drivers and barriers – a contribution that is still relatively unique to the literature on the green bond market. At the time of publication, only a handful of studies (Saravade & Weber, 2020; Taghizadeh-Hesary, Zakari, Alvarado, & Tawiah, 2022) had undertaken a case study approach for understanding domestic market factors in building a sustainable finance market from the bottom-up. However, building on the first case study of the Canadian green bond market, this research's contribution to literature is also further strengthened by the introduction of the transition taxonomy concept in relation to

the green bond market – as this concept is still evolving and has not yet been engaged with by the broader scholarship on sustainable finance.

The third manuscript’s contribution to behavioral finance theory and green bond literature comes from its unique setting of a retail investor perception of this market. Based on the author’s knowledge, no other study has looked at connecting the green bond market to the framing effects found in its unique label. Furthermore, no other study has looked at introducing the retail investor perspective on this market or connected it with behavioral norms (like pro-environmental personal norms or injunctive reporting norms) and personal traits at the individual level. By doing so, this paper provides novel contributions to behavioral finance theory and connects constructs like Systems 1 thinking and anchoring heuristics with the natural framing effects and settings found in a green bond market (i.e., through its labelling, environmental benefits and reporting disclosures). Furthermore, the unique study design of our discrete choice experiment that combines experimental settings with personal characteristics questionnaire, is a methodological contribution to the literature on discrete choice experimental surveys as well. To our knowledge, this is the first-of-its-kind study that has an experimental methodological contribution, a theoretical contribution to the framing effects found in the green bond market and a practical contribution to highlighting the potential market for retail-level green bonds.

Using a multi-theoretical lens of institutional, stakeholder and behavioral theories, this dissertation addresses the literature gaps by evaluating the linkages between the “how”, “what” and “why” of green bond market growth. The main contribution of this work comes in the form of identifying the institutional, stakeholder, and behavioral-level drivers and barriers for scaling green bonds. More specifically, the growth of this market depends on the use of context-specific institutional coercive pressures and top-down policy approaches, fostering bottom-up market growth through stakeholder salience and legitimacy as well tapping into the individual level behavioral biases and heuristics when it comes to investment decision-making. The dissertation directly contributes to the fast-emerging body of academic

literature on this market as well as provides a new institutional-, stakeholder- and behavioral-based theoretical framework by which to assess the impact of green bonds on a global scale.

## Chapter 2

# Impact of regulatory policies on green bond issuances in China: policy lessons from a top-down approach

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### Abstract

This study examines whether the green bond policies of major Chinese financial regulators' have a direct and positive impact on the green bond market. Using Chinese green bond issuances from 2012 to 2019, we analyze green bond issuer response to top-down regulatory policies post 2014. Using a difference-in-difference model, we find a direct positive influence of green bond regulatory policies on issuance amounts. Additional analysis shows that specific issuer characteristics like ownership type (government-owned), industry type (green industry), and sector type (financial issuer) have a positive and highly significant reaction to policy announcements and led to the issuance of more green bonds. Our results highlight the supporting role of financial regulators in advancing the green finance agenda in China.

### Key Policy Insights

- Green bond policies implemented by Chinese financial market regulators have been an effective means to increase overall green bond issuances.
- Certain issuer types react more significantly by increasing their green bond issuances following the announcement of green bond policies.

- Pro-active participation by key financial regulators in the form of harmonized definitions, consistent engagement, and alignment with international best practices can be beneficial for stimulating green finance growth.

## **MANUSCRIPT BEGINS**

### **2.1. Introduction**

Issuers have used green bonds to raise long-term debt capital from various domestic and international investors to either finance or refinance green assets and projects (Saravade & Weber, 2020). Since its inception in 2007, the financial value of green bond issuances has increased significantly; and in 2021, the global market stood at \$1.2 trillion of cumulative issuances (Climate Bonds Initiative, 2021). However, with each year of delayed action on meeting the 1.5 degree-Celsius target, the costs to address climate impacts have also risen from \$1.3 trillion per year of inaction in 2010 to over \$5 trillion per year in 2020 (Sanderson & O'Neill, 2020). Hence, it becomes important to examine how sustainable finance instruments like green bonds can meet this expanding financing gap, as well as shift more capital towards the green economy.

Sustainable finance investments are even more crucial in emerging yet carbon-intensive economies like China, where expensive capital can make low-carbon projects economically unviable (Sonerud, Kidney, & Tripathy, 2015). Considering the critical role of regulators and government in creating incentives to grow such financial markets in China (Bai et al., 2013; Chang et al., 2019; Geng & Doberstein, 2008; Green Finance Task Force, 2015), it is surprising that the literature on analyzing their effect on green bonds has been sparse to date. This creates a knowledge gap regarding the role of policy and regulation in scaling up this market (Bhandary et al., 2021). Hence, this study examines the impact of major financial regulators like People's Bank of China (PBC), National Development and Reform Commission (NDRC) and China Securities and Regulatory Commission (CSRC) on the green bond market.

Although previous research has examined important policies like the Chinese green credit guidelines (Jiguang & Zhiqun, 2011; Weber, 2017; Zhang et al., 2011; Zhao & Xu, 2012) and more recently the green bond policies (Anh Tu et al., 2020; Otek Ntsama et al., 2021), most studies suggest that there is a need to understand the specific context of China. Furthermore, it is essential to understand how the knowledge about green finance policies in China can be applied to other regions (Bhandary et al., 2021). The current study addresses this gap by examining the role of key market regulators by documenting their direct impact on scaling up the green bond market. Hence, it closes the academic knowledge gap on green bonds by providing policy lessons on how regulators are driving the establishment of a market and why market regulation matters to different types of issuers.

Based on a sample of all bonds issued in mainland China (including green bonds but not including government debt) by Chinese issuers between 2012 and 2019, we analyze the effect of specific green bond policies and regulations on bond issuances. Using regression and differences-in-differences models, we find that the ratio of green to non-green bond issuances increased significantly after the announcement of green bond policies. Our results highlight key policy insights to show why regulations introduced by key financial regulators can be an effective means of increasing green bond issuances. Furthermore, we suggest that specific issuer characteristics, such as ownership type (government-owned issuers), industry type (green issuers), and sector type (financial issuers), are more likely to respond to these policies. Our findings fill the knowledge gap regarding regulator-driven top-down policies in the green bond market by highlighting how specific market-based regulators are effective in stimulating overall green bond issuances as they build more market confidence from certain issuer types. Based on these findings, we recommend regulators harmonize market definitions, align with international best practices, and engage across the market to encourage a variety of issuers to also respond positively to market regulations and policies.

The remainder of the paper is structured as follows: first, the paper provides a detailed overview on the types of green bond policies that the Chinese government has issued so far and the rationale for choosing to study specific regulators and their impact. Second, we present

the result of our differences-in-differences model and regression analyses to show the effect of these policies on green bond issuances. Finally, we discuss the results and policy insights to highlight the role of a market regulator in growing the domestic market for green finance.

## 2.2. Green Bond Policies in China

In China, the green finance policy ecosystem started with the 2012 Green Credit Guidelines, which were complementary with other key policies such as the Guidelines for Establishing the Green Financial System (Aizawa & Yang, 2010). These policies outlined green finance, various incentives, disclosure requirements, risk mitigation, and an overall development plan for China's green financial products and strategies (Yao & Zadek, 2017). Due to the early involvement of key financial supervisors (including PBC) in drafting these guidelines and policies, a green agenda was brought into China's monetary policy and regulatory framework (Ordonez, Uzsoki, & Dorji, 2015) that other central banks followed.

This proactive approach has been one of the unique features in China's plan to address climate risks and opportunities and is visible in its comprehensive regulatory approach to addressing the various incentives within the banking system, insurance, and securities markets (Dikau & Volz, 2018). Having a clear policy in place has also enabled the data collection on green financial products that is often missing. Data collection, however, allows for compliance tracking green financial products and services (Dikau & Volz, 2018; Azhgaliyeva, Kapoor, & Liu, 2019). Given that the green bond market started in 2015, the Chinese green bond market has grown significantly and since 2016 has ranked in the top 10 country-level markets. Given the country's recognition as a top issuer of green bonds globally, there is a need to understand China's top-down institutional approach in detail and to subsequently develop policy lessons for other countries (Yao & Zadek, 2017).

Although the issuance of Chinese green bonds began in 2015 (Boulle, Dai, & Meng, 2017), PBC published the first green bond regulations in the China interbank market (China's largest bond market) in the same year. Another set of guidelines by the NDRC, outlining a separate list of eligible projects in the state-owned enterprise sector (Boulle, Dai, & Meng,

2017) and non-listed entities, followed the PBC regulation in 2015. Although both PBC and NDRC issued detailed guidelines on eligible projects, the criteria used to select these categories were slightly different and confused the market. For instance, the NDRC Guidance identified 12 categories that allowed 50 percent of proceeds to be directed to repaying bank loans and investing in working capital (Boulle, Dai, & Meng, 2017, p. 7). On the other hand, the PBC Green Bond Catalogue outlined six broad categories more closely aligned to the international best practice of directing 95 percent of proceeds to green projects (Boulle, Dai, & Meng, 2017, p. 7).

In 2017, the securities market regulator CSRC also published its own set of guidelines on how listed Chinese companies could issue green bonds. The CSRC guidelines recommended how listed Chinese companies could issue green bonds based on the use of PBC Catalogue, with the caveat of an annual reporting requirement instead of a quarterly one. Given the different issuer types that are regulated by these financial supervisors – for instance, all financial institutions are regulated by PBC, all non-listed issuers by NDRC, and all listed-issuers by CSRC – the impact of different regulations with slightly different requirements led to a bit of market confusion (Boulle, Dai, & Meng, 2017). Hence, we chose to examine the impact that each regulatory policy had on the overall market as well as highlight any issuer characteristics that seemed to respond well to regulatory guidance.

To further emphasize the significance of these three regulators, any Chinese green bond must be approved by the relevant regulatory authority to be issued on the domestic market (Meng, Lau, Boulle, Chen, Liu, & Liu, 2018; Kidney & Oliver, 2014). Furthermore, the supervision and management aspect of these bonds was highlighted by the PBC in 2018 (March 2018) through its collateral monetary policy (June 2018) that was established to allow financial green bonds to be acceptable collateral for its Medium Long Term Lending Facility (Fang, Wang, & Wu, 2020; Macaire & Naef, 2021). However, given the paper's focus on understanding the impact of the first regulatory announcement related to this market, we only focus on the PBC Announcement No. 39 (December 2015), the NDRC Guidelines No. 3504



(December 2015) and the CSRC Guidelines to Support Corporate Green Bond Issuances (March 2017).

To further categorize the various regulatory policies, Table 2.1 highlights the three chosen policies, their requirements, and the types of bonds issued in China. An interesting point to note is the lack of harmonization across these policies – especially with post-issuance reporting requirements and the classification for use-of-proceeds.

**Table 2.1: Green bond policies and their subsequent regulators in Mainland China**

	<b>Government Bond/Central Bank Bond</b>	<b>Listed Company Bond, SME Private Placement Bond</b>	<b>Financial Bond, Asset Backed Securities (ABS), Convertible Bond</b>	<b>Corporate Bond, International Institution Bond</b>
<i>PBC Announcement No. 39 (2015)</i>	YES		YES	YES
<i>NDRC No. 3504 (2015)</i>				YES
<i>CSRC Guidelines to Support Green Corporate Bond Issuances (2017)</i>	YES	YES	YES	YES
<b>Regulating Agencies</b>	<ul style="list-style-type: none"> <li>• PBC</li> <li>• CSRC</li> </ul>	<ul style="list-style-type: none"> <li>• CSRC</li> </ul>	<ul style="list-style-type: none"> <li>• PBC</li> <li>• CSRC</li> </ul>	<ul style="list-style-type: none"> <li>• NDRC</li> <li>• PBC</li> <li>• CSRC</li> </ul>
<b>Classification Guidelines for its Use-of-Proceeds</b>	PBC Catalogue	PBC Catalogue	PBC Catalogue	NDRC Catalogue

<b>Post-Issuance Reporting Requirements</b>	<ul style="list-style-type: none"> <li>• Quarterly (PBC)</li> <li>• Annual reporting (CSRC)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual reporting (CSRC)</li> </ul>	<ul style="list-style-type: none"> <li>• Quarterly (PBC)</li> <li>• Annual reporting (CSRC)</li> </ul>	<ul style="list-style-type: none"> <li>• Unspecified</li> </ul>
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### 2.2.1. Literature on Institutional Support for Green Bonds

Although the literature on green bonds focusing on China has grown recently, various aspects of the market have been addressed for several years. For instance, the green municipal bond market in the United States has been well documented in terms of significant market-driven growth (Brennan & MacLean, 2018). In contrast, other studies highlight the need for stronger regulations and policies to increase issuances of green sovereign bonds that can create long-term economic growth (Monasterolo & Raberto, 2018). Saravade and Weber (2020) examine India's emerging green bond market to show that green bonds can help build the adaptive capacity to respond to climate change among institutions like regulators and among market actors like issuers and investors. Other aspects of the market, including green finance policies within Asia (Azhgaliyeva & Liddle, 2020) and pricing mechanisms (Azhgaliyeva, 2020), have been addressed recently. The standardization component of the green bond market has been studied by Ehlers and Packer (2017), who suggest that various certification mechanisms have evolved to allow for more granularity and continuity while assessing green bonds. Baulkaran (2019) has examined green bond announcements to show how firm or issuer-level characteristics positively affect the stock market. More recently, Flammer (2020) highlights how green bonds have improved the environmental performance of companies and suggests the importance of mandating certification mechanisms in achieving this. All these studies found positive effects of green bond regulations and policies.

Regarding China's market, the literature shows how regulators have been involved in the market oversight right from the start of the market (Park, 2018). However, as pointed out by Park (2018) the "lack of transparency of the regulatory regime could exacerbate the risk of

regulatory capture and arbitrage rather than mitigate it” (p. 44). In addition, Zhang (2020) points out how state-owned financial institutions lead in issuances and have driven the Chinese market. A significant market stimulus for this has been the green credit policy and its mobilization of China’s financial ecosystem to address environmental credit risk (Cui, Geobey, Weber, & Lin, 2018) and environmental problems in tandem (Aizawa & Yang, 2010; Weber, 2017).

However, an examination of the institutional regulatory impact on the market is needed to address its direct effect on green finance. Our paper addresses this gap and provides key policy lessons for regulators looking to stimulate the domestic green bond market. Consequently, this study analyzes the impact of three key market regulators and their green bond policies at the issuer level. Our two research questions are: (1) How does the introduction of specific green bond policies affect the total issuance of green bonds? and (2) Do these policies have a significant positive impact on specific issuer characteristics such as industry, sector, and ownership? Our findings highlight key policy insights regarding the issuer perception of green bond regulations and whether specific issuer characteristics might react more positively to these policies.

### 2.3. Methods and Sample

To select our sample, we first identified all bonds issued by Chinese institutions in mainland China from 2012 to 2019, except for government bonds. The rationale for starting in 2012 was because 2015 was the first year a green bond-specific policy was released, and we wanted to keep a balanced sample period before and after the reform year. The data was collected from Wind Database<sup>6</sup> and cross-checked with the China Bond Information Network<sup>7</sup> and China Finance Information Network<sup>8</sup> data.

Second, we marked the green bonds according to the approval documents from PBC and NDRC released in 2015. Next, we grouped our sample in terms of issuer characteristics

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6 <https://www.wind.com.cn/en/edb.html>

7 <https://www.chinabond.com.cn/>

8 <http://greenfinance.xinhua08.com/zt/database/>

such as ownership (state-owned versus private-owned issuers), sector (financial versus non-financial issuers), and industry (green versus non-green issuers). We categorized financial and non-financial issuers to analyze the influence of respective regulations on their issuances, because financial institutions account for a majority of green bond issuers in China (Boulle, Dai & Meng, 2017). We also chose to look at industry characteristics like green versus non-green industries, based on the rationale that green industries are predominantly driving the supply side of this market and the existence of the regulatory guidelines that establish what qualifies as green.

Using the “Green Industry Guidance Catalogue”<sup>9</sup> issued in 2019 we categorized green industries versus non-green industries. We used the 2019 version because our sample period ended that year. According to this Catalogue, green industries are active in energy-saving and environment protection, clean energy, cleaner production, ecology, green services, and green infrastructure upgrading (Guo, Liu, Wu, & Guan, 2020). An important point to note is that the 2020 Catalogue was much more aligned to international definitions and excluded controversial categories like ‘clean coal’ and unconventional oil and gas development (Guo et al., 2020).

To analyze the effect of regulations on green bonds, we used t-tests to highlight the increase in the monetary value of issuances before and after introducing a specific regulation. Furthermore, we used a difference-in-difference model (Conley & Taber, 2011) to analyze the differences between types of issuers before and after introducing the regulation. To establish robustness, we analyzed the influence of control variables such as firm size, leverage, ROA, and intangible asset ratio. Though our approach can be classified as an event study approach, we did not conduct a 30-day or similar short-term event study because event studies focus on short-term effects of events (McWilliams et al., 1999), whereas green bonds usually take some time to be issued after the introduction of a new regulation.

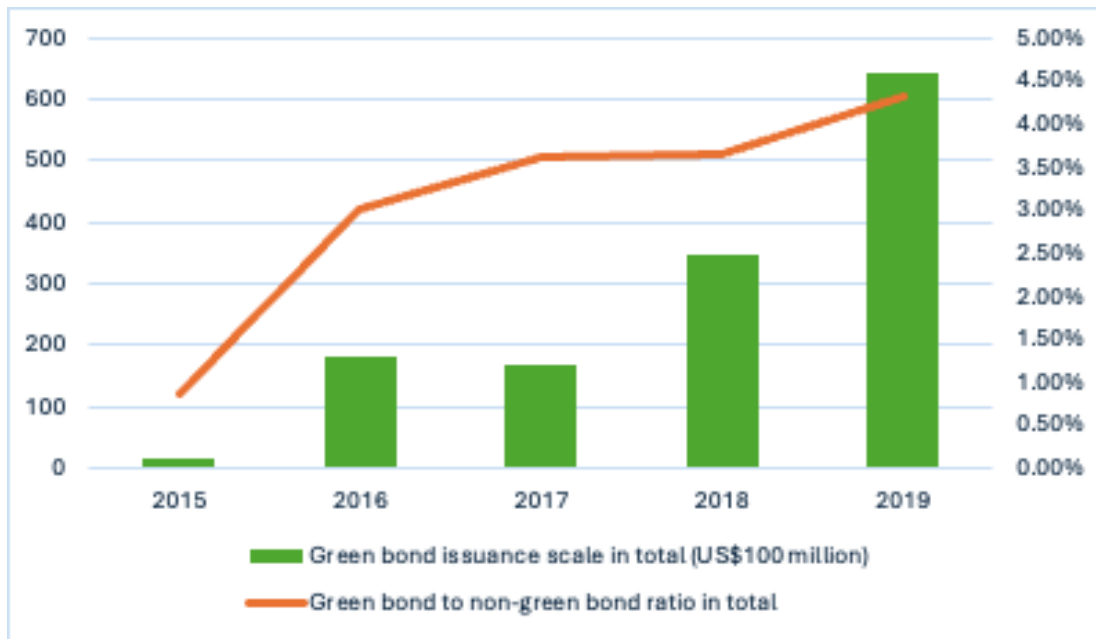
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<sup>9</sup> [https://www.ndrc.gov.cn/fggz/hjzyz/stwmjs/201903/t20190305\\_1220625.html](https://www.ndrc.gov.cn/fggz/hjzyz/stwmjs/201903/t20190305_1220625.html)

## 2.4. Results

### 2.4.1. Descriptive Results

Figure 2.1. highlights the annual issuance amounts for green bonds (in US\$100 million), ranging from \$1.3 billion in 2015 to \$64.28 billion in 2019. Although the market size increased linearly, with the slight exception of 2017, the ratio of green bond issuances to non-green bond issuances is one of the leading indicators for green bond market growth. In 2015, the ratio was 0.85%; in 2016, it increased to 2.99%, and up to 4.32% in 2019. The data suggests a more substantial growth of green bond issuances compared to conventional bonds.



**Figure 2.1: Increase of green bond issuances (Author's construction)**

### 2.4.2. Difference-in-Difference Tests

To test whether the green bond policies issued by the Chinese government have an impact on the issuance of green bonds, we constructed a difference-in-difference model as follows:

$$\ln(\text{Bond\_Issuance})_{i,t} = \alpha_0 + \alpha_1 \text{Green}_{i,t} + \alpha_2 \text{Post}_{i,t} + \alpha_3 \text{Green} * \text{Post}_{i,t} + \alpha_4 \text{Controls}_{i,t} + \varepsilon \quad (1)$$

Where,  $\ln(\text{Bond\_Issuance})_{i,t}$  is the natural log of the bond issue amount of issuer  $i$  in year  $t$ .

$\text{Green}_{i,t}$  is a binary variable classifying whether the bond issued by firm  $i$  in year  $t$  is a green bond or a regular bond.

$\text{Post}_{i,t}$ ,  $\text{Controls}_{i,t}$  represents the control variables, including bond yield and bond period as well as the financial indicators of bond issuers such as leverage, ROA, size, and tangibility.

In the regression model, we mainly focus on the sign and significance of the coefficient of  $\text{Green} * \text{Post}_{i,t}$ . If  $\alpha_3$  is positive and significant, it indicates that the green bond policies promote the issuance of green bonds in China.

In Table 2.2, we control the year fixed effect in Column (2) to lower the influence of unobservable factors that change with the year. We also control the firm fixed effect in Column (3) to mitigate the impact of company-level characteristics on bond issuances<sup>10</sup>. In Column (4), we add the control variables to the regression model. The regressions of  $\alpha_3$  are positive and significant, confirming our conjecture that the green bond policies promote the issuance of green bonds in mainland China. We also find that bond issuance is positively related to the size of the issuers. However, issuances are negatively correlated with bond yield, financial leverage and tangibility of the issuers. The sign and significance of our results are consistent with the finding of Wang et al. (2020). Finally, our results show that after the introduction of the regulations, green bond issuances increased by RMB 0.52 billion (US\$81 million) compared to non-green bond issuances.

**Table 2.2. Test of impact of green bond policies on green bond issuance in mainland China**

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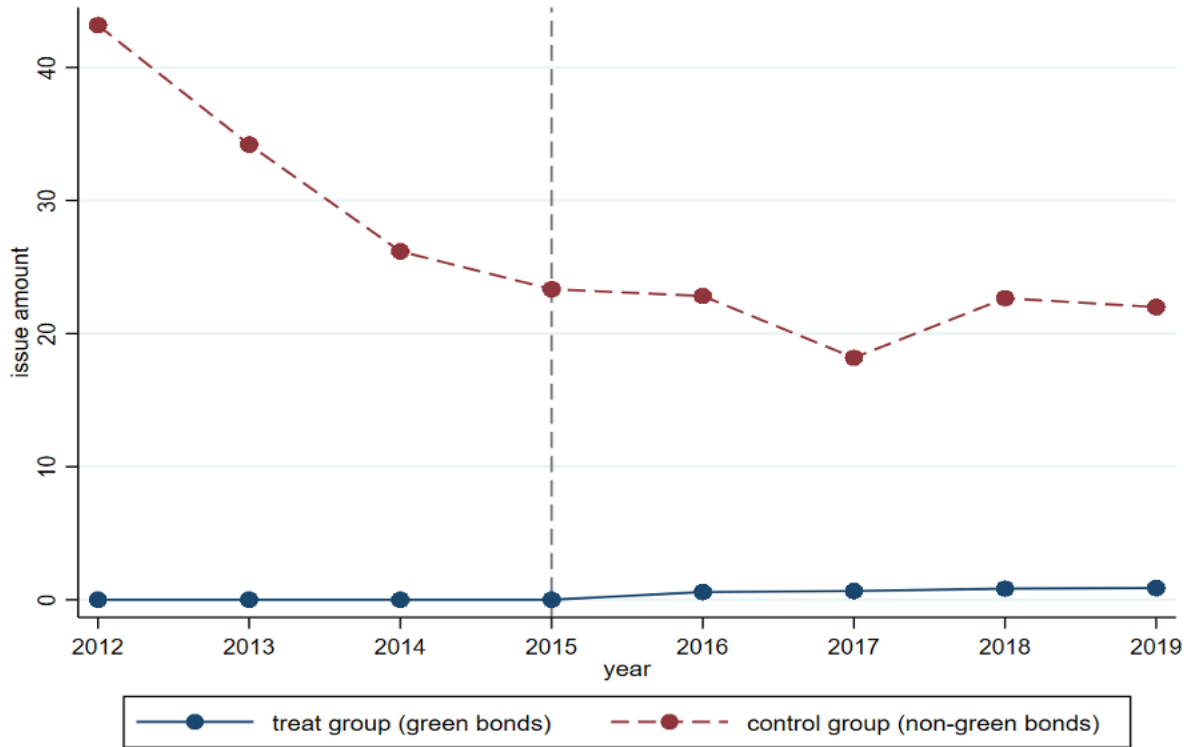
<sup>10</sup>Note on the magnitude of coefficient change when firm-level fixed effects are introduced: We believe this could have been due to the policy having more of an effect in getting issuers who were already active in the market to change their issuance approach, rather than bringing new issuers for green bonds who had not previously issued any bonds.

**Note:** The table reports the estimates of the difference-in-difference model in equation (1). The dependent variable is the ln of the total bond issuance amount (in RMB 1 billion).

	(1)	(2)	(3)	(4)
Green	-1.160*** (0.024)	-1.159*** (0.023)	-1.146*** (0.233)	-0.074*** (0.019)
Green_Post	0.167*** (0.025)	0.167*** (0.025)	0.517*** (0.224)	0.112*** (0.016)
Post	-0.124*** (0.017)			
Bond_Yield				-0.048*** (0.002)
Bond_Period				-0.001 (0.001)
Leverage				-0.319*** (0.025)
ROA				0.001 (0.000)
Size				0.137*** (0.002)
Tangibility				-0.072* (0.041)
_cons	1.159*** (0.017)	1.269*** (0.044)	1.280*** (0.152)	-1.012*** (0.033)
Year fixed effects	No	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Adj. R <sup>2</sup>	0.493	0.494	0.453	0.349
Observations	21400	21400	21400	21400

Standard errors are presented in parentheses. \* Significance at a 10% level. \*\* significance at a 5% level. \*\*\* significance at a 1% level.

Figure 2.2 shows the comparison of green bond and non-green bond issuances in China. There were no green bond issuances before 2015. Issuances have risen each year since 2016, whereas the issuance amount of non-green bonds shows a downward trend. Figure 2 also indicates that after 2015, which was the same year the two green bond policies by PBC and NDRC were announced, the issuance of green bonds also increased.



**Figure 2.2: Yearly comparison of the issue amount of green bonds and non-green bonds**

To analyze whether the value of the bond issuance is associated with the significance of Green\_Post, we group the sample into small and large bonds according to the annual median bond issue size. The coefficients of Green\_Post are positive and significant in both regressions (see Table 3); however, the coefficient is only marginally significant for the smaller issue size and the significant positive effect is driven by the larger issuers. We also conducted a Chow test with the two regressions and found a significant difference ( $p < .01$ ). The results suggest



that bond issuers tend to issue larger green bonds after the implementation of the green bond policies.

**Table 2.3: The impact of green bond policies on the size of green bonds**

	(1)	(2)
	Larger issue size subsamples	Smaller issue size subsamples
Green	-1.213*** (0.034)	-1.006** (0.012)
Green_Post	0.441*** (0.035)	0.259* (0.043)
_cons	1.295*** (0.049)	1.011*** (0.031)
Controls	Yes	Yes
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Adj. R <sup>2</sup>	0.436	0.193
Observations	17742	3658

**Note:** The table reports the results of the difference-in-difference model. The dependent variable is the natural logarithm of the total bond issuance amount (in RMB 1 billion). Standard errors are presented in parentheses. \* Significance at a 10% level. \*\* significance at a 5% level. \*\*\* significance at a 1% level.

### 2.4.3. Impact of regulations on issuances of different types of issuers

Based on the differences-in-differences model (1), we further grouped the sample into three different issuer characteristics linked to ownership (government versus private), industry (green versus non-green), and sector (financial versus non-financial) of the issuer. We can see from Table 2.4 that, firstly, the regression coefficient is positive and significant in regression (2) but is not significant in regression (1). This result indicates that the government-owned issuers reacted more significantly to the green bond policies. Secondly, the regression coefficient is positive and significant in regression (4), but not significant in regression (3), which means the issuers in green industries are more significantly to the green bonds policies.

Thirdly, the regression coefficient is positive and significant in regression (5) and (6). This result suggests that financial and non-financial issuers react positively to the policies. To explore whether financial and non-financial issuers respond differently to the policies, we conducted a Chow test with the two regression models. We found a significant difference ( $p < .01$ ), indicating that financial issuers responded more significantly to the policy than non-financial issuers.

**Table 2.4: Regression for issuer type**

	(1)	(2)	(3)	(4)	(5)	(6)
	Gov=0	Gov=1	GreenInd=0	GreenInd=1	Financial=0	Financial=1
Green	-1.697** (0.684)	-1.583*** (0.152)	-1.780*** (0.192)	-1.109*** (0.257)	-2.003*** (0.285)	-1.924*** (0.164)
Green_Post	0.438 (0.695)	0.235*** (0.113)	0.177 (0.153)	0.146*** (0.376)	0.373** (0.267)	0.115*** (0.165)
_cons	1.627*** (0.541)	1.583*** (0.683)	1.717*** (0.594)	1.604*** (0.652)	1.510*** (0.572)	1.812*** (0.607)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.335	0.360	0.398	0.369	0.345	0.381
Observations	3050	18350	20834	566	9292	12108

**Note:** The table presents the results of comparisons between different ownerships, industries, and sectors of green bond issuers. The dependent variable is a natural logarithm of the bond issuance amount (in RMB 1 billion). \* Significance at a 10% level. \*\* significance at a 5% level. \*\*\* significance at a 1% level.

#### 2.4.4. Impact of regulations on corporate green bonds

We also applied a difference-in-difference model to test whether the green bond guidelines for corporate bonds introduced by CSRC in March 2017 influenced the issuance of green bonds of listed companies. We controlled the industry fixed effect in all four regressions and controlled for year fixed effects and firm fixed effects in regression (2) and regression (3), respectively. Regression (4) includes control variables, including Leverage, ROA, Size, Tangibility, Bond Yield and Bond Period. Table 2.5 shows that all four regressions of  $\alpha_3$  are positive and significant, which confirms our conjecture that CSRC's corporate green bond policy promotes the issuance of corporate green bonds. Further, Bond Yield, Leverage, Size and Tangibility have significant coefficients as well. However, their inclusion increases the adjusted r square by .152. Based on the results presented in Table 2.5, we conclude with more certainty that after the introduction of the CSRC regulation, green bonds issuances of listed firms increased significantly higher than issuances of non-green bonds.

**Table 2.5: Regression results of CSRC guidelines**

	(1)	(2)	(3)	(4)
Green	-0.072*** (0.019)	-0.072*** (0.019)	-0.957*** (0.051)	-0.016* (0.141)
Green_Post	0.156*** (0.008)	0.162*** (0.011)	0.165** (0.037)	0.106*** (0.007)
Post	0.048 (0.008)			
Bond_Yield				-0.047*** (0.002)
Bond_Period				-0.001 (0.000)
Leverage				-0.197*** (0.023)

ROA				0.002 (0.001)
Size				0.141*** (0.002)
Tangibility				-0.120*** (0.039)
_cons	0.740*** (0.004)	0.745*** (0.011)	0.576** (0.025)	-0.936*** (0.032)
Year fixed effects	No	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.132	0.137	0.248	0.400
Observations	2896	2896	2896	2896

Note: The table presents the regression coefficients of the natural logarithm of the total bond issue amount (in RMB 1 billion) as the dependent variable. \* Significance at a 10% level. \*\* significance at a 5% level. \*\*\* significance at a 1% level.

## 2.5. Discussion and Policy Recommendations

Given the pro-active regulatory support provided to the Chinese market in its early years, we find that green bond policies positively influenced the market. As seen in Figure 2.1, exponential growth started after introducing PBC and NDRC policies in December 2015. The policies outlined the process of issuing a green bond and outlined eligible green categories for China's financial sector and non-listed issuers (Boulle, Dai, & Meng, 2017). Given the positive reaction of government-owned enterprises, green industry issuers, and financial issuers to these policies and green finance-related regulation (Weber, 2017), early activities of PBC and NDRC may have had a positive impact on the green bond market.

Although the early participation of major financial regulators seems to be a necessary condition for establishing a market in China's financial ecosystem, having non-harmonized guidelines in place might have negatively affected the market growth. For example, definitions for green industries and post-issuance reporting requirements differed across regulators and their policies. These gaps were only addressed in 2021 through the issuance of harmonized

definitions across PBC, NDRC, and CSRC (Moody's Analytics, 2021). Hence, it is probable that previous versions of these regulatory policies might have promoted green bond issuances from issuers that were already likely to issue green bonds, as they may have had a green mandate in place or were participating in the green financial system. However, it could have also hampered participation from mainstream private, non-green or non-financial issuers.

Having a harmonized version of these policies seems to be a good path for regulators to address and encourage participation of non-traditional issuers in the market, including those from non-green sectors. This Chinese top-down approach has been essential in supporting green industries and green products to date, since polluting industries such as coal and steel are still the backbone of the Chinese economy (Nguyen et al., 2021). Consequently, polluting industries are also interesting from an investor perspective as they need to reduce their emissions and require a certain level of green investment to do so (Weber, 2017). Hence, without a top-down approach that specifically supports green industries and green investments, the introduction of green bond market policies and the subsequent transition to a greener economy would be slower and much less coordinated.

The growth of the Chinese green bond market has also driven domestic awareness around the viability of green finance investments. Although such awareness has increased the engagement of issuers, the need for investments into new green developments and infrastructure projects, including railway and renewable energy, has also driven the diversity in issuer participation across the Chinese green bond market (Meng, Xie, Shao & Shang, 2021). To support projects related to carbon-intensive sectors and industries, green bonds have been issued to provide much-needed long-term capital necessary for green finance (Hong et al., 2020). Their growing popularity has attracted issuances from companies listed on the stock market as well (Baulkaran, 2019).

The reaction of Chinese issuers suggests that regulatory guidelines for the green bond market seems to instill market confidence among other market participants, including investors, who usually prefer more market transparency. The harmonization of the three regulatory policies in 2020 was also partly driven by an investor push to align with

international best practices of excluding controversial green definitions such as ‘clean coal’ or unconventional oil and gas (Meng et al., 2021). However, the importance of meeting local needs, including reducing environmental degradation and pollution control, are still likely to be necessary base conditions for financial regulators to venture into this market or to get a positive reaction from local issuers.

Although China frequently uses top-down approaches, they might be harder to implement in other countries and regions where regulatory action comes after markets are established (Saravade & Weber, 2020). In North America, for instance, the sustainability-related activities of financial regulators are in their initial stages. Nevertheless, regulatory activities such as mandating climate-stress testing and implementing Task Force on Climate-related Disclosures (TCFD) indicators (O'Dwyer & Unerman, 2020) are becoming more prominent with financial regulators globally. However, based on our study we believe that financial regulators should examine what role they can play in creating incentives for mainstream issuers and investors to participate in the green bond market.

Our results regarding issuer characteristics also suggest that government-backed issuers, green industry issuers, and financial issuers are more likely to participate in the Chinese market after the announcement of a policy. Hence, financial regulators can incentivize public and private finance by encouraging ambitious yet harmonized green definitions aligned with a low-carbon transition. Based on our results it is recommended that regulators focus any new policy development opportunities on engaging with a variety of issuer types. This model also fits with the UNFCCC signatory countries that want to scale up their green industries and enable a green economic transition and recovery.

## 2.6. Conclusion

As suggested by previous literature, our study confirms the direct positive impact of regulatory policies on green financial products and services in China and other countries (Monasterolo & Raberto, 2018; Weber, 2017; Weber & Chowdury, 2020). Based on our findings, it looks like specific green bond-focused policies can overcome market skepticism

(Schultz, 2012) and instill market confidence based on sustained regulatory oversight. Consequently, these policies have also contributed to the greening of monetary policies (Schoenmaker, 2021) and encourage the participation of various bond issuers, particularly in the case of China.

In related fields of green finance, such as green credit, other studies have found similar results. In Bangladesh, for instance, the central supervisor implemented a top-down approach to addressing environmental credit risk increasing the green credit ratio for commercial lending (Bangladesh Bank, 2011). For Bangladesh, results showed a positive impact of the approach on both environmental performance and the financial risk of loan portfolios (Weber & Chowdury, 2020; Weber et al., 2015). Since many other countries, including United States and Canada, also plan to integrate similar environmental risks and climate risks into their list of key performance indicators for green financial products, our policy insights can be applied to demonstrate a positive outcome from implementing a top-down approach in policymaking aiming to define and incentivize green finance.

Similarly, the European Union has also implemented a sustainable finance guideline that includes green bond standards (European Commission, 2021). Although the analyses about the impact of recent guidelines is still missing in academic literature, our study demonstrates that top-down guidelines can stimulate green finance growth at the market level. Our study might also provide some insights for the implementation of COP26 agreements to catalyze greater private and public sector flows of sustainable finance to address climate change<sup>11</sup>.

In conclusion, our research has contributed to the current body of knowledge on the institutional impact of regulatory policies in the Chinese green bond market as well as laid out some policy insights for other governments and regulators. By having critical regulators like the PBC, NDRC, and CSRC participating early in the green bond market, we find that market confidence increases after introducing a regulation. This spillover effect is positive and

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<sup>11</sup><https://ukcop26.org/cop26-goals/finance/>

significant among green industry, government-backed, and financial sector issuer types. Consequently, green bond regulations and guidelines directly support a greener economy because they enable more private and foreign direct investment into activities that address environmental and sustainability issues. Enabling such private investments will be crucial to achieving the Sustainable Development Goals (Weber, 2019) and transitioning to a low carbon economy (Campiglio, 2016).

**MANUSCRIPT ENDS**



## Chapter 3

# Catalyzing the growth of green bonds: A closer look at the drivers and barriers of the Canadian green bond market

*Contents of this chapter are published in:*

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### Abstract

**Purpose:** This paper aims to examine the Canadian financial sector's reaction to opportunities and risks created by the green bond market in a low-carbon and climate-resilient (LCR) economy.

**Design/methodology/approach:** The authors used a concurrent mixed methodological approach that undertakes an online survey and semi-structured interviews with critical green bond market stakeholders.

**Findings:** The most significant market driver in Canada is the reputational benefit for stakeholders, i.e. its ability to meet the high demand for sustainable finance and the marketing potential of its green credentials. The major market barriers are transactional costs, i.e. additional tracking required for reporting purposes, lack of market liquidity and identification of environmental impact or additionality. Canadian green bonds are also more likely to be evaluated on their green impact than their global market peers.

**Research limitations/implications:** Limitations of this study include its focus on Canada, which may exclude or not apply to drivers and barriers in other green bond markets.

**Practical implications:** The paper helps create an accounting-based conceptual framework for key motivations and barriers that affect financial decision-making regarding green bonds.

**Social implications:** The authors identify economic and policy-related barriers and drivers for green bonds, addressing the financing gap for the LCR economy.

**Originality/value:** To the best of the authors' knowledge, this study is the first to identify and compare Canadian green bond market drivers and barriers and to examine relevant stakeholder- and policy-related approaches that can be targeted to scale this market effectively.

## MANUSCRIPT BEGINS

### 3.1. Introduction

Countries like Canada, with a resource-dependent and carbon-intensive economy, might have a reduced ability to scale sustainable investment flows (Dordi *et al.*, 2023). To address such issues, in September 2022, the Government of Canada-backed Sustainable Finance Action Council (SFAC) published the Taxonomy Roadmap Report<sup>12</sup>, highlighting the climate investment gap in Canada being CAD\$115 billion (or US\$71.5 billion<sup>13</sup>) annually (SFAC, 2022). Before, Canada's transition-related conversations mainly addressed the energy sector. However, there is a renewed interest in attracting sustainable finance players to look at all relevant transition sectors to meet the financing gap.

Green bonds are a predominant part of Canada's sustainable finance markets. In 2021, the overall issuances placed Canada at the 11<sup>th</sup> country level rank (Harrison and Muething,

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<sup>12</sup> Sustainable finance and transition taxonomies are a system of classification of economic activities, assets or investments that allows issuers and investors to label their issuances or investments as “green” and provides a form of organization (green versus non-green) across the economy (Climate Bonds Initiative, 2022).

<sup>13</sup> Based on Bank of Canada's annual exchange rate for 2022.

2020), showcasing the impact it can have on the world stage. So far, the Canadian market growth has been driven mainly by institutional issuers and major corporations, with an average deal size between US\$100-500 million (Harrison and Muething, 2020). Given the climate investment gap of US\$71.5 billion in Canada, the 2021 domestic green bond issuances of US\$34.8 billion show great potential to help address this gap.

Yet, compared to the overall Canadian debt market, green bonds still occupy only a small portion of issuances, raising the question regarding the barriers facing this market's scalability in Canada. The concept of transitioning the Canadian economy and its financial sector to a low-carbon climate-resilient (LCR) one has also created several hurdles for green bond market participants as they engage with each other to define what fits with market expectations and what is greenwashing. These issues re-emphasize the need to identify what motivates market participants to drive sustainable finance bond issuances and investments and which risks restrict this engagement (Etzion *et al.*, 2019).

The academic scholarship examining strategies for the low-carbon transition and the green bond market addresses nationally determined contribution (NDC) targets and renewable energy investment (Tolliver *et al.*, 2020). It links green bond investment flows with fossil fuel divestment of businesses (Glomsrød *et al.*, 2018), bond, issuer, and market characteristics and their impact on investment demand (Barua and Chiesa, 2019). Furthermore, the research analyses the adaptive capacity response of the market at the institutional level (Saravade and Weber, 2020) as well as its barriers (Deschryver and de Mariz, 2020). However, a literature gap remains in identifying the market's stakeholder- and legitimacy-related barriers and drivers and how these affect its scalability at the country level. In the Canadian setting, these country-level barriers and drivers are unexamined, and the literature is still relatively nascent, focusing on comparing the diversification benefits and green bond spillover effect across 12 different international green bond markets (Rehman *et al.*, 2023).

The existing scholarship on understanding intra-country and intra-market barriers is also limited to aspects such as the lack of harmonized standards and definitions of green, the

risk of greenwashing, higher transaction costs for issuers, the lack of supply of green bonds, and the infancy of the market (Deschryver and de Mariz., 2020; Casanovas, 2022).

Although these barriers were relevant in restricting market growth a few years ago, the supply issue and standardization have since been addressed due to market growth and new accounting-related standards. More importantly, the country-level drivers of this market are still underexamined. One popular market driver is the 'greenium', which has been cited across existing scholarship (Agliardi and Agliardi, 2021; Duarte, 2021). However, other drivers are yet to be identified in the literature, especially in Canada's context, where transition dynamics also affect the market's uptake.

As highlighted by the literature on stranded assets and its link to the low-carbon economy transition (Weber *et al.*, 2020), lessons for legitimizing the transition will predominantly be learned through the barriers and drivers affecting popular sustainable finance. Furthermore, Zadek (2019) mentions that green bonds provide a non-market intervention when it comes to redirecting global sustainable finance flows<sup>14</sup> and raising awareness around climate change. In doing so, green bonds can also directly address the sustainable development goals (SDG) of improving climate action (SDG 13). Given green bond market's contribution to global sustainable finance flows and its ability to raise awareness around climate change, these lessons allow other sustainable finance tools to learn about designing markets such as the legitimization of new accounting-participatory architecture (including post-issuance reporting or second opinions) that meet the needs of its stakeholders (Ferraro *et al.*, 2015). This addresses multi-stakeholder partnerships (SDG 17) through resource mobilization and knowledge sharing.

Despite the global popularity of the green bond market, its lack of ability to scale at the mainstream level is currently understudied in policy and academic circles (Maltais and

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<sup>14</sup> Approximately 61 percent of the global climate finance flows from 2011-20 were linked to debt instruments (Climate Policy Initiative, 2022), highlighting the important role that debt instruments (like bonds) play in the financing of a low-carbon economy. In 2023, the global green bond market had cumulatively raised US\$2.34 trillion (Climate Bonds Initiative, 2023) since its inception in 2007. However, this amount is still small compared to the global bond market size of US\$128 trillion in 2020 (ICMA, 2020). Hence, we define scalability of this market as its ability to reach a size close to the mainstream bond market.

Ntkvist, 2020). Our paper contributes to the literature by identifying the behavior-action gap faced by relevant stakeholders (Andrews *et al.*, 2018), linking legitimacy theory concepts like action and presentation of market norms to stakeholder theory concepts like normative and instrumental approaches of market stakeholders. Hence, identifying various barriers and drivers shaping the growth of this market (Cheung *et al.*, 2022; Mustaffa *et al.*, 2021), especially in the Canadian context, becomes a relevant research inquiry and basis for this paper.

Our paper also contributes to the unique intersection of legitimacy theory and stakeholder theory literature by using Canada as a case study. It creates a conceptual framework around the main drivers and barriers for the green bond market in Canada. It applies policy lessons of sustainable finance to outline further how stakeholders, such as state actors, can shape and build new market infrastructure in collaboration with market-based actors. Using a mixed methods approach, we survey and interview market stakeholders to identify the nuances of the Canadian green bond market. Our research finds that the most significant driver is the reputational benefit for market stakeholders. In contrast, the biggest barriers are transactional costs related to reporting, liquidity, and environmental impact identification (also called additionality).

We also find that Canadian bonds are more likely to be evaluated on their environmental impact as compared to global green bonds – indicating that the environmental impact can be a critical factor for how transition and sustainable finance are viewed by global investors when it comes to investing in Canada. Our findings contribute to the literature on green bonds to further highlight how intra-market and intra-country dynamics affect its ability to scale up. The results also discuss how accounting practice can be improved when it comes to reporting on the bond's use-of-proceeds and engaging with key stakeholders that can provide legitimacy to the transition efforts undertaken within Canada.

This paper is structured as follows: we start with the theoretical background highlighting relevant accounting and sustainable finance research. The methods section outlines our research approach and is followed by the triangulation of our qualitative and

quantitative data collection results. In the final two sections, we discuss the new conceptual framework to highlight the main barriers and drivers for Canadian green bonds. We also analyze our findings using a stakeholder and legitimacy theory lens to draw relevant policy and market growth conclusions.

### 3.2. Accounting-Related Drivers and Barriers for Green Bonds

In any economic decision-making process, accounting valuation frameworks, such as cost and benefits analysis, are often used to move forward a project or investment (Drèze and Stern, 1987). This allows market participants to help distribute limited financial or human resources in a manner that may be more efficient. Accounting literature that focuses on costs and benefit analysis often discusses governance and measurement-linked aspects like transaction costs (David *et al.*, 2022), financial costs and benefits for market participants (Schipper, 2010), environmental or socially responsible investment (SRI)- related costs and reputational benefits (Kind *et al.*, 2016) related to stakeholder engagement. A similar multi-faceted approach in acknowledging costs and benefits within the green bond market can be useful as it allows for establishing new accounting-related norms.

Accounting itself can be helpful when estimating the 'value' a stakeholder may place on a unique financial product, such as a green bond, for which valuations or premiums are constantly evolving as the mainstream market becomes more aware of the benefits of sustainable finance (Barua & Chiesa, 2019). One aspect of such valuation is the idea of a 'greenium' within the green bond market, where investors are willing to pay more for a green bond or accept a lower yield compared to a non-green bond (Agliardi and Agliardi, 2021). 'Greenium' is now evident in the market, especially for US dollar debt, where the supply of green bonds seems to be limited compared to the demand (Karpf and Mandel, 2017).

By incorporating non-traditional and non-financial information when it comes to decision-making, green bonds have allowed for the concept of double materiality to become more legitimate and reflect stakeholder priorities (Popescu *et al.*, 2021). In the green bond market, non-traditional accounting data like greenhouse gas (GHG) emissions are tracked

and reported to investors, creating a baseline for industry best practices that reflect the sector. An example is the use of Climate Bonds Initiative's Standard and Certification Scheme to guide investor criteria when evaluating thresholds for GHG emissions. Not only are such certification schemes used to establish an accounting-linked taxonomy for determining green investments, but they also allow key stakeholders' involvement in the selection and consultation process.

This is where the applicability of a stakeholder perspective is necessary, as it considers the various roles participants can play in addressing any market inefficiencies. Reporting is seen as a tool of legitimization for organizations looking to reduce external costs or pressures from external key stakeholders and regulators (Deschryver and de Mariz, 2020). Such non-financial disclosures are now becoming common and even the norm in green bond markets (Ameli *et al.*, 2020). However, with this market's evolution, stakeholder demands are addressing greater accounting benefits, especially in the form of 'additionality' of environmental impact. Therefore, to further understand the accounting-related costs and benefits of this market and its stakeholders in Canada, our first research question is: ***What is the main accounting-related drivers and barriers in the Canadian green bond market?***

### 3.2.1. Stakeholder Perspectives in the Green Bond Market

Adding "vision and values, with a 'sense of purpose' into the mainstream conversations about business" (Manetti and Bellucci, 2018, p. 85) helps stakeholders bind environmental outcomes and impacts of financial products into the decision-making process. This is quite an integral caveat of the green bond market, where the vision and values of a market actor and stakeholder are intrinsically linked to their investment, issuance, or strategic and policy decisions.

Given our research scope to understand the accounting-related interactions of those already in the existing market, we define primary stakeholders as green bond investors, issuers, regulators, and policymakers directly linked to this market and third-party rating agencies undertaking disclosure and impact reporting for green bonds. In the green bond

market, the inconsistent and conflicting demands from multiple primary stakeholders have also shaped the unique legitimacy-linked accounting structures within this market (Saravade and Weber, 2020). For example, to avoid greenwashing and other challenges, the demand from and response of various primary stakeholders like investors and third-party agencies has created legitimacy-based frameworks like second opinions, where third-party agencies provide an expert-based opinion regarding the green bond framework of an issuer (CICERO, 2022).

Aspects like the issuer's green bond use-of-proceeds framework or a regulator mandating annual reporting of the bond's proceeds in certain countries (Saravade *et al.*, 2022) are also integral to establishing this market's legitimacy. Such unique accounting architecture is a fundamental characteristic of this sustainable finance market. Reporting in the green bond market has also been useful in allowing various investors and other primary stakeholders to make decisions not linked purely to financial reports or standard company communication. According to the accounting literature, there are two approaches to stakeholder-linked reporting disclosures: normative and instrumental (Donaldson and Preston, 1995). The normative approach is the duty to primary stakeholders and, hence, a responsibility to report. In contrast, the instrumental approach sees reporting as a pathway to improve relationships with various stakeholders and further showcases the organization's reputation and performance (Donaldson and Preston, 1995).

The normative approach exists in the green bond market due to the *annual level of post-issuance disclosure reporting* on a green bond's environmental impact, either due to domestic-level disclosure regulation or to meet global best practices. The instrumental approach can be witnessed when there are *second opinions* about an issuer's green bond framework, *meeting global standards* like the Green Bond Principles (GBP), and *certification* using the Climate Bonds Initiative's Standards. Such strategies allow issuers and investors to go above and beyond what is already expected and, therefore, might help them improve their reputation and financial performance.



The GBP is also an example of how stakeholder collaboration has created new norms for market participants. These types of best practices are market-driven and have created the impetus for other levels of stakeholder engagement – including the engagement from governments and regulators to issue their regulatory guidance or policies linked to green bonds (Saravade and Weber, 2020) A prominent example is the Chinese market, where green bond policies are driving the growth in green bond issuances (Saravade *et al.*, 2022). Similarly, the high demand in sustainable finance has led to developments like the European Union's taxonomy as well as their green bond standard – both of which are driving other countries and regions to come up with their forms of guidance and regulation around sustainable finance (de Sousa and Moredo Santos, 2022).

Most of these developments have been stakeholder-driven, for instance, by investors or public entities, to further understand the ability of this market to address material concerns like climate impact or environmental benefits (Clark and Hebb, 2005). Such stakeholder pressure has enabled the creation of unique accounting structures within the market, including *second opinions* on green bond frameworks, *third-party auditing* of impacts, and *annual or frequent disclosures* of the bond's use of proceeds. To gain further legitimacy, issuers and investors now need to show how their green bond issuances and investments target existing or new climate-linked pledges or sustainability strategies, respectively. However, given the high potential for greenwashing, reputational impact can pose a weakness for this market as various other stakeholder-centric initiatives linked to transforming the economy move in tandem with market growth.

Given the key role that stakeholders have played in building this market's legitimacy, we pose our second research question: ***What can relevant stakeholders do to tap into opportunities and reduce barriers to further grow this market within Canada?***

### 3.2.2. Transition-related Legitimacy in the Market

For several countries, including Canada, having a resource-focused economy can work against greening the financial system. Hence, the idea of transition has been an

evolving concept and a new factor in how a country incorporates sustainable finance into the financial system. The sustainability transitions literature has historically focused on the socio-technical management aspect of a transition – consisting of various multi-level and multi-governance approaches of stakeholders in relation to the integration of new policies and institutions towards a green economy. This approach involves identifying regimes, niches, and landscapes relevant to the transition (Geels, 2013; Gibbs and O'Neill, 2015).

Although our research questions are somewhat based on a multi-level perspective (MLP) advocated by transitions literature, we focus on identifying stakeholder-related opportunities and constraints affecting the legitimacy and scalability of the sustainable finance landscape in Canada. We look to build a picture around the Canadian green bond market's growth and the subsequent lessons it might have for transition finance in the future. With this in mind, we document the opportunities and drawbacks of transition and sustainable finance that can further affect the establishment of its legitimacy without running the risk of greenwashing (Hallin *et al.*, 2021). More specifically, in the green bond market, transition legitimacy looks like a market ecosystem that truly addresses societal demands like environmental degradation or climate impacts in a manner that is also pragmatic for the market actors (i.e., able to issue or invest in a green bond with little or no change as compared to their regular projects or investments) (Climate Bonds Initiative, 2021).

According to the accounting literature, to attain legitimacy, two dimensions need to be met: **action** of the organization, where its activities are congruent with social values, and **presentation**, where its activities appear congruent with social values (Manetti and Bellucci, 2018). Although ideally, both conditions need to be met, there have been instances where presentation could be undertaken without the necessary action by the market actor. In the green bond market, this is the risk of greenwashing or presenting a bond as green without meeting any significant environmental improvements.<sup>15</sup>

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<sup>15</sup> The case of Repsol has been cited as an example where a green bond was issued by an oil and gas issuer to refinance and improve the efficiency of its oil refineries. Most critics pointed out that this bond was not to be called a green bond as it did not deliver on any additional improvements and met the 'low hanging fruit' (Weber and Saravade, 2019).

A significant aspect of greenwashing has also been linked to a lack of legitimate economic transition, i.e., the presentation of how a country or entity appears to make a public commitment but without making any real or significant changes when it comes to business-as-usual. In Canada, this concern around transition has been witnessed with the evolution of the transition taxonomy and how it may or may not incentivize the financial sector to make significant improvements in financing the LCR gap (Canada Climate Law Initiative, 2020). Hence, this raises the third key research question: ***how do stakeholders affect the transition concerning the green bond market in Canada?***

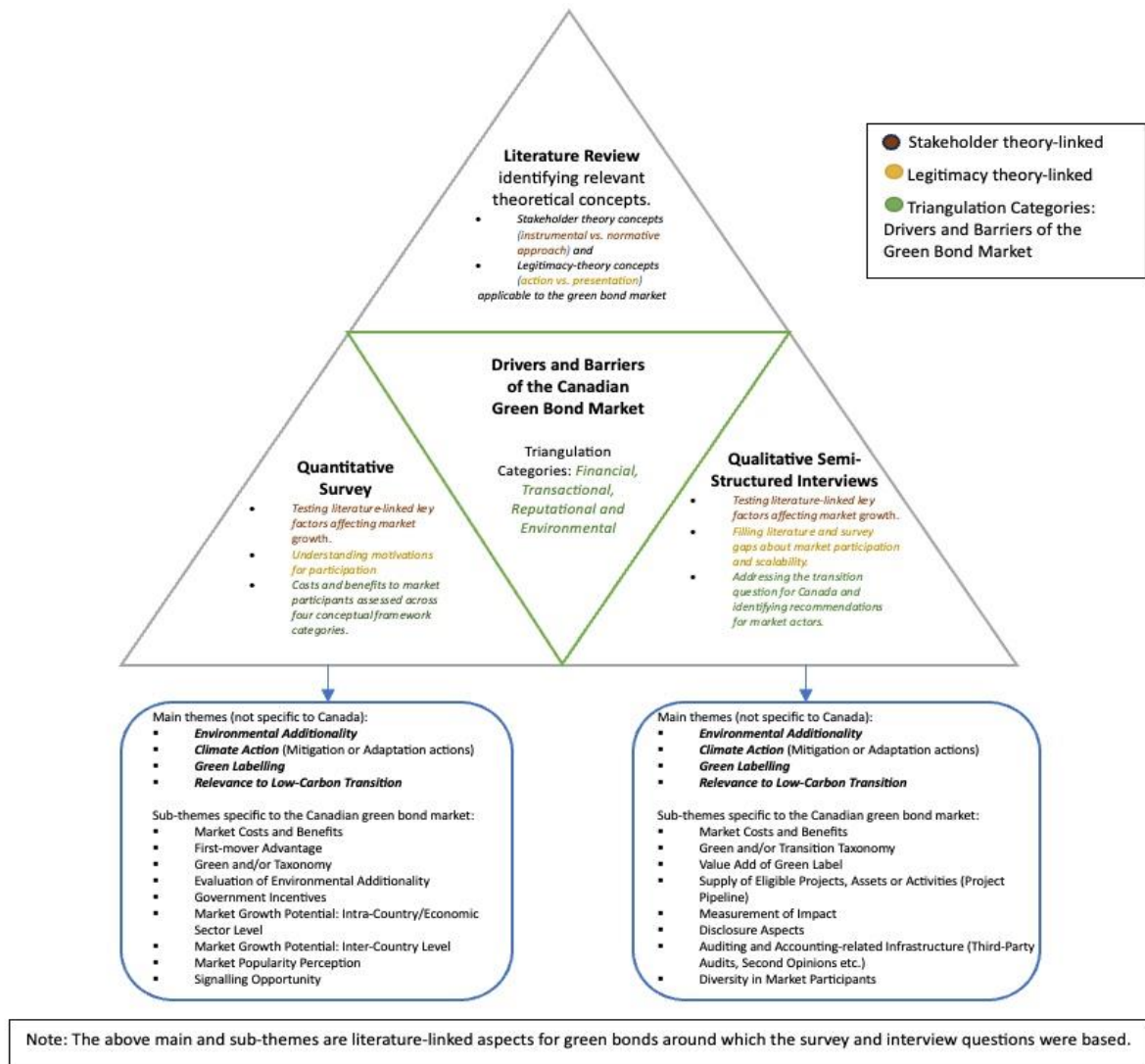
Our paper contributes to theoretical and practitioner literature by answering these three research questions. By exploring the role of state and market actors in building or shaping new market infrastructure, our paper hopes to contribute to the legitimacy and stakeholder theory by filling the scholarship gap on the Canadian market and providing some policy lessons for other market developments linked to the transition agenda.

### 3.3. Methods

Our research scope was to examine the Canadian green bond market due to its urgent need to close the sustainable finance gap and implement accounting-focused market-building lessons for transition finance. To meet the intricacies of our inquiry, we chose a concurrent mixed methodological approach that triangulates the findings from quantitative and qualitative results (Cresswell and Cresswell, 2017). For the quantitative side, we conducted an online survey to document responses to key barriers and drivers identified by the literature. For the qualitative side, we carried out in-depth semi-structured qualitative interviews with key stakeholders of the green bond market to better understand underlying trends and challenges. Given the small size of stakeholders in the Canadian market, we chose this method due to its ability to undertake the survey and interviews concurrently and fill any gaps presented by challenges in either type of data collection.

The following key concepts identified in each theory drove the triangulation of our results: ***normative*** and ***instrumental approaches*** for stakeholder engagement and the ***action***

versus *presentation aspect* of stakeholder norms as it relates to legitimacy in this market. As highlighted in our background section, the cost and benefit analysis of financial, transactional, reputational, and environmental categories can be a method to understand the drivers and barriers for stakeholders. Hence, we triangulated our results based on these categories to provide a conceptual analysis framework. To test our legitimacy theory concepts, we asked both survey and interview participants about their primary motivation for market participation, and additionally asked the interviewees open-ended questions about the market scalability and transition finance in Canada. The survey helped understand the key factors driving green bond interest in Canada, and the interviews filled the gap on recommendations for addressing stakeholder and legitimacy-linked concerns (see Figure 3.1).



**Figure 3.1: Triangulation Approach for Understanding Barriers and Drivers of the Canadian Green Bond Market (Authors' Construction)**

We emailed our online survey to 66 participants. The completion rate was 31.8 percent, with 21 participants completing the survey. Out of this sample size, about 85 percent directly interacted with the Canadian green bond market. Due to our research scope on Canada, our result section focuses on the survey and interview findings that directly address

our research questions. Our sample size for the interviews was 22 participants (see Table I in Appendix for profiles), and they ranged predominantly across the Canadian market (with 77 percent based in Canada), with a few selected from the global green bond market. About 95 percent of participants participated in both stages and hence were able to fill any gaps experienced with either data collection stages. The study participants were chosen based on their affiliation with known investors or issuers in this market (public data on firms that do issuance or investment was available from the Climate Bonds Initiative website). Some participants recommended further names during the interview process, and others were known to the researchers based on their interactions at previous industry-led sustainable finance workshops or academic conferences.

Hence, the participating stakeholders can be classified into the following categories: issuers (N = 4), investors (N = 4), third-party rating agencies (N = 5), academics and other market observers (N = 9). These stakeholders are involved in the green bond market differently and are primary stakeholders. Issuers and investors are the main market participants on the supply and demand side. Rating agencies have a strong influence because they provide ratings for green bonds that investors use. Finally, we wanted to integrate the views from relatively neutral stakeholders who still have a direct impact on the market growth potential. These include academics and other market observers like policymakers or non-governmental organizations (NGOs).

Both the survey and the interview questionnaires (see Supplementary File 2) were created using reports from the Climate Bonds Initiative, including country-level reports for Canada and other market and academic literature. Based on this research, the four main themes included in the survey and interview questionnaire were: **additionality** provided by this market, **climate action ability**, **green labeling**, and relevance to a **low-carbon transition**. For the survey, we divided these aspects into sub-themes like costs and benefits of the market, first-mover advantage, taxonomy (or green definition), evaluation of additionality, government incentives, market growth potential (intra- and inter-country level), market popularity perception, and its ability to provide a signaling opportunity. For the

interviews, our sub-themes consisted of similar questions to the survey, but with the addition of questions around eligible investment projects, the value-added of green labels and accounting-related infrastructure (e.g., second opinions), disclosure aspects, and the diversity in market participants.

These main themes were tested across both global and Canadian markets. We assumed the global green bond market consists of countries with the top 10 green bond issuances over the last five years. These countries include the USA, China, France, Germany, Netherlands, Spain, Sweden, the UK, Italy, and Japan (Climate Bonds Initiative, 2021). However, given the scope of this paper, we focus mainly on the Canadian context and examine the sub-themes related to the Canadian market. To help cover any knowledge gaps, we provided some open-ended questions in the survey to identify one major barrier and driver for the Canadian market.

To allow for robustness in our survey results and based on the smaller sample size, we undertook non-parametric tests like the Wilcoxon signed-rank test to explore whether the medians of the questions for the global green bonds were different from the medians of the responses for Canadian bonds. The tests were conducted for aspects like additionality, climate action potential, green labeling, impact evaluation criteria (being assessed on environmental impact versus purely financial information), and evaluation methods (potential to use tools like life cycle assessment for measuring impact). We analyzed these aspects because they provided comparability for global and Canadian green bonds in our survey.

Regarding the qualitative data, we categorized the interview transcripts and the open-ended survey responses using a reflexive thematic coding approach (see Supplementary File 1) (Clarke & Braun, 2016). We highlighted emerging trends and keywords in our analysis. This was done using NVivo coding software, which helped us code the various overarching themes and sub-themes to create a conceptual analysis framework (with main categories of financial, environmental, reputational, and transactional drivers and barriers). To support the triangulation of results, the approach showcased in Figure 3.1 was undertaken to fill any data

gaps concurrently. The triangulation results (Figure 3.5) were further explored by connecting them to the discussion section.

## 3.4. Results

This section presents the quantitative and the qualitative results and their triangulation.

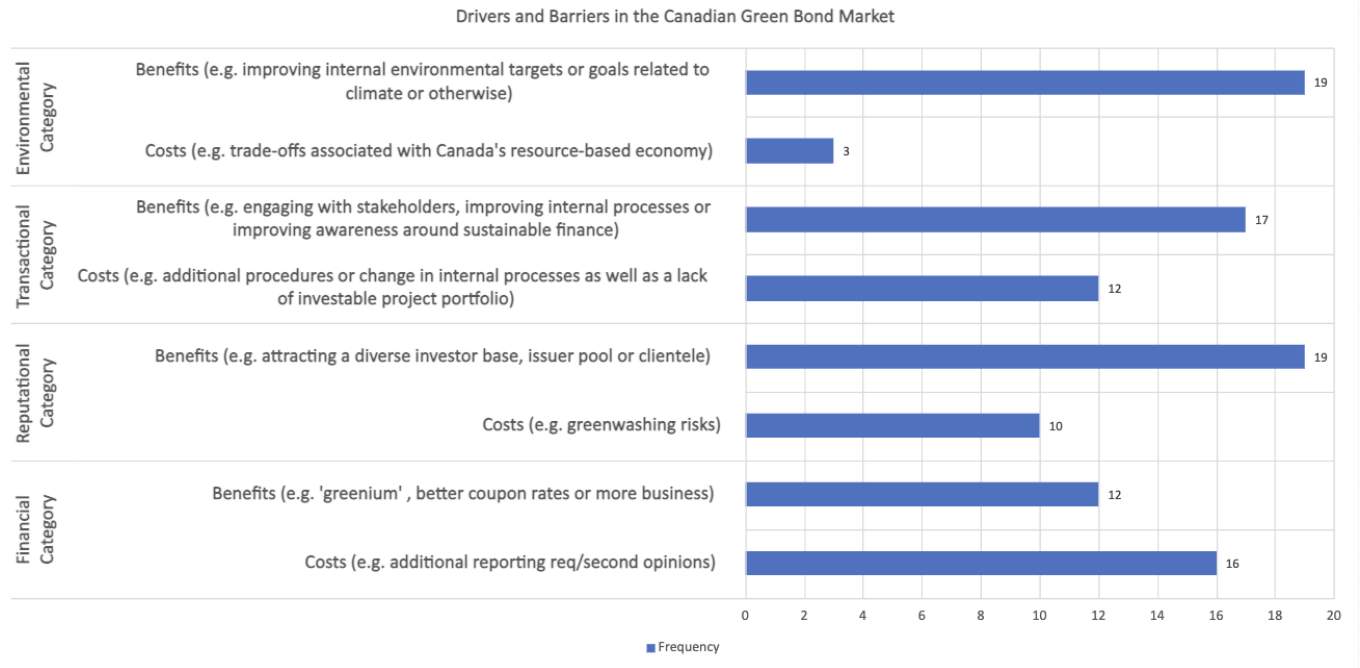
### 3.4.1. Quantitative Results

The rationale for undertaking the survey was to identify the participant's perspective on literature-highlighted drivers and barriers that would be applicable to the Canadian green bond market. Our survey demographic data found that most participants occupied senior to executive-level roles within their organizations. The sample consists of 18 male and three female members. Participants also had some previous training or education related to sustainable finance, but not specifically to green bonds.

Regarding examining the main barriers affecting the Canadian market, our results (see Figure 3.2) suggest that financial and transactional costs were more frequently experienced than other costs. These included aspects such as additional reporting and tracking as well as third-party services required for green bond issuance. For the transactional side, the main barriers ranged from undertaking internal process or procedure changes to a



lack of project portfolio or investable opportunities.

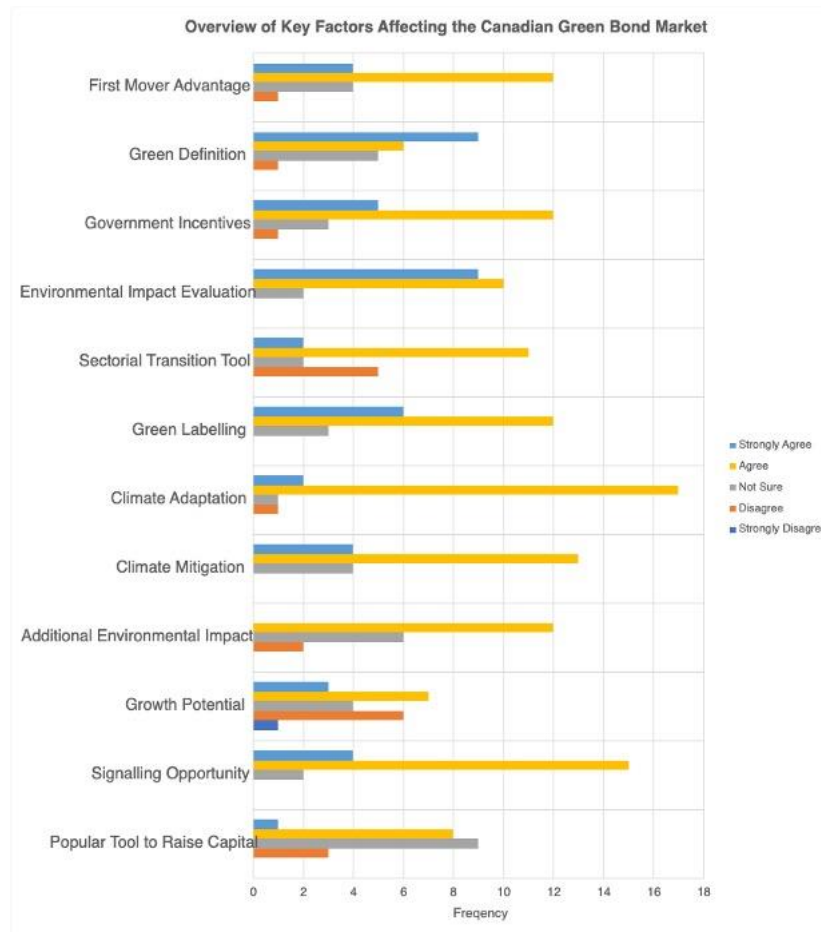


**Figure 3.2: Survey Response Drivers and Barriers of the Canadian Green Bond Market (Authors’ Construction)**

Regarding the main drivers of the Canadian market, Figure 3.2 shows that the survey respondents highlighted the reputational and environmental benefits of green bonds equally. The aspects of market drivers ranged from attracting a diverse stakeholder base to improving environmental targets or goals.

Our survey results (see Figure 3.3) also show that respondents agreed or strongly agreed that green bonds are becoming a popular tool to raise capital, signaling substantial investment opportunities that could create beneficial environmental impact and address climate adaptation and mitigation. The green label and first-mover advantage were also seen as beneficial for the Canadian market.

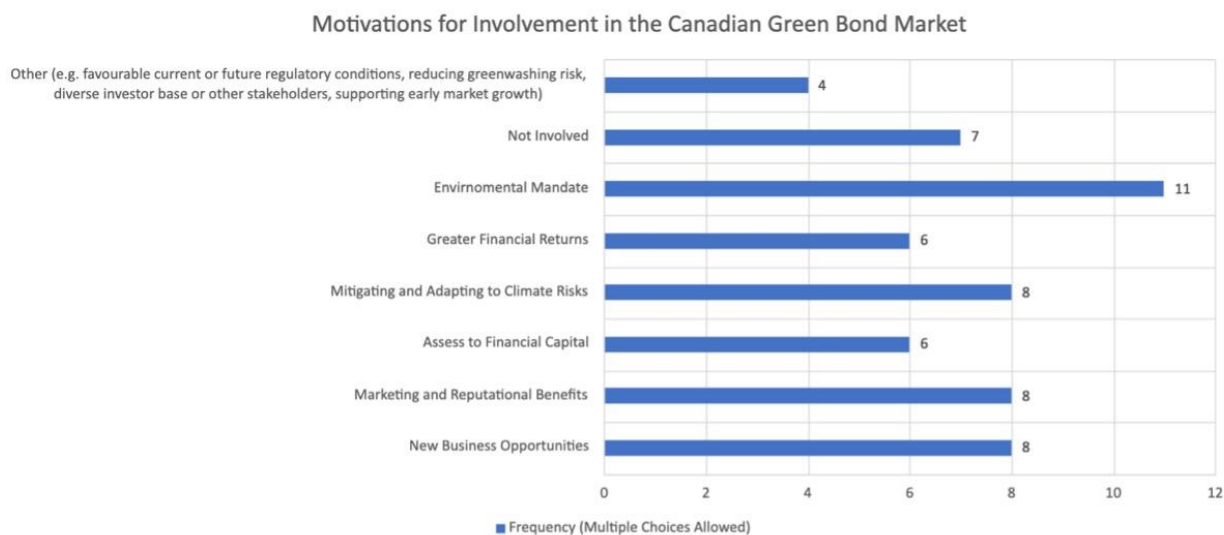
Looking at the role of government and other market stakeholders, it seemed that financial and reputational incentives could be helpful for market participants who are looking to increase issuances or enter the market. Finally, the only question with a mixed response was whether the Canadian market possessed the potential to be a global leader in sustainable finance (see Figure 3.3).



**Figure 3.3: Overview of Key Factors Affecting the Canadian Green Bond Market (Authors' Construction)**

In terms of overall motivations linked to participation in the market, respondents suggested that the environmental mandate was the strongest pull in terms of participation.

However, aspects like adapting or mitigating climate-related risks, marketing, and reputational benefits from issuing or investing in a green bond or new business opportunities (see Figure 3.4) also helped draw involvement from stakeholders.



**Figure 3.4: Motivations for Involvement in the Canadian Green Bond Market  
(Authors’ Construction)**

Finally, to provide robustness to the results, we tested whether the participants had different views on the Canadian market compared to the global one. Using the Wilcoxon signed-rank test, we found statistically significant differences ( $p < 0.05$ ) for the following:

1. Participants perceived greater additionality or environmental benefits for global green bonds compared to their Canadian counterparts.
2. However, the evaluation aspect of the environment or climate-related impact of a Canadian green bond was seen to be more important than for its global green bond counterpart.

### 3.4.2. Qualitative Results

The rationale for undertaking interviews was to gain deeper insights and to better understand underlying trends and challenges of the Canadian green bond market. Using NVivo coding (Supplementary File 1), we established common themes across our interviews and open-ended survey responses. The following market drivers and barriers were identified based on our coding.

#### *3.4.2.1. Drivers of the Canadian Green Bond Market*

The main drivers of the market were its ability to meet the high demand for sustainable finance products, emerging evidence of a 'greenium' or preferential financial terms (such as a better cost of capital for green bonds), value-added of green credentials, and a public commitment or marketing opportunity to showcase environmental impact, as well as new access to a diverse investor base. Apart from these drivers, secondary factors like stakeholder engagement for issuers and investors –internally at the staff level and externally at the stakeholder level – also increased tangibly due to the green bond market.

Major drivers were the high demand for sustainable finance products and the market's ability to fulfill this demand. Stakeholder engagement came as the second most coded response category and involved more investor input on aspects such as additionality or measurement of environmental impact. Investors are now savvier about these investments and want to avoid investments that increase their financial and reputational risks. To address such risks, one investor mentioned how the "green bond market provided the ability to ring-fence projects in a way that ensured the investment was going towards outlined projects" (INV\_01).

For investors, green labeling acted as an opportunity to fulfill the growing mandate of having climate-friendly investments in their portfolio and addressed the need to reduce environmental risk exposure. Green labeling provided a marketing argument for issuers to attract a diverse investor base. From a reputational perspective, a green bond issuance was also seen as a public commitment to green business activities. According to one investor,

"labeling could prove to be the basis of a robust discussion on what counts as green and how to reorganize public policy to address climate risks and opportunities" (INV\_03). As mentioned by a policymaker "this opportunity to restructure pathways to the low-carbon transition also help provide governance and social benefits to the financial markets, such as those seen with introducing new climate-related measurement tools or evolving global standards related to sustainable finance" (AMO\_08).

#### *3.4.2.2. Barriers for the Canadian Green Bond Market*

The main drawbacks faced by the green bond market are the risk of greenwashing, higher transactional costs, liquidity issues in the secondary market, concerns around the additionality of environmental impact, and the lack of investable project opportunities in Canada. Apart from these concerns, various transactional challenges have risen due to a lack of expertise or standardization when tracking and measuring the impact of green bond's use-of-proceeds. Governance-related transactional barriers were coded as most frequent, followed by potential greenwashing risks. As one smaller issuer suggested, additional reporting requirements seem even more demanding as they "face capacity building constraints and act as an impediment for potential issuers trying to enter the market" (ISS\_02). As highlighted by an investor, "a big factor in what makes this market acceptable at the mainstream level can also be having universal standards and retail investor buy-in, and currently, this is a drawback for scaling up the market" (INV\_02). When it came to investor needs, interviewees highlighted the rising demand to understand impact additionality provided by green bonds, the lack of more meaningful disclosures on investment performance, concerns on how to avoid greenwashing, and the overall strategic efforts of issuers in addressing their alignment with the net-zero trajectory. However, they also mentioned evaluating an issuer's overall trajectory or strategic direction as important. The alignment with climate targets is an important point of scrutiny for investors already involved in this market. This led to the point around taxonomy development and how it could help scale or deter market growth.

As mentioned by an issuer, not only is there a need to discuss the evolution of different types of global taxonomies—ranging from more green-focused (e.g., the European Union's Environmental taxonomy) to a transition one (e.g., Canada or Japan's work on transition finance). Doing so will help set a clear pathway and prescribe a nomenclature bridging the gap between financial market participants and scientific communities (ISS\_03). However, a caveat mentioned by an investor was that "if an investment seems good today, it may not necessarily hold up a decade down the line" (INV\_01). Hence, building a taxonomy needs a long-term perspective, but also keeping the short-term economic impacts in mind.

Interviewees mentioned that "transition is not necessarily a Canadian-only phenomenon; the idea of a transition taxonomy needs to be more broadly acceptable to attract international investors and maintain a good reputation" (TRP\_02). As a global market interviewee suggested "the focus of certain players in the Canadian financial sector was to build this taxonomy for sectors that may be fossil fuel intensive and key to the Canadian economy" (TPR\_03). However, a common concern for those outside of Canada was ensuring that the "taxonomy is truly a bridge that connects brown to green transition rather than just a low-hanging fruit for the fossil fuel sector and its financiers" (AMO\_01). One policymaker mentioned that the private sector could lead the "creation of a transition taxonomy, but the end goal was to have it be a part of how Canada can align its transition with its international pledges" (AMO\_07).

Governments were also seen as the central coordinator across different sectors and industries, and one investor mentioned, "the Canadian government should play this role when looking to chart Canada's transition pathway or shape policy priorities in the budget" (INV\_03). Interviewees highlighted the need for better stewardship and guidance on which issuers or investors could use climate scenarios to create reliable baselines and track their projects and investments over time. As one policymaker mentioned, "although the green bond market is on the tailwind of federal policy changes, the need to have it front and center is becoming more evident with rising physical climate risks and closing windows of opportunities" (AMO\_05).

In terms of challenges due to the changing definition of green, interviewees noted the positive impact of disclosure regulations like the Taskforce on Climate-related Financial Disclosures (TCFD) and the applicability of the Green Bond Principles (GBP). One interviewee in the bond rating space mentioned that "in terms of addressing the use of second opinions for evaluating the use-of-proceeds framework, they were not as valuable as third-party verifications due to the changing use of metrics and frameworks being used to evaluate the evolving definition of green" (TPR\_01).

All interviewees noted the lack of incorporation of climate change adaptation when it came to the climate action potential. For instance, projects that could help with carbon sequestration (i.e., carbon capture and storage or wetland restoration) and help reduce disaster risk and insurance costs, were currently missing in the issuer's project portfolio. Furthermore, sectors such as water were not presently being targeted enough in Canada – especially given the abundance of freshwater in provinces like Ontario. A big challenge noted by issuers was the inability to measure the progress of projects over a short time horizon and track any direct financial returns.

Interviewees were asked about impact measurement criteria, including Scope 1,2, and 3 emissions, and what other scientific measurement tools (such as LCAs) could be useful when evaluating a green bond. As mentioned by a rating agency participant, "tools like LCAs could be useful in addressing Scope 3 challenges (tracking indirect emissions across the supply chain), but they could also prove to be onerous if the market already faced barriers when scaling up" (TPR\_03). Building on this, an issuer noted that "having some continuity in undertaking measurement assessments was an important factor" (ISS\_01). Still, it also needed to ensure that sectors or projects critical to the low-carbon economy did not potentially disrupt supply chains. Another significant barrier was the lack of awareness around potential scientific tools and novel climate data linked to the impact of financial investment.

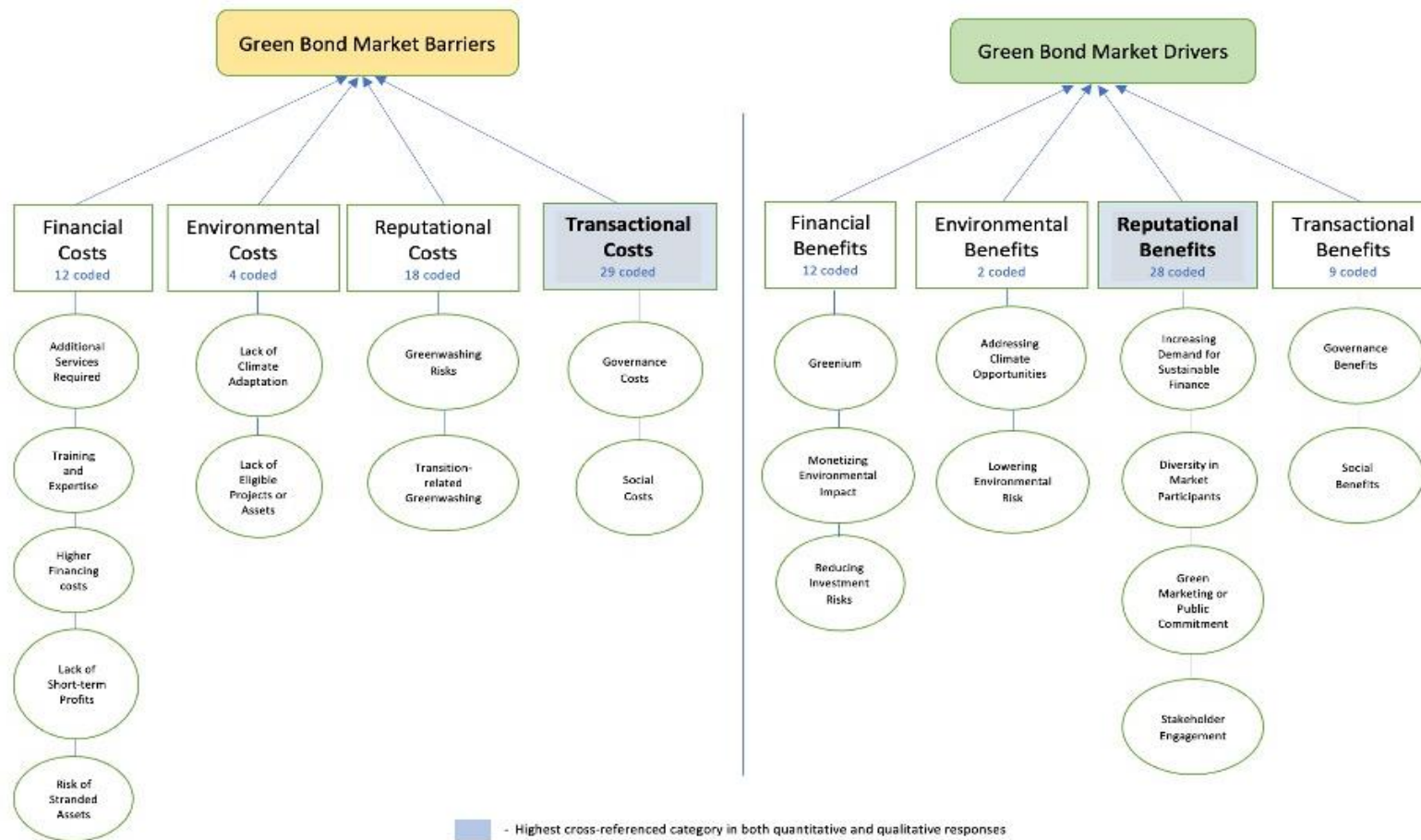
### 3.4.3. Triangulation of results

Our survey shows that financial and transactional costs are the highest in the Canadian green bond space. On the other hand, our qualitative results suggest that transaction and reputational barriers best described the Canadian market. Upon triangulation of the results, *transaction costs* seem to be the main barrier to the market. These results align with the literature (Deschryver and de Mariz, 2020).

In terms of the main drivers of the market, our survey finds reputational and environmental benefits have the highest return for participants. Our interviews reiterated the importance of reputational benefits as a market driver. Thus, we conclude the main drivers of the Canadian market are the *reputational benefits* for stakeholders.

Figure 3.5 showcases the triangulation efforts by connecting the four triangulation categories with the primary and secondary data.





**Figure 3.5: Triangulation Results (Authors' Construction)**

## 3.5. Discussion

In this section, we discuss the triangulation results and provide a new conceptual lens for understanding the barriers and drivers of a country-level green bond market.

### 3.5.1. Analysis of the Market Barriers

Green bonds have evolved in a contested space, where there is a need to prove additionality regarding impact (Schneeweiß, 2019). Our results show that Canadian green bonds are more likely to be perceived critically regarding the impact evaluation of their use-of-proceed compared to their global counterparts. This implies that the global green bond market's built-in perceived environmental benefits (i.e., additionality) are less likely to exist within the Canadian market, unless Canadian green bonds prove the additionality of their impact and document their evaluation processes more thoroughly.

As highlighted by the survey, financial and transactional costs are high in the Canadian green bond space. Tracking the green bond impact and assessing the additionality is often conducted by primary stakeholders, such as third-party reporting agencies or second-opinion provider and increases costs. However, using the accounting-related infrastructure provided by rating agencies allows Canadian green bonds to meet global standards, showcasing the *normative approach* to stakeholder engagement. On the other hand, our results also suggest that transaction and reputational barriers are those mentioned most frequently in the Canadian market. This result aligns with the accounting theory literature on how stakeholders influence the market and its shortcomings (Donaldson and Preston, 1995; David *et al.*, 2022). For example, suppose reputational barriers such as greenwashing risks are evaluated by market participants such as investors at the time of investment; this will help address the additionality gap that the Canadian green bond market faces and fit within the *instrumental approach*, where stakeholder engagement seeks to go above and beyond the baseline.

Similarly, if transaction-related barriers falling in the governance category (e.g., lack of expertise in sustainable impact tracking and no universal disclosure standards) or the social category (e.g., lack of broader market buy-in from retail investors or institutional guidance on

how to transition or align with a net-zero target) are to be addressed, it would need an *instrumental approach* as well. Our findings suggest the need for more coordinated support and leadership from critical primary stakeholders such as policymakers. In the Canadian context, the necessary policy and regulatory guidance on due diligence in this market is currently missing from major financial oversight bodies, including Canada's Office of the Superintendent of Financial Institutions (OSFI), securities regulators across various provinces (e.g., Ontario Securities Commission), Bank of Canada, and the Government of Canada. Having some level of involvement, especially in aspects like taxonomy creation or even providing market support to smaller issuers, could be useful for scaling up market participation.

Given that transition is not a Canada-specific case, a taxonomy should also be designed in a flexible way that other countries could adopt (Scott, 2021). Through the involvement of certain regulators and governments on different levels that may face greater transition pressures, the taxonomy could create a 'just transition' framework and provide an outlet for greater stakeholder involvement (Pai *et al.*, 2020). This aspect aligns with the *instrumental approach*.

The green bond market can push for significant engagement with transition-based stakeholders to provide more *action-centric* legitimacy for the Canadian transition process. To reduce the risk of greenwashing and create legitimacy, governments can also help by putting in loan guarantees or using their investments for certain transparent and aligned bonds (Baraldi *et al.*, 2021). Our findings suggest that the Canadian federal government and various financial regulators can look further into sectors that will be a burden and those that are valuable assets for Canada's low-carbon economy. Ensuring a legitimate taxonomy, which is supported by the federal government, will allow investors to identify relevant bonds and issuers to appropriately align their corporate strategies and baseline scenarios with a net zero trajectory. This strategy also reduces the risk of delegitimate taxonomies.

An action-centric transition approach in the green bond market can effectively orient our society toward economic sustainability, keeping in mind the sustainable development agenda to meet the needs of the present without compromising the ability of future generations to meet their own needs (Loorbach *et al.*, 2011; Brundtland, 1987). With lessons learned from the Canadian green bond market, addressing challenges like reputational costs and transaction costs can be crucial for how effective any transition process works. This means the involvement of

primary stakeholders, such as policymakers, institutional investors, and issuers of green bonds, can be a crucial step towards attributing transactional and reputational legitimacy to the process (Saravade and Weber, 2020). Therefore, an instrumental stakeholder-focused approach is necessary to ensure that the transition occurs on an action-centric and positive note (Pai *et al.*, 2020). Other countries with resource-dependent economies can potentially transition their carbon-intensive sectors towards sustainable development by alleviating green bond market-related stakeholder costs and challenges early on.

### 3.5.2. Analysis of the Market Drivers

The main benefits of the green bond market lie in its ability to ring-fence the use of proceeds, prescribe certain project types, and monitor and measure the impact of an investment over its lifetime. This means that green bonds help provide a reputational benefit to their issuer, investor, and third-party service provider. Green bonds help provide immeasurable reputational benefits to those participating, attracting more publicity, capacity, and capital towards growing this market and hence providing more legitimacy (Karpf and Mandel, 2017). These aspects not only target the *presentation aspect* of legitimacy but also engage stakeholders through the *normative approach*, where disclosure reporting is based on the norms and standards set by the market. By targeting stakeholders and legitimacy aspects, the green bond market encourages better green performance assessments among other sustainable finance products in Canada. As reinforced by our results, stakeholders place environmental benefits and the assessment of Canadian green bonds as important market drivers.

With current interest piquing in sustainable finance, there is a flurry of international accounting frameworks, standards, and indicators related to measuring impact – including the TCFD recommendations, Sustainability Accounting Standards Board (SASB), Climate Disclosure Standards Board (CDSB), Global Reporting Initiative (GRI), and International Integrated Reporting Council (IIRC) (Climate Disclosure Project, 2022). Though this plethora of standards can create confusion in the market and be a barrier for new stakeholders, they also present an opportunity for stakeholders to meet the *normative approach* and allow for the *presentation* of legitimacy. For example, the process of identifying environment additionality in the green bond market has been a significant challenge, but as one market participant mentioned, "it can be enlightening to take a step back to think of how far green bonds have come to

champion the cause of climate action around the world." Not only were thresholds, metrics, and indicators identified to track the green bond performance, but important stakeholders and financial actors also asked questions about the impact and additionality of their other investments and projects. Such market drivers help develop instrumental approaches among stakeholders and allow for more *action-centric* legitimacy in the market.

To ensure comparability, assumptions used in these impact methodologies and scientific measurement tools must be transparent (Ameli *et al.*, 2020). If meaningful and comparable key performance indicators (KPIs) are not part of the audit process (Ehlers *et al.*, 2020), it might appear as a *presentation* of legitimacy rather than an action-centric approach. Here is where governments and academia could use an *instrumental approach* for providing better guidance, assessment tools, and scoring frameworks for issuers looking to address large-scale projects (e.g., municipal transit or infrastructure) in emission-intensive sectors (e.g., mining or agriculture). In addition, stakeholders like investors and policymakers could explore alternative investment tools like sustainability-linked bonds<sup>16</sup>, to help issuers meet their stated ‘additionality’ goals when it comes to sustainable finance debt.

In March 2022, the Government of Canada issued its inaugural sovereign green bond, highlighting various eligible project categories<sup>17</sup> that could help encourage other Canadian issuers to follow suit. This is an example of action-centric legitimacy for defining the boundaries of the market. Policymakers can play a crucial role in supporting innovative project types – such as nature-based solutions (Stanley *et al.*, 2019). Consequently, they can provide an instrumental approach to stakeholder engagement across various sectors.

Although Provinces like Ontario are already actively participating and are some of the biggest issuers in the market (Climate Bonds Initiative, 2023), the issuance of green bonds by the Canadian government in 2022 signals a more action-based, legitimate transition towards scaling the market. To make green capital more competitive for smaller issuers, the role of established primary stakeholders involves helping market newcomers by reducing their transactional costs

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<sup>16</sup> Sustainability-linked bonds (SLBs) are structured in a way that allow for issuers to meet predefined sustainability and ESG objectives that are forward-looking and performance-based. If issuers are unable to meet the sustainability outcomes in the determined time, the interest rate of the bond increases by a predetermined penalty amount. Alternatively, if they meet them by the date, their subsequent interest payments decrease by the pre-determined amount. There are several other types of structural and financial characteristics associated with SLBs.

<sup>17</sup> See for more detailed categorization: [https://www.canada.ca/content/dam/fin/publications/green-bond/21265%20Green%20Bond%20Framework\\_EN.pdf](https://www.canada.ca/content/dam/fin/publications/green-bond/21265%20Green%20Bond%20Framework_EN.pdf)

and increasing their reputational benefits as provided by the market (Harrison and Muething, 2020). This approach will allow for the action-based legitimization of the market as more formalized structures are created to ensure access (Saravade and Weber, 2020) and will enable the addition of new stakeholders, including retail investors or small and medium-sized issuers.

### 3.5.3. Policy Recommendations

Our results suggest the following policy recommendations for the Canadian market:

- To help primary stakeholders understand the market's value, some aspects of reporting and disclosure should target the question of environmental additionality. This can be achieved by setting trackable climate targets and benchmarks towards an LCR transition. The use of globally recognized accounting standards, frameworks, and metrics for Canadian green bonds (and transition bonds) can also reassure market actors that sustainable finance can be tracked and held accountable in terms of its additionality.
- When issuing green bonds, stakeholders, such as governments, should also help address the project pipeline gap and introduce new project types, such as climate adaptation or nature-based solutions. Another aspect to consider when building such a project portfolio is that Canadian market stakeholders could use the transition taxonomy to anticipate the projects that fall into the green category (green bonds) or the transition category (transition bonds), and thereby reduce the transaction costs posed by the lack of labeling.
- Better market legitimacy can be established by stakeholders if there is engagement with more meaningful performance indicators, especially those based on climate data and scientifically backed performance measurement tools. This is integral since Canadian green bonds need to demonstrate additional impact.

Enhancing the role of significant stakeholders, such as policymakers, through bond issuances and policymaking is necessary to help legitimize the market and address transaction-related barriers. Issuing more sovereign green bonds and creating baseline rules and regulations will help solve the liquidity problem and enhance the reputational benefits of this market for other stakeholders.

### 3.6. Conclusion

As Canada's green bond market grows, questions are raised about its effectiveness and efficiency in addressing the low-carbon transition in time. Our research found that green bonds are an essential financial tool to address opportunities in the LCR economy. However, there was still some hesitation regarding how country-level markets, particularly the Canadian market, were developing. Based on the results of our three research questions, we conclude the following:

The main accounting-related driver for the Canadian market is the reputational benefit for stakeholders, i.e., its ability to meet high demand for sustainable finance and the marketing benefit of its green credentials. Hence, to maintain a high reputation, green bonds should be transparent and be used for financing real green projects that are not suspicious of greenwashing (Delmas & Burbano, 2011; Strauß et al., 2023; Testa et al., 2018).

The most significant market barriers for green bonds in Canada are transactional costs, i.e., additional tracking required for reporting purposes, lack of market liquidity, and lack of identification of environmental impact or 'additionality'. However, as seen above, transparency and impact reporting are required by many stakeholders (Ameli et al., 2020). Hence, the standardization of reporting might be able to reduce costs.

To tap into opportunities and reduce barriers, Canadian green bond market stakeholders should engage with **normative approaches** (that meet industry best practices) or **instrumental approaches** (that go above and beyond expected norms) (Donaldson & Preston, 1995). This means reducing transaction costs by issuing more green bonds and using established best practices like second opinions or third-party reporting. On the reputational side, identifying robust assessment criteria for environmental 'additionality' provided by Canadian bonds could be useful.

Finally, stakeholders affect the transition through their **actions** and **presentation** aspects of sustainability-related change, thereby creating market legitimacy. This means addressing reputational concerns and maximizing the reputational benefits provided by the market will increase opportunities for green bonds in Canada and reduce the risk of greenwashing through public commitments and disclosure of green bond impacts. We also recommend addressing

transaction-related concerns by creating a governance mechanism (i.e., internal process change or taxonomy frameworks) that reduces stakeholder transaction costs.

Hence, what might be the roles of the different stakeholders in increasing the green bond market in Canada? Bond issuers need to ensure transparency about how their bonds address environmental issues and how they perform financially. Furthermore, they need to issue more bonds since investors' demand is much higher than the supply. The second stakeholder group, rating agencies, are the intermediaries between issuers and investors. They provide certainty about green bonds' performances through standardized audits and ratings and consequently have the power to increase the transparency of green bonds. The third powerful stakeholder group is investors. They are interested in a supply of financially and environmentally attractive green bonds to 'green' their portfolios. All these stakeholder groups are interested in removing the barriers to green bonds through reducing transaction costs and increasing transparency of the green bond market.

The drivers and barriers highlighted in our study also apply to other country-level markets, where there is a need to undertake some form of LCR transition without disrupting the legitimacy of green bonds. One limitation of our research has been the focus on the Canadian setting; however, future research could use a similar approach and undertake comparative case studies of other resource-based economies that implement transition taxonomies or explore the unintended or negative impacts of introducing accounting standards in the green bond market.

**MANUSCRIPT ENDS**



## Chapter 4

# To Label or Not? A Discrete Choice Experiment Testing Whether Labelled Green Bonds Matter to Retail Investors

*Contents of this chapter are to be cited as:*

Saravade, V., Weber, O., & Vitalis, A. (2024). To Label or Not? A Discrete Choice Experiment Testing Whether Labelled Green Bonds Matter to Retail Investors.

### **Abstract**

The green bond market provides an ideal setting to understand how retail investor behavior is influenced by a green label and helps determine the potential to extend this market into a retail financial space. Our study uses a discrete choice experimental survey to evaluate how 1105 Amazon Mechanical Turk workers assess a potential retail investor scenario where they are offered a choice of investment between three different bonds. We provide investors with a choice between a baseline labelled green bond, a hybrid green bond, and a non-green bond across all three scenarios – with the two types of green bonds having disincentivizing financial returns. Our research scope was to examine whether a green bond label matters to retail investors and if so, whether this is based on their personal and behavioral norms. We also see if personal traits like risk tolerance, investor portfolio preferences, investment experience, and sociodemographic characteristics has a mediating effect on predicting a retail green bond investor. We have the following findings from our study:

1. Our study finds that there is a significant influence of the ‘green label effect’ on the overall investment preferences of retail investors.
2. Appropriate activation of behavioral norms can lead to higher preference for enhanced performance green bonds, even if it is antithetical to their economic interests. However, most retail investors cannot distinguish between the performance-framing green bonds and hence tend to invest based on anchoring heuristics and Systems 1 thinking, rather than on framing effects.

3. Personal traits like *higher risk tolerance* (individual for baseline green bond and institutional risk for hybrid green bond), and *previous investment experience with bonds* (high) and *term deposits* (any) predict higher investments into green bonds. Traits that are predictive of lower investments include *higher risk tolerance* (individual), *lower education level* (not completing high school), *investment horizon* (short), *experience with ETFs, stocks, or mutual funds* (moderate to high) as well as *not consulting financial experts* as a source of investment knowledge.

Our study has several contributions –we not only document this market among the retail investor space and measure their behavioral biases in decision-making, but also provide practical recommendations for the growth of this market, which can help attract more retail investment if it is done in manner that safeguards their interests. Our findings serve as the basis for our academic contribution to the literature on green bonds as well as is the first to identify retail investors’ behavioral norms and traits related to this market.

## MANUSCRIPT BEGINS

### 4.1. Introduction

The global financial sector has started providing retail-level access to innovative services and products like green banking, green bonds, green loans, and even green equity. Their motivations are driven by several factors – including the need to address climate risks and business opportunities as well as fulfill a growing socially-responsible customer demand for products that are seen to have a positive social or green impact. This trend is even reflected even at the corporate level, where the need to prove responsible social impact is prioritized by companies in their annual reporting or corporate communications (Valls-Martínez, Cervantes & Rambaud, 2020). Given that most individual-level investors want to have a ‘warm glow giving’ effect about their investments (Bank of New York Mellon, 2022; Dreyer, Sharma & Smith, 2023), but lack the institutional decision-making power, having this ease of access to retail-level financial tools can be empowering.

Among the innovative financial tools available for sustainable investing, the green bond market has exponentially grown in its global impact and popularity in raising climate awareness and closing the gap for the sustainable finance flows (Weber & Saravade, 2019; Saravade, Chen,

Weber & Song, 2022). Although this market is driven by institutional investors given the minimum size required for investment, there is growing evidence of retail investor participation and interest in this market as well (Azad, Devi & Mishra, 2024; Meng, Boulle & Giuliani, 2017). Undertaking a survey of potential retail investors in the market, Azad, Devi & Mishra (2024) found that demand for green bond investment can be predicted based on intrinsic factors like behavioral control and attitude as opposed to external factors like government policy support or social influence. However, since the green bond market in India is still emerging with no outlet for retail investor participation yet (Saravade & Weber, 2020), it warrants the examination of this research area in a more established investment setting where green bond markets are more likely to be accessible to retail investors.

One of the first country level markets that has provided retail level access to green bonds has been that of Canada – where retail investors had access to green bond investment through smaller energy co-operatives like Solar Share<sup>18</sup> or through boutique sustainable investment companies like CoPower<sup>19</sup>. However, the Canadian green bond market faces a scale barrier, with green bond supply falling short of the investor demand (Saravade & Weber, 2024). Saravade & Weber (2024) analyzed the barriers and drivers of the Canadian green bond market in the policy and institutional context and found that the minimum amount needed for investment<sup>20</sup> and the liquidity of green bonds seemed to pose a major barrier for retail investors. These findings inform the motivations of our study to understand what would drive the growth of retail investor participation in this market and what would inhibit its growth. Furthermore, with retail investors accounting for almost 52% of global assets under management in 2021 and expected to grow to almost 61% by 2030<sup>21</sup>, the rationale for examining a retail investor’s perception of green bonds becomes the new frontier when it comes to scaling up sustainable finance and providing a mainstream outlet for its growing demand.

Another motivation to study why the green bond market could be attractive to retail investors is to understand whether the effect of a green label found in the mainstream market can also apply to retail investors. This unique demand for a green bond’s label has manifested through the concept of a ‘greenium’ in the mainstream green bond market, where a preference is shown to

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<sup>18</sup> <https://solarbonds.ca/start-investing/>

<sup>19</sup> <https://vancitycommunityinvestmentbank.ca/copower/#whoWasCoPower>

<sup>20</sup> This was \$1000 for Solar Share and \$5000 for CoPower green bonds.

<sup>21</sup> <https://www.weforum.org/agenda/2022/10/a-fresh-look-at-how-to-empower-retail-investors/>

green bonds regardless of lower financial returns compared to a *pari-passu* conventional bond<sup>22</sup>. Although we can compare the green label effect to a halo effect<sup>23</sup> in some respects, we do not call it the green halo effect. The reason behind this is that we only examine the trait (green bond label) and its direct influences on the investment patterns of investors, rather than its indirect influence on how they perceive other aspects of the investment. We classify our findings as the ‘green label effect’, that drives investment into these bonds. However, we do believe there is future potential to document the green halo effect in this market and connect it to the green label effect.

Even though there is a range of literature examining the role of the green bond labelling in attracting investment (Karpf & Mandel, 2018; Henide, 2022; Hyun, Park & Tian, 2021; Gianfrante & Peri, 2019), only a few studies have mentioned the ‘halo effect’ linked to this market and none have connected it to the retail investor setting. For instance, Sangiorgi & Schopohl (2021) find that green bond issuances can have a ‘halo effect’ on investors’ interest for other securities of the same issuer. Yeow & Ng (2021) find that green bond create a corporate financial ‘halo effect’, by indirectly encouraging companies to have green practices which in turn are a catalyst for wealth creation based on higher profitability and financial valuation of those companies. However, no study has examined the ‘halo effect’ that a green bond label has on the retail investor market segment. To do so, we first need to understand whether a ‘green label effect’ exists among retail investors, and this is where our study seeks to contribute to the literature.

Our first research objective was to understand whether this ‘green label effect’ applies to the retail investor market, and subsequently our second and third research objective was to identify their personal and behavioral norms as well as personal trait characteristics, which can help predict their green bond preferences. Since our scope was limited to the analysis of the retail investor perspective, we did not consider the institutional investors mindset. However, we tested whether self-stated institutional risk tolerance<sup>24</sup> was different from their individual risk tolerance – thereby integrating a key difference between how retail investors and institutional investors might operate. Furthermore, since we focused on the North American context of retail investors based out of

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<sup>22</sup> *Pari-passu* means equal footing or ranking equally.

<sup>23</sup> Halo effect can be described as the ability to elicit the overall judgement or feeling for an investment based on a particular trait of the product, as well as its subsequent application into a different setting. For example, if a green bond is seen as a preferred investment opportunity, the green halo effect would allow the investor to (correctly or incorrectly) transfer their perception of green bond’s positive environmental or financial characteristics to its issuer as well.

<sup>24</sup> Institutional risk tolerance can be described as the proxy risk tolerance (or risk taken on behalf of others). An example here would be an institutional investor or fund manager that must make risk-related investment decisions on behalf of others. The rationale for using a different risk measure was to check if there is a change in investing styles based on the type of risk undertaken.

United States of America and Canada, our findings might not be applicable to the European or emerging market perspective when it comes to identifying retail-level green bond investment potential.

By conducting a discrete choice experiment with 1105 Amazon Mechanical Turk workers, our study tests whether retail investors' behavioral decision-making frameworks are in conjunction or against their pro-environmental preferences. We also analyzed whether retail investors are aware of the nuances within a green bond market, when it comes to existing market-level debates on environmental additionality (Saravade & Weber, 2024; Gibon, Popescu, Hitaj, Petucco & Benetto, 2020; Schneeweiß, 2019) or disclosure reporting norms (Steuer & Tröger, 2022; Saravade & Weber, 2020; Deschryver & De Mariz, 2020). To assess this, we tested their investment choices across experimental scenarios as related to retail investors' labelling preferences for bonds (Scenario 1), environmental benefits perception of bonds (Scenario 2) and bonds' disclosure reporting preferences (Scenario 3). We provide investors with three types of bonds (with different framing attributes in each scenario) – baseline green bonds, hybrid green bonds and non-green conventional bonds – and ask them to invest based on their preferred bond-specific characteristics.

Our findings suggests that retail investors consistently showed a preference for baseline labelled green bonds across all scenarios. When retail investors are presented with just limited framing information (such as label and financial performance), they tend to prioritize environmental considerations over financial returns. However, when additional framing around labelled green bonds is introduced, such as environmental benefits and reporting performance, they still prefer investing the highest amount in a labelled green bond (even though it has mid-level returns) but tend to discount enhanced performance or the “greenness” of a green bond and assign greater value to its financial performance over environmental considerations.

Our findings also suggest that when it came to behavioral norms of retail investors with pro-environmental personal norms and stronger injunctive norms, the correct comprehension of a bond's performance framing tends to have a positive and significant on their investment into the enhanced performance labelled green bonds (even if it is antithetical to their economic interests but is in line with their beliefs). However, it is important to note that most retail investors cannot seem to distinguish the nuances in the performance-related framing – hence, they tend to invest based on anchoring heuristics (green label effect) rather than framing effects.

We also find that personal traits like *higher risk tolerance* (individual for baseline green bonds and institutional risk for hybrid green bonds), and *previous investment experience with bonds* (high), *term deposits* (any) predict higher investments into green bonds. Traits that are predictive of lower investments include *higher risk tolerance* (individual for hybrid green bonds), *investment horizon* (short), *lower education level* (not completing high school), *experience with ETFs, stocks, or mutual funds* (moderate to high) as well as *not consulting financial experts* as a source of investment knowledge.

Our results show that labelling can be a useful tool in influencing the flow of funds into a sustainable finance market like the green bond. However, it could be even more successful with retail investors that have intrinsic factors (pro-environmental personal and injunctive norms), exhibit a certain type of risk tolerance, investment portfolio preferences or investment experience level. However, given that retail investors find it hard to evaluate the green nuances across different types of green bonds, we suggest that there is also a risk of financial sector greenwashing when selling such products to a retail customer base. Hence, there is a need to have some level of policy or regulatory oversight into the development of the retail investor green bond market.

Our research has three-fold contribution to literature – firstly, we fill the literature gap on the evaluation of investor perception of this market; secondly, we create a green investor-profile of those retail investors that might be interested in investing in green bonds; and thirdly, we provide recommendations for the market to improve its current policy and accounting-related frameworks as it pertains to environmental impact disclosure reporting.

The paper is structured as follows: the theory and research question section highlights the relevant theoretical concepts and provides a literature overview as it relates to green bonds and behavioral norms in investment decision-making. The section on methods highlights our experimental survey design and provides the rationale for choosing our research methods. The results section displays our findings as it relates to the three research questions. The discussion provides highlights certain theoretical and scholarship implications. And finally, we conclude our findings by providing some study limitations and presenting future research avenues.

## 4.2. Theory and Research Questions

### 4.2.1. Unique Framing Effects of Green Bonds

Green bond markets have become a well-studied phenomena when it comes to their environmental impact potential (Sangiorgi & Schopohl, 2023; Sangiorgi & Schopohl, 2021; Deschryver & de Mariz, 2020), their policy scope to close the sustainable finance gap (Sangiorgi & Schopohl, 2021; Saravade et al., 2022; Deschryver & de Mariz, 2020) as well as diversify the corporate sector's debt requirements by incorporating green or socially responsible investors (SRI) to the mix (Chiesa & Barua, 2019; Flammer, 2021; Lebel, Lajili & Sassi, 2020; Yeow & Ng, 2021; Saravade & Weber, 2024).

Although it is similar in structure to a traditional investment product like a bond, its first unique framing benefit comes from its green labelling (Hyun, Park & Tian, 2021; Gianfranco & Peri, 2019, Saravade & Weber, 2024) – a tag which allows investors the confidence that it has a verifiable green attribute to its use-of-proceeds. Although labelling is an important feature, there is still a market segment of unlabeled green bonds (referred to as climate-aligned bonds when tracking flows of funds). In comparison to labelled green bonds, Hyun, Park & Tian (2021) find that unlabeled climate-aligned bonds are likely to have higher yields despite having the same characteristics as labelled green bonds. The key differentiating factor here being the official green label, which offers greater greenness information to its investors and therefore allows its issuers to enjoy a better pricing advantage than those offered by the unlabeled green bond (Hyun, Park & Tian, 2021). This type of phenomena has been defined in the literature as the 'greenium' or the green premium paid or accepted by investors in terms of lower yields for having an official green bond label.

The concept of 'greenium' has been well documented across literature. Recent studies (Agliardi & Agliardi, 2021; Coretellini & Panetta, 2021; Nanayakkara & Colombage, 2019; Hachenberg & Schiereck, 2018; Liaw, 2020; Hyun, Park & Tian, 2021; Gianfranco & Peri, 2019) have shown that investors are willing to pay more or have a premium when it comes to investing in green bonds. So far, the scholarship has only looked at the institutional investor setting to examine this effect, based on the rationale that most investors in this market fall in the professional investor category. However, with a growing demand for SRI preferences among

retail investors (Badía, Ferruz & Cortez, 2020; Diouf, Hebb & Touré, 2016), a literature gap emerges when it comes to understanding whether a green bond label or a ‘greenium’ effect would transfer to the retail investor setting. Although retail investors have been studied experimentally in terms of various socially responsible product settings, including green projects (Siemroth & Hornuf, 2023) impact investing (Barber, Morse, & Yasuda, 2021) and green mutual funds (Riedl & Smeets, 2017) – there is no study to our knowledge that examines the framing effects (green bond label vs. an unlabeled climate-aligned bond), including the ‘greenium’ effect, on a retail investor.

A second unique feature of this market is its ability to undertake unique **disclosure reporting** in the form of annual reports documenting the environmental impact of its use-of-proceeds. The rationale for an issuer undertaking greater disclosures is to reduce informational asymmetries and avoid greenwashing risks (Bachelet, Becchetti, & Manfredonia, 2019) to investors. However, as Lebelle, Jarjir, & Sassi (2022) highlight, green bonds face disclosure-related challenges when it comes to information disclosure to the public at large, especially regarding the level of details of disclosure and the challenges posed by market information asymmetry. They show that green bonds that have greater disclosure and readability of their environmental impact documentation tend to have more liquidity (Lebelle, Jarjir, & Sassi, 2022), and hence indicate a higher institutional investor demand. In contrast, literature on retail investor’s reaction to disclosures points to their lack of use of environmental, social, and governance (ESG) information (Moss, Naughton, & Wang, 2023), and rather shows their preference for economic information disclosures when it comes to evaluating company-level performance (Cohen, Holder-Webb, Nath, & Wood, 2011). Hence, the presence and detail of environmental disclosure reporting in this market<sup>25</sup> is still an evolving question for the retail investor. Here is where our research provides a contribution in terms of whether retail investors prefer any type of disclosure reporting and if so, what levels of disclosure and environmental performance of a company matters for their green bond preferences.

However, to truly understand the factors in how green bond preferences are showcased, we must also look at the investor mindset and the role of personal norms and traits in decision-

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<sup>25</sup> With several initiatives linked to green bond standardization and creation of voluntary disclosure frameworks (with greenhouse gas emissions as the main indicator) have been linked to this market. These include voluntary frameworks like ISO Green Bond Standard, Climate Bonds Initiative Standard, Green Bond Principles (GBP). On the regulatory side, countries and regions like India, China, and the EU among others, have come out with their own frameworks on green bond disclosure.



making. The following section highlights the relevant theory and literature linked to individual decision-making in the socially responsible investment setting.

#### 4.2.2. Behavioral Norms and Personal Traits in Socially Responsible Investment Decision-Making

Several studies (Dreyer, Sharma & Smith, 2023; Díaz-Caro, Crespo-Cebada, Goenechea, Mirón Sanguino, 2023; Andrews, Delton & Kline, 2018; Diouf, Hebb & Touré, 2016) have analyzed the effect of SRI portfolio-level preferences on the behavioral norms and personal traits of investors. Individual level behavioral norms fall into two categories – personal norms, which are defined as the “inner moral conviction that is defended irrespective of the expectation of others” (Hunecke, Blobaum, Matthies, and Hoger, 2001, p. 832) and social norms, which are categorized into injunctive norms (i.e. what one should do) and descriptive norms (i.e., what others do) (Onel, 2017). Although personal norms and injunctive social norms are similar, they differ based on the internal motivation of an individual (de Groot, Abrahamse, & Jones, 2013).

As shown by previous studies, it is the relevant activation of these personal norms and social norms that tend to have a direct and positive influence on an individual’s pro-environmental preferences for investing in green or SRI products (Jiang, Kuang, & Vitalis, 2019; Diouf, Hebb & Touré, 2016; Garg, Goel, Sharma, & Rana, 2022). In the green bond market, personal norms can be identified as the pro-environmental attitudes of investors, whereas injunctive norms are seen as the investor’s disclosure preferences for a green bond’s environmental impacts based on what is believed to be societal expectations. Our research looks to contribute to this area of behavioral finance, where we identify the relation between personal norms like pro-environmental attitudes and injunctive norms related to disclosure reporting preferences, to further explain the green bond preferences of a retail investor.

As shown by Jiang, Kuang, & Vitalis (2019), activation of pro-environmental personal norms in conjunction with relevant non-financial information disclosures tends to have a mediating effect on an individual’s green investment decision, to the extent that it influences them to go against their economically rational mindset. We posit that in line with previous literature, personal norms related to pro-environmental attitudes and injunctive norms related to non-financial (or environmental) information disclosure, tends to have an explanatory effect for identifying the green bond preferences of retail investors. Given that previous green bond

literature has identified that investors will choose a green bond at the cost of their economic benefit (Agliardi & Agliardi, 2021; Coretellini & Panetta, 2021; Nanayakkara & Colombage, 2019; Hachenberg & Schiereck, 2018; Liaw, 2020; Hyun, Park & Tian, 2021; Gianfranco & Peri, 2019), our study goes one step further to understand whether the type and interaction of their personal and injunctive norms in conjunction with the natural framing effects provided by a green bond can allow for this norm activation to occur or not.

Unlike norms which are formed based on an individual's values, beliefs and ethical convictions, personal traits are linked to the already existing features of an individual. For instance, sociodemographic characteristics, portfolio- and risk-linked preferences can be seen as personal traits that may be used to identify the overall profile of an individual and influence their investment decision as well (Dreyer, Sharma & Smith, 2023; Diouf, Hebb & Touré, 2016). For instance, personal traits like gender (female) (Cheah et al., 2011), age (younger demographic) (Berry & Junkus, 2010; Löfgren & Nordblom, 2024), education (higher education) – all seem to play a positive role in mediating the SRI preferences of retail investors (Siddiqui, 2018; Masters, 1989). However, aspects like employment history (especially in the financial sector) tend to negatively affect the sustainability-preferences of individuals (Hasebrook, Michalak, Wessel, Koenig, Spierling & Kirmsse, 2022). These findings signal that not all personal traits work in favor of encouraging green investment behavior, and ultimately context or framing of the situation seems to matter.

As highlighted by Andrews, Delton, & Kline (2018), when framing a context as being socially beneficial and positive on climate action, individuals are willing to invest in risky or low-financial return investments. In such contextual decisions, personal traits like individual investment horizons and personal norms like attitudes also seem to mediate their decision-making process (Bassen, Gödker, Lüdeke-Freund & Oll, 2019; Gödker & Mertins, 2018). These studies reflect the tendency of an individual to deviate from the standard expected utility theory, where maximizing financial gains or economic benefits is seen as the end goal (Moser & Martin, 2012). However, for pro-environmental behavior to be witnessed, the norm activation model (NAM) suggests that behavioral norms which are pro-environmental in nature also need to be activated (Jiang, Kuang, & Vitalis, 2019). We posit that the interaction of green bond framing effect supports the activation of these behavioral norms and traits to choose the higher investment into green bonds regardless of their financial loss in higher returns. Given that the

green bond has been marketed as a financial tool that provides climate action and creates positive environmental benefits, our study's second main contribution comes in the form of identifying the mediating effects of a retail investor's behavioral norms and traits when it comes to their green bond preferences.

However, with well observed 'greenium' effect emerging among institutional-level green bond market investors, the question remains on how intuitively retail investors are thinking about their decision to invest as opposed to selecting a choice purely based on a green bond's 'greenium' or green label effect. One way to test this is to separate performance levels across green bonds that are *pari-passu* in terms of their label but vary in terms of their financial and environmental performance – to see if controlling for the green label's mediating effect might have any difference in influencing the retail investor's decision-making process. To help explain the individual-level decision-making processes, behavioral literature highlights dual-process theory of how information processing is usually done at the heuristic-level, known as Systems 1 thinking, or at the analytical level, known as Systems 2 thinking (Kahneman, 2003; Barrett, Tugade & Engle, 2004). Although we do not directly measure the type of thinking employed in our research context, we do posit that some level of retail investors' decision-making will be influenced by either System 1 or Systems 2 thinking, given the complex and unconventional bond disclosure information presented in Scenarios 2 and 3. To our knowledge, the current level of interdisciplinary research connecting behavioral psychology with sustainable finance is vastly underexamined in the existing scholarship, and none whatsoever in the context of retail investors perception or the green bond market. This is the third and final contribution of our paper.

#### 4.2.3. Research Objectives and Questions

Our study has three research objectives – the first is to see if differences in bond framing can directly influence a retail investor's green bond preferences. Our second objective is to test whether personal and social norm proxies (ex-post environmental benefits perception and disclosure reporting preferences of a bond) have an explanatory effect when it comes to their choice in green bond investments. And finally, we test the combination of personal traits (like risk tolerance, investment portfolio preferences and sociodemographic characteristics) that can positively influence their green bond preferences.

Our research question and predictive validity framework are showcased below:

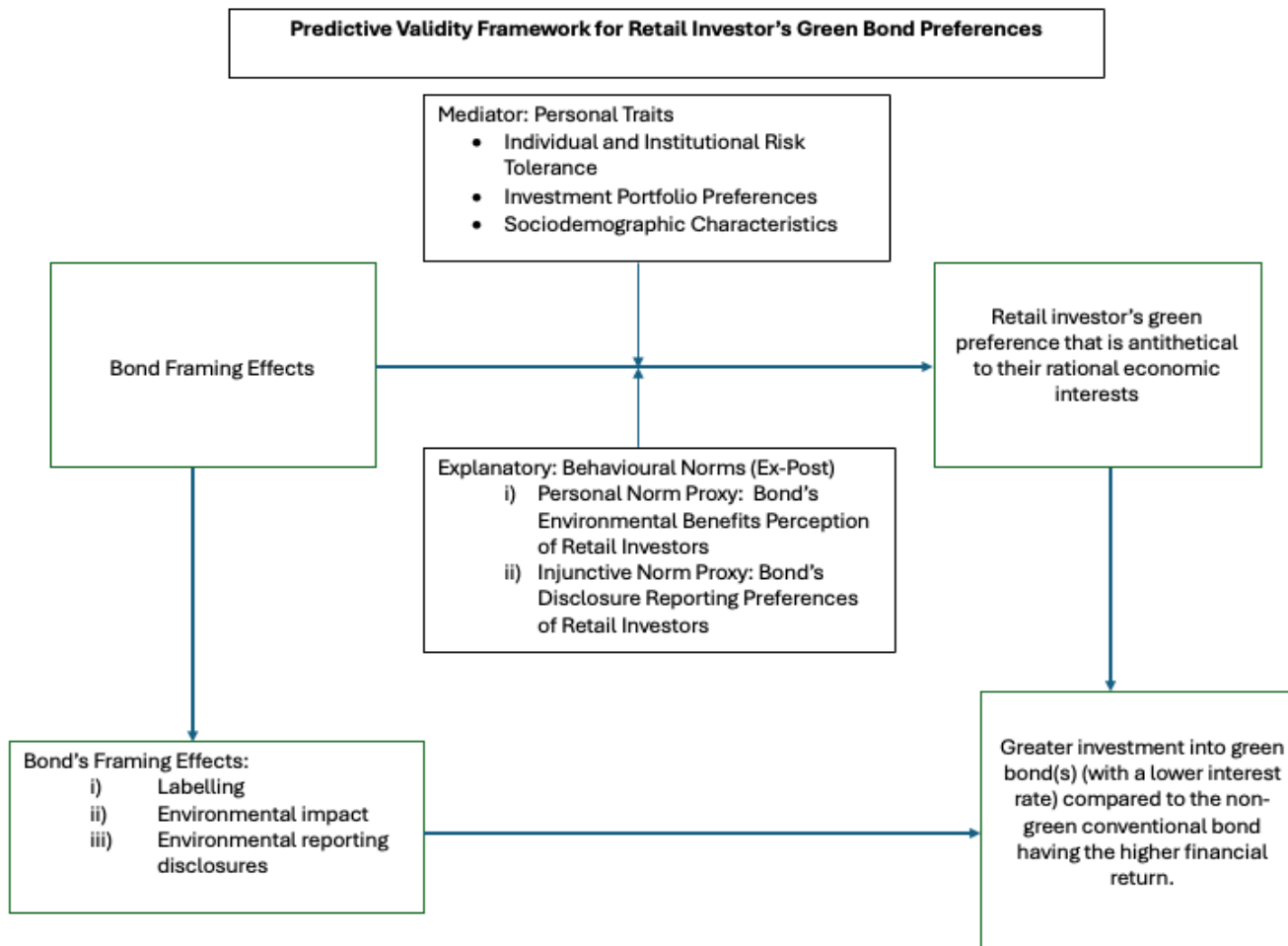
**RQ1: Does the difference in bond framing effects influence their choice in green bond investments?**

**RQ2: Do retail investor's behavioral norms<sup>26</sup> like their pro-environmental personal norm and pro-reporting injunctive norm, have an explanatory effect when it comes to their choice in green bond investments?**

**RQ3: What are the personal traits of retail investors that have a positive mediating effect on their preference for green bond investments?**

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<sup>26</sup> Ex-post proxy for personal norm was their environmental benefits perception and for injunctive norm was their disclosure reporting preferences.



**Figure 4.1: Predictive validity framework for retail investor's labelled green bond preferences (Source: Author's construction)**

## 4.3. Methodology

### 4.3.1. Experimental Design

Our survey was designed as a discrete choice experiment (DCE), providing different bond labels and scenarios to participants. A discrete choice experiment allows participants to consider various trade-offs and criteria between the options provided. The objective of our DCE was to elicit the green preferences of retail investors based on a discrete choice model. The choice criteria we provided investors was related to the investment return (coupon rate of bond) and the green characteristics (or lack of) of the bond and allowed to make an investment decision (Apostolakis, van Dijk, Kraanen, Blomme, 2018) as though they would in the real world.

Although such information might be easier to obtain in a general survey question format, the “potential preference based on the social desirability bias or other biases make the actual choice with material consequences, rather than the stated preferences to seem more credible” (Siemroth and Hornuf, 2023, p.78). That implies that a participant might believe that they could appear more desirable to the survey if they are seen to be caring for the environment (or having green preferences in this case), even if they do not display these preferences in a real-world scenario. Hence, varying levels of interest rates were provided to disincentivize participants from only selecting a green bond based on the social desirability bias. However, we posit that those having the highest environmental or green preferences would still pick the green bond, even if it came with the lowest return. Based on this research design, we argue that retail investors having green preferences are more likely to pick the labelled green bonds (baseline and hybrid) or the unlabeled climate-aligned bond (hybrid green bond) as the more preferred bond, in comparison to picking the non-green conventional corporate bond.

We preceded our experimental scenarios with a frequently asked questions (FAQ) section on describing the main characteristics of a bond and a green bond. For instance, we outlined that bonds have key risk and financial characteristics like maturity, coupon rate, credit rating and issue size. We also described how a green bond differs from a conventional bond, based on its use-of-proceeds and the scrutiny it faces around the disclosures of its impacts. In addition, we mentioned who the issuers of the bonds were and how they were the same as a regular bond issuer. Additionally, we outlined that the main point of difference is the extra disclosures and

auditing aspects undertaken by a green bond and how this is usually a best practice undertaken by issuers of green bonds. This section was provided to ensure that all participants had a common level of understanding between the various bond choices and the merits of each bond type. Although we acknowledge that an FAQ section would have primed our participants to pick green bonds, having a financial disincentive in the form of a non-green conventional bond with the highest financial return across all scenarios was used to negate this effect.

To test the understanding of this material among our participants, we asked them five test questions based on the FAQ section before they proceeded to the experimental survey. They had to get all the answers correct to proceed to the next stage of the survey. In the event they got an incorrect answer, they could refer to the FAQ material and change their selection until they got the answer correct. This was done to ensure comprehension checks when it came to their understanding of the differences between a green bond and a conventional bond. We then started off the experimental scenario by outlining a general description about the issuer and its operations. This showed the retail investor that the issuer was a standard issuer of bonds in North America and met the industry average of 20% renewable energy power generation as well as all baseline industry standards for stakeholder reporting and annual disclosure activities.

The rationale for doing a general issuer description prior to the experimental scenarios was to ensure that the survey participant would have some awareness around the company and its operations – as any retail investor would have some level of knowledge or awareness about the companies (especially in the stock market) in their investment portfolio. We did an attention check for the issuer description by asking participants to select the correct percentage (provided as a percentage scale from 0 to 100 percent) of renewable energy generation of this issuer. Participants had to mandatorily pass attention check questions across all other scenarios as well, before they could proceed on to the next question. The rationale for making these questions mandatory was to ensure they were carefully reading the scenarios and the information provided to them in each scenario – given that the basis of our scenarios was the unique framing of each bond option. We then proceeded on to the scenarios – starting with the label preference selection (Scenario 1), followed by environmental benefits preference (Scenario 2) and the disclosure reporting preference (Scenario 3).

### 4.3.2. Experimental Task

We provided investors the ability to pick and distribute their personal wealth across three unique experimental scenarios, offering three different bond options issued by this company looking to refinance its assets. In each scenario, the first bond type was always a *baseline labelled green bond*, the second bond type was a *hybrid green bond* (unlabelled in Scenario 1 and labelled in Scenarios 2 and 3), and the third bond type was a *non-green bond*. However, the three bond types (baseline labelled green bond, hybrid green bond and non-green bond) were not mentioned in the bond descriptions, as we did not want to prime the participants to pick a specific bond type. For a more detailed difference between each scenario and bond descriptions, please refer to Table 4.1 below.

**Table 4.1: Unique bond framing wording and bond descriptions across all three scenarios.**

<b>Bond Type</b>	<b>Bond Label</b>	<b>Coupon Rate<sup>27</sup></b>	<b>Type of Existing Company Asset That Bond's Use-of-Proceeds Are Reinvested Into</b>	<b>Unique Bond Framing Wording<sup>28</sup></b>
<b>Scenario 1: Labelling Preferences</b>				
<b>Bond A</b> <i>(Baseline green bond)</i>	Labelled green bond	<b>5.20%</b>	Renewable energy assets	<b>Labelled green bond</b>
<b>Bond B</b> <i>(Hybrid green bond)</i>	Unlabelled climate-aligned bond	<b>5.30%</b>		<b>Unlabelled climate-aligned bond</b>
<b>Bond C</b> <i>(Non-green bond)</i>	Traditional corporate bond	<b>5.50%</b>	Non-renewable energy assets	<b>Traditional corporate bond</b>

<sup>27</sup> Wording in blue was also highlighted in blue throughout the experiment as the coupon rates for each bond. This was done to ensure special attention was paid to the financial characteristics of the bond in addition to the framing of the bond description.

<sup>28</sup> Wording in blue was also highlighted in blue throughout the experiment as the unique framing for each bond description. This was done to ensure special attention was paid to this wording by the participants.



Scenario 2: Environmental Benefits Perception				
<b>Bond D</b> ( <i>Baseline green bond</i> )	Labelled green bond	<b>5.20%</b>	Renewable energy assets	<ol style="list-style-type: none"> <li>1. <b>Meets the issuer’s internal renewable energy generation target of 20%</b> of its portfolio.</li> <li>2. <b>Does not change the environmental impact, nor does it affect the overall GHG footprint</b> of issuer.</li> </ol>
<b>Bond E</b> ( <i>Hybrid green bond</i> )	Labelled green bond	<b>5.10%</b>		<ol style="list-style-type: none"> <li>1. <b>Increases the issuer’s renewable energy generation from 20% to 35%</b> of its portfolio by 2028.</li> <li>2. <b>Reduces the overall GHG footprint</b> of issuer.</li> </ol>
<b>Bond F</b> ( <i>Non-green bond</i> )	Traditional corporate bond	<b>5.50%</b>	Non-renewable energy assets	<ol style="list-style-type: none"> <li>1. <b>Does not affect the issuer’s internal renewable energy generation target</b> of 20% of its portfolio.</li> <li>2. <b>Increases the overall GHG footprint</b> of the issuer.</li> </ol>
Scenario 3: Disclosure Reporting Preferences				
<b>Bond G</b> ( <i>Baseline green bond</i> )	Labelled green bond	<b>5.20%</b>	Renewable energy assets	<ol style="list-style-type: none"> <li>1. <b>Baseline reporting disclosure</b> in the form of <i>direct GHG emissions</i>.</li> <li>2. Uses a second opinion verified green bond framework and annually discloses on use-of-proceeds environmental impacts.</li> </ol>
<b>Bond H</b> ( <i>Hybrid green bond</i> )	Labelled green bond	<b>5.10%</b>		<ol style="list-style-type: none"> <li>1. <b>Enhanced reporting disclosure</b> in the form of <i>direct and indirect GHG emissions</i>.</li> <li>2. Uses a second opinion verified green bond framework and annually discloses on use-of-proceeds environmental impacts</li> </ol>
<b>Bond I</b> ( <i>Non-green bond</i> )	Traditional corporate bond	<b>5.50%</b>	Non-renewable energy assets	<ol style="list-style-type: none"> <li>1. <b>Does not undertake any disclosures</b> in the form of GHG emissions.</li> <li>2. Does not use a second opinion verified framework</li> </ol>

				nor does it disclose on its use-of-proceeds environmental impacts.
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We wanted the participants to assume that the bond issuer or the company wanted to signal its green intentions to investors in a credible manner by issuing these different types of green bonds, however, it also needed to issue some non-green bonds as part of its overall debt fundraising. To simulate a real-world scenario where retail investors have a certain amount of wealth that they distribute across a variety of investments (whether to diversify or meet their investment goals), we provided our retail investors with a hypothetical US\$10,000 to spend on the three bonds. In this situation, they could choose to invest in one single bond or across all three bonds – with the full amount being invested at the end.

As highlighted in Table 4.1., the first scenario had three bonds with varying levels of coupon rates (or interest rate) – the labelled green bond (Bond A) being the lowest financial return (5.20%), the unlabeled climate-aligned bond (Bond B) falling in the middle (5.30%), and the traditional corporate bond (Bond C) having the highest return (5.50%). The rationale for providing a difference in coupon rates was to elicit true preferences of retail investors and identify those that have green preferences (higher investment in Bond A or Bond B as compared to Bond C). The specific coupon rates allotted to the bonds were based on the following rationale – for the *non-green bond* (Bond C), we provided the average bond coupon rate or 5.50% for a typical North American bond rated at the AA- credit rating with an average bond issuance size of US\$300 million; for the *baseline labelled green bond* (Bond A) we picked a coupon rate of 5.20% that was 30 basis points lower than the non-green bond (or Bond C), as this is usually the case for labelled green bonds (Hyun, Park & Tian, 2021; Zerbib, 2019; Hachenberg & Dirk, 2018; Immel, Hachenberg, Kiesel & Schiereck, 2021) due to the ‘greenium’ effect; for the *unlabeled or hybrid green bond* (Bond B) we used a mid-point rate of 5.30% because we wanted to test whether retail investors preferred an unlabeled green bond but with a slightly higher return as compared to the labelled one. Apart from the label and coupon rates, the only other difference between the three bonds was where the investment was being reinvested – both the green bonds (Bond A and Bond B) reinvested the proceeds into renewable energy assets, whereas the non-green bond (Bond C) reinvested the proceeds into non-renewable energy assets.

The rationale for giving them three options across all three scenarios, was to understand their preference for a particular label, environmental benefit, or disclosure reporting – without overwhelming them with too many options. Given that each scenario had a unique set of three bonds, with their own unique descriptions or labels, we wanted to test the green preferences of retail investors. For Scenario 1, we offered them a choice between a labelled green bond and an unlabeled climate-aligned bonds as the latter are still a segment of the global sustainable finance bond markets, and we wanted to test whether the lack of label mattered to a retail investor or not. For Scenario 2 and 3 we offered them the choice between two labelled green bonds (one with baseline performance with a middle level interest rate, and another with enhanced performance but the lowest interest rate)<sup>29</sup> in relation to the non-green corporate bond (highest interest rate). The reason why we chose to provide two labelled green bonds in these scenarios was to understand whether a baseline performing green bond with a slightly higher interest rate was more preferential to retail investors or if green bond with an enhanced performance mattered more than financial return.

When making an investment decision, interest rate would usually be provided in a real-world situation and so would aspects like credit rating of bond, maturity, and size of issuance. Hence, we disclosed this type of information across all our scenarios - all three bonds in each scenario had a credit rating of AA-, a 10-year maturity date of June 2033 and an issuance size of US\$300 million each. To highlight the differences between them, the issuer provided the following unique disclosures around the label, coupon rate and the use-of-proceeds for each bond. Participants were informed that bond descriptions provided in each scenario were independent of that provided in a previous or future scenario.

The choice to distribute their wealth across the three bonds reveals the true preference of the retail investor. However, based on our scope of eliciting green bond preferences, we were most interested in the investment amount allotted to the baseline labelled and the hybrid green bond types. Applying this screening criteria also helped us identify the risk, portfolio preferences, investment experience and socioeconomic characteristics of those that prefer the

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<sup>29</sup> Scenario 2 and 3 both had two labelled green bonds as opposed to one labelled green bond and one unlabelled climate-aligned bond in Scenario 1. The rationale for doing this was to test if there was a difference in preference among green bond's environmental impact and reporting preferences.

green bonds (labelled and unlabeled as well as enhanced and baseline green bonds) across all the scenarios.

### 4.3.3. Implementation

The discrete choice experimental survey was implemented in Qualtrics. We then used a market research company called CloudResearch to recruit participants from Amazon’s Mechanical Turk (MTurk) that passed certain data quality features and criteria, including blocking duplicate internet provider (IP) addresses, suspicious geocode block, anonymizing worker identifications (ID) and verifying worker country location. In addition to this, MTurk workers needed to be in either United States of America (USA) or Canada and have at least a 90 percent approval rate. Approval rating refers to the number of times a worker’s submission was accepted by a requester divided by the total number of HITs (human intelligence task or a question that needs an answer<sup>30</sup>) a worker has submitted<sup>31</sup>. The approval rating is expressed as a percentage. The benefit of using CloudResearch was the ability to filter out participants based on a certain set of robust criteria – namely, the location and the data quality features.

We wanted to test the mindset of participants based in the US and Canada, as it provided a snapshot of the psychology of potential retail investors in North America. To further screen out the participants based on their basic understanding of financial products, we added two straightforward pre-screening questions. The question asked them to choose the correct definition of stocks and bonds and were based on a multiple-choice format (see Supplementary File). These questions were picked based on the general level of awareness of retail investors when it comes to the stock or bond market products (Masters, 1989). If they got either question incorrect, the survey participation ended for them at the point and redirected them to the end of the survey. We excluded these responses in our data cleaning stage, as they would have been recorded as being incomplete participation. Out of a total of 1443 responses, we dropped 338 responses (23.42%) as they were incomplete or had duplicate IP addresses. More details on data cleaning are presented in the following sub-sections.

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<sup>30</sup> <https://www.mturk.com/worker/help>

<sup>31</sup> <https://go.cloudresearch.com/en/knowledge/selecting-worker-requirements>

#### 4.3.4. Data Characteristics and Missing Value Analysis.

Before running the final survey across all participants, we ran two pilot surveys with 20 participants in total. From our pilot surveys we learned that participants did not comprehend the *environmental benefits perception* or the *preferred disclosure reporting* questions (Q3 and Q4 in Scenario 2 and 3 respectively) when they were presented as a scale measure (0 to 100) or could potentially create a social desirability bias when it came to their choice of bonds as it would prime them to choose green. The questions related to perception and disclosure preferences were provided ex-post the bond descriptions to measure the personal norms and injunctive norm of retail investors respectively and were our first set of predictor variables when it came to behavioral norms. The rationale for doing so was to understand whether specific bond framing or an interaction between two or more bond's framing had any significant impact on their investment amounts in these bonds.

To deal with the first issue of the measurement, we converted the 0-100 scale to a 5-point Likert scale category type measure<sup>32</sup>. To reduce the risk of the social desirability bias, we also randomized the order of the questions by showing them the wealth distribution question first (distribute their wealth across the three bonds), and then asking them the bond perception question and vice-versa. Finally, we also had an open-ended question about their rationale for the order of distribution of their investment, however, we thought this would discourage the impulsive nature of retail investors and create a demand effect to select green, because now they had to justify their investments and meet the social desirability bias. We ended up removing this question as it would have led to unnecessary statistical noise in the data. Based on their choices across the three bonds, we concluded that it would provide enough evidence to suggest whether they had clear green preferences or not. However, the change of scale did not have the expected outcome across a bigger sample, and the implications of our survey questionnaire design will be discussed in the limitation section.

Each participant was paid US\$2.50 as compensation for the completion of their survey response. We had a completion rate of 89 percent, with 9 percent being the rejection rate for incomplete survey. The participation was deemed complete based on the unique randomized

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<sup>32</sup> The 5-Point Likert scale for Q3 was worded as: lowest category being *far below average*, mid-point being *average* and highest category being *far above average* environmental benefits perception. The 5-Point Likert scale for Q4 was worded as: lowest category was *far short of expectations*, mid-point being *equals expectations* and highest category being *far exceed expectations*.

generated code they had to input into their MTurk account (to be paid) that was provided to them at the end of the survey. The expected time to finish the survey was 20 minutes, however, average time taken was 30.60 minutes and median time was 28.85 minutes. The survey was open to participation between June 22, 2023, to July 3, 2023, to reach our target of at least 1100 participants.

#### 4.3.5. Analytical Approach

Upon completion of the three experimental scenarios, the participants were directed towards a participant experience questionnaire (PEQ) section – where they were asked questions about their self-assessed financial risk tolerance (adapted from Linciano, Lucarelli, Gentile, & Soccorso, 2018), investor portfolio preferences and experience level, followed by a sociodemographic questionnaire. The PEQ section formed our second set of independent or predictor variables (IV) linked to measuring relevant investor personal traits. Table 4.2 shows the categorization of our dependent and predictor variables that are usually indicative of retail investors real world preferences when it comes to investment decisions.

**Table 4.2: Independent and dependent variables implemented in our survey.**

<b>Variable Type</b>	<b>Main Variable Category</b>	<b>Sub-Category</b>	<b>Sub-Levels</b>
<b><i>Behavioral Norms: Personal Norm and Injunctive Norm Proxies</i></b>			
<i>Predictor Variables</i>	<b><i>Environmental Benefits Perception</i></b>	Baseline Performance Green Bond (Bond D)	<b><u>5-point Likert scale for environmental benefits perception:</u></b> Far below average, Somewhat below average, Average, Somewhat above average, Far above average
		Enhanced Performance Green Bond (Bond E)	
		Non-Green Conventional Bond (Bond F)	
	<b><i>Disclosure Reporting Preferences</i></b>	Baseline Reporting Green Bond (Bond G)	
		Enhanced Reporting Green Bond (Bond H)	Far short of expectations,

Non-Reporting Non-Green  
Conventional Bond (Bond I)

Short of expectations,  
Equals expectations,  
Exceeds expectations,  
Far exceeds expectations

**PEQ Section 1: Financial Risk Tolerance and Investment Preference Elicitation**

*Predictor  
Variables*

**Risk Tolerance**

Individual Risk Score  
Institutional Risk Score

0 being least level of risk and  
10 being the highest level

**Investment Portfolio  
Preferences**

Investment Horizon

1-3 years  
3-5 years  
5-10 years  
10-20 years  
20+ years

Investment Attitude

Very conservative  
Somewhat conservative  
Moderate  
Somewhat aggressive  
Very aggressive

Portfolio Stability Over  
Returns

Strongly agree  
Agree  
Neutral  
Disagree  
Strongly disagree

Investment Philosophy

Comfortable with stable  
investments  
Willing to withstand  
fluctuations  
Seeking substantial investment  
return  
Seeking potentially high  
investment return

Investment Knowledge

Do not make investment  
decisions

<b><i>Investment Experience</i></b>	Investment in Product Type	Consult various data sources, including ESG or climate-related financial information
		Consult various financial sources of information
		Consult financial expert or use external advice
		What type of expert? ( <i>Open ended response</i> )
	Stock Experience Level Bond Experience Level Mutual Fund Experience Level ETF Experience Level Term Deposit Experience Level	Stocks
		Bonds
		Exchange Traded Funds (ETFs)
		Mutual Funds
		Term Deposits
		None
	<b><u>5-point Likert scale:</u></b>	
	None at all,	
	A little,	
	A moderate amount,	
	A lot,	
	A great deal	

***PEQ Section 2: Socioeconomic Characteristics***

*Predictor Variables*

***Socioeconomic Traits***

Gender

Agender

Man

Woman

Transgender Man

Transgender Woman

Non-binary

Two-Spirit

Prefer to Self-Define

Prefer Not to Answer

Education

Not Completed High School



		High School
		Bachelor's Degree
		Master's Degree
		Ph.D.
		Prefer Not to Answer
	Employment Experience in Financial Services Industry	Yes
		No
	Location	Canada
		United States of America (USA)
	Age Group	34 and under
		35-45
		46-55
		56-65
		66 and older
		Prefer Not to Answer

<b>Retail Investor Bond Investment</b>					
<i>Dependent Variables</i>	<b>Mean Investment Amount Across Each:</b>	<ul style="list-style-type: none"> <li>• <i>Scenario</i></li> <li>• <i>Bond Type</i></li> </ul>	<b>Baseline Green Bonds</b> <i>(Labelled Green Bonds only)</i>	Bond A (Scenario 1)	
				Bond D (Scenario 2)	
				Bond G (Scenario 3)	
				<b>Hybrid Green Bonds</b> <i>(Unlabeled Climate-Aligned/Enhanced Labelled Green Bonds)</i>	Bond B (Scenario 1)
					Bond E (Scenario 2)
					Bond H (Scenario 3)
				<b>Non-Green Bonds</b> <i>(Conventional Corporate Bonds)</i>	Bond C (Scenario 1)
					Bond F (Scenario 2)
					Bond I (Scenario 3)

#### 4.3.6. Measuring Behavioral Norms

To assess the personal norms related to pro-environmental preferences, we used the ex-post measure of *environmental benefits perception* of participants in Scenario 2 – where two bonds were labelled green bonds (with Bond D having baseline environmental benefit and Bond E having enhanced environmental benefit) and the third bond (Bond F) was a non-green corporate

bond with a negative environmental impact. The main differentiation between the baseline and the enhanced green bond was on their level of environmental benefit – with the baseline maintaining the status quo levels of greenhouse gas emissions (GHG) and environmental footprint, and the enhanced green bond achieving significant GHG reductions and lowering the environmental footprint of the issuer. Each bond had a 5-point Likert scale with the lowest assessment of environmental benefit being *Far Below Average*, mid-point being *Average*, and the highest being *Far above Average*. The expectation here was that participants with stronger pro-environmental preferences would pick either of the green bonds as being more than average as their perception of a bond's environmental performance. More specifically, with the enhanced green bond (Bond E) having the best performance, baseline green bond (Bond D) having a mid-level performance and non-green bond (Bond F) having the worst performance. Doing so, would help us identify their personal norms as it relates to their pro-environmental preferences, and whether it had an influence on their actual investment behaviour in this scenario.

To assess retail investor's injunctive norms related to reporting performance of the bonds, we asked them about their *preferred disclosure reporting levels* for all three bonds in Scenario 3 (taken ex-post as well) – with the first two bonds being labelled green bonds (with Bond 1 having baseline environmental reporting disclosure and Bond 2 having enhanced environmental reporting disclosure) and the third bond being a non-green corporate bond with no environmental reporting disclosures. The main differentiation between the baseline and the enhanced green bond was their level of environmental reporting disclosure – with the baseline reporting on direct GHG emission levels, and the enhanced green bond reporting on direct and indirect GHG levels. For retail investors to fully comprehend disclosure reporting aspects, we had additionally provided this description in the FAQ section as well. To assess the reporting performance of each bond, we provided a 5-point Likert scale with the lowest assessment of environmental reporting being *Far Short of Expectations*, mid-point being *Equals Expectations*, and the highest being *Far Exceeds Expectations*. Our expectation was that retail investors who thought the baseline or enhanced green bonds equaled their expectations (or exceeded their expectations) of disclosure performance (or if they thought the non-green bond fell in the below expectations category of disclosure performance) would prefer the green bond investment. Doing so, would help us identify their injunctive norms as it relates to their preference for information disclosures, and whether it had an influence on their actual investment behaviour in this scenario.

#### 4.3.7. Personal Experience Questionnaire (PEQ) Section

We asked participants to choose their investment horizon, investment attitude, portfolio stability, investment philosophy, investment knowledge source and investment product type and their experience level across these products. These questions helped assess their individual *investment portfolio preferences* that also mimicked questions that would usually be asked of those making an investment decision on an online retail investment platform. As highlighted in our theory and background section, we posited that retail investors having a longer-term horizon, conservative investment attitude, preferring portfolio stability or an investment philosophy of stable investments, would prefer green investment. Based on this, we also further estimated that they would have investment experience or prefer investments in relatively less risky investment products like bonds, ETFs, or term deposits.

The only unique question that would not usually feature on an online retail investing platform was the question around *investment knowledge source*. This question gauged the type or source of knowledge they incorporated into their decision-making preferences – for instance, did they use *financial information only, financial expert or external advice* (if this option was picked, they could also provide an open-ended response as to the expert or external advice used), *various types of data sources including environmental, social and governance (ESG) -related financial information*, or did they *not make any investment decisions*. Participants could also pick multiple responses for this question. We inferred that those that picked the ESG option would likely pick the green bond as the most preferred bond, given their interest in incorporating non-financial information in their decision-making.

Next, we wanted to test whether previous *investment experience with financial products* had an impact on the preference for green bonds. Hence, we allowed participants to choose their level of experience on a 5-point Likert scale (ranging from *None at all* to *A Great Deal* level of experience) for various investment products like stocks, bonds, ETFs, mutual funds, and term deposits. Based on our literature review, we posit that those with greater level of prior investment experience in stocks and mutual funds, or having a lack of pro-environmental preferences, would favour high-financial return riskier products like stocks or mutual funds. We further add that they would invest greater amounts in the traditional corporate bond due to its highest level of financial return (5.50% versus the 5.20% provided by the green bond).

For our *risk tolerance* measure, we posited that those who were more likely to take institutional risk over individual risk, would prefer to invest in a green bond as compared to a traditional corporate bond. To measure this, we provided two levels of risk scales to self-assess how willing participants were to take risks individually and on behalf of others. The risk taken on behalf of others was called institutional risk and was explained as the financial investment risk taken by someone like an investment fund manager or institutional investor on behalf of others – we provided this example as part of the question. The rationale for including two different risk scales was to understand if there was any difference between the individual risk taken and the institutional risk taken. Understanding whether this had any significant impact would also help us understand if retail investors value financial risk differently when making an investment decision as an institutional investor. Both the measures were provided as a 10-point scale, with 0 being the least risky and 10 being the riskiest. Furthermore, given that we had explained how green bonds are usually connected to institutional investors in our FAQ section, we posited that retail investors who were more likely to have a higher institutional risk tolerance would prefer investing into green bonds.

Finally, we wanted to test whether covariates like *socioeconomic characteristics* of gender, age group, education level, previous or current employment experience working in the financial services industry and country location, would have any effect on the green bond preferences of retail investors. Our expectation related to gender was that female retail investors would have a green bond preference over male investors (Berry & Junkus, 2010; Löfgren & Nordblom, 2024). In relation to the age group, our expectation was that younger retail investors prefer green bond investment over older retail investors (Löfgren & Nordblom, 2024). In terms of education level, we posited that highly educated (post-secondary education and upwards) retail investors would prefer green bond investment over less educated retail investors (Siddiqui, 2018). We also expected that those having some experience working or being employed with the financial services industry would have more preference for green bonds as they might be aware of their existence or benefit (Holzmeister et al., 2020). And finally, when it came to location, we thought that it would not have a significant impact on the preference level as both US and Canada are quite similar in terms of their retail investor population characteristics based on cultural similarities.

### 4.3.8. Data Cleaning and Addressing Missing Values

Post survey response collection, we had to undertake significant data cleaning. We used SPSS version 29.0 as our software for statistical analysis. The following table has the summary of our data cleaning steps:

**Table 4.3: Steps taken to address data cleaning and missing values.**

	Description
Step 1: Remove incomplete or fraudulent responses	<ul style="list-style-type: none"> <li>○ Remove responses that were duplicate or left incomplete (without answering the question about the distribution of wealth across the three bonds/scenarios).</li> <li>○ Our original sample consisted of 1443 responses; however, after removing incomplete or fraudulent responses we got 1105 as the full response set.</li> </ul>
Step 2: Improve data robustness	<ul style="list-style-type: none"> <li>○ Remove responses that did not pass our two robustness checks (Check 1 was the pre-screening questions and Check 2 was the open-ended question asking their age – which had to match their selected age category).</li> <li>○ Confirm all the legitimate responses had passed the attention check questions (this was assumed to be met as they had to mandatorily choose the correct answer for each attention check before proceeding to the next question).</li> </ul>
Step 3: Address any missing values	<ul style="list-style-type: none"> <li>○ We had under 10% missing values in the financial portfolio experience questions (experience with stocks, bonds, ETFs, mutual funds, and term deposits) and hence had to undertake some</li> </ul>

	<p>missing value analysis to identify if they were missing at random or not.</p> <ul style="list-style-type: none"> <li>○ For our regression analysis, we excluded the missing values based on the pairwise deletion option.</li> </ul>
<p>Step 4: Create new variables for multiple responses and listwise exclusions for certain predictor variables</p>	<ul style="list-style-type: none"> <li>○ We then dummy coded certain multiple response variables like <i>investment in product type</i> and <i>investment knowledge source</i>.</li> <li>○ Our predictor variables related to <i>investment experience in product types</i> (stocks, bonds, ETFs, mutual funds, and term deposits) also had multiple response picked (For instance, if someone picked <i>A little to A moderate amount</i>). First, we tried to undertake a mean value of the two multiple responses, however, this was creating too much noise in the data (as some people had picked more than two responses, which did not make sense – for e.g., picking <i>A little, A lot</i> and <i>A moderate amount</i>). Hence, to reduce this noise in the data, we ended up excluding these responses listwise.</li> </ul>

Our first step in data cleaning was to evaluate the robustness of data, where we ensured that all legitimate responses had correctly answered all the attention check questions and met the pre-screening criteria. We then removed any duplicate responses and identified the missing values. Since the only questions mandatory on our survey were attention checks and the survey scenario questions (investment distribution across the three bonds and the perception questions for Scenario 2 and 3), we did seem to face some missing values in the financial portfolio questions (our predictor variables) and hence had to undertake some missing value analysis.

We undertook a missing value analysis for all the independent or predictor variables and found that under 9.67% of data was missing for variables like mutual fund experience, term deposit experience, ETF experience, bond experience and stock experience. We then conducted a missing values analysis to understand if data was missing completely at random (MCAR), missing at random (MAR) or missing not at random (MNAR). We used the Expectation Maximization (EM) method and found that the EM Means and the Little's MCAR test Chi-Square results were .000,  $DF=70$ ,  $p = 1.000$ , or non-significant. Hence, we rejected the null hypothesis that the data was not missing at random. We then assumed the data is missing completely at random (MCAR) and proceeded with further cleaning of the data (as described in Step 4 of Table 3).

#### 4.3.9. Addressing Multivariate Assumption Violations

The assumptions of the multivariate regression model were assessed to ensure the validity of the results for research question 2 and 3. Multicollinearity, independence of errors, linearity, multivariate normality, homoscedasticity, and outliers were evaluated using standard diagnostic tests and visual inspections.

First, multicollinearity was examined using a variance inflation factor (VIF), which used the conservative benchmark of 5.0 for all our 26 predictor variables as well as using the collinearity diagnostics in regression output. The VIF values for all predictor variables were below the conservative benchmark of 5.0. However, when looking at the collinearity diagnostics, we found that there was collinearity among the predictor variables of environmental benefits perception (EnvBen\_D) and the reporting disclosure preferences (EnvDis\_G) of the baseline labelled green bond. However, since both these variables were analyzed separately, we were able to reduce multicollinearity without sacrificing information or needing to combine the variables.

Next, the Durbin-Watson statistic was used to test for independence of errors, yielding a value of 2.04, suggesting no autocorrelation. Heteroscedasticity was found when plotting the residuals against the predicted values as well as confirmed by doing the Breusch-Pagan test ( $p=0.003$ , significant hence it was heteroscedasticity). Outliers and influential observations were also identified using diagnostic plots and statistical measures like Cook's distance. To address issues like heteroscedasticity, non-linear distribution (for certain predictor variables and not others), and non-normality, we implemented the Kruskal-Wallis non-parametric test for both

sensitivity checks and robustness checks in addressing our research question 2 findings. Any changes to significance level or confidence interval were noted in the results as well.

For the dependent variables (investment amount in all bonds), we checked assumption of normality and homogeneity of variance. For examining normality, we checked the visual plots of histograms (indicating right skewness) and Shapiro -Wilk's tests ( $p < 0.001$  and hence data was not normally distributed). To address this issue as well as other issues like heteroscedasticity, we used a common logarithmic transformation or a log10 transformation. This was done because it helps stabilize variance, makes distribution of data more symmetrical, linearizes relationships as well as handles heteroscedasticity issue.

Even for research question 3 (mediating personal traits), we used the same log10 transformed dependent variable data (investment into bonds) for conducting the MANOVA, as it allowed us to maintain consistency and robustness in findings for both our research questions. By further undertaking non-parametric tests like the Independent Samples Mann-Whitney U Test and Kruskal-Wallis Test as robustness checks, we were able to confirm the significance of our findings.



#### 4.3.10. Models<sup>33</sup>

##### **Research Question 1:**

Our first research question was to ascertain whether the difference in bond framing effects influence their choice in green investments, and the data was analyzed in SPSS using the descriptive statistics (mean investment amounts across each scenario and across each bond type) and paired-sample t-test of differences:

##### ***Paired sample t-tests for bond pairs across all scenarios and bond types***

$$\bar{D}_{XY} = \frac{\sum_{i=1}^3(Y_{iX} - X_{iX}) - \sum_{i=1}^3(Y_{iY} - X_{iY})}{3}$$

Where:

$\bar{D}_{XY}$  represents the mean difference between the pre- and post-intervention measurements for bond pair X and Y

$X_{iX}$  and  $Y_{iX}$  represents the pre- and post-intervention measurements for Bond X in scenario  $i$ , respectively.

$X_{iY}$  and  $Y_{iY}$  represents pre- and post-intervention measurements for Bond Y in scenario  $i$ , respectively.

The summation is performed over the three scenarios (Pairs 1-3 from Scenario 1, Pairs 4-6 from Scenario 2, Pairs 7-9 from Scenario 3) and bond types (Pairs 10-12 for baseline labelled green bonds, Pairs 13-15 for hybrid green bonds, Pairs 16-18 for non-green bonds)

##### ***Paired sample t-tests for average of bond types***

$$\bar{D}_{XY} = \frac{\sum_{i=1}^3(\bar{Y}_{iX} - \bar{X}_{iX}) - \sum_{i=1}^3(\bar{Y}_{iY} - \bar{X}_{iY})}{3}$$

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<sup>33</sup> Although we tried various statistical techniques of analysis – including binomial and multinomial logistic regressions as well as generalized linear mixed models – we settled on the multivariate analysis of variance (MANOVA) general linear model, as our final technique for statistical analysis for Research Question 2 and 3. The rationale for doing this was because it allowed us to do simultaneous analysis of multiple dependent variables (investment into various bonds and across various scenarios), assess multivariate effects of several predictor variables, increase statistical power because of the correlation among the dependent variables and reduce the likelihood of Type I errors.

Where:

$\bar{D}_{XY}$  represents the mean difference between the average pre- and post-intervention measurements for bond pair X and Y

$\bar{X}_{iX}$  and  $\bar{Y}_{iX}$  represents the average pre- and post-intervention measurements for Bond X in scenario  $i$ , respectively.

$\bar{X}_{iY}$  and  $\bar{Y}_{iY}$  represents average pre- and post-intervention measurements for Bond Y in scenario  $i$ , respectively.

The summation is performed over the three bond types – baseline labelled green bond with hybrid green bonds (average of bonds ADG – BEH), baseline labelled green bonds with non-green bonds (average of bonds ADG – CFI), hybrid green bonds with non-green bonds (average of bonds BEH – CFI)

Computing the t-statistic equation:

$$t = \frac{\bar{D}}{s_D / \sqrt{n}}$$

Where:

- $\bar{D}$  is the mean difference between pre- and post-interval measurements for all bond pairs across scenarios.
- $s_D$  is the standard deviation of the differences in measurements.
- $n$  is the number of paired observations (total number of scenarios)

### ***Research Question 2:***

Our second research question was to ascertain whether retail investor's behavioral norms (ex-post proxies taken were their environmental benefits perception as their personal norm and the disclosure reporting preferences of a bond as their injunctive norm) have an explanatory effect when it comes to their choice in green bond investments. To analyze this data, we used multivariate regression analysis for Scenarios 2 and 3 separately.

*Multivariate regression model (MANOVA) equation for pro-environmental personal norms (Scenario 2)*

$$Y = \beta_0 + \beta_1 X_D + \beta_2 X_E + \beta_3 X_F + \varepsilon$$

Where:

- Y is a vector of the three dependent variables (mean investment amounts in Bond D, Bond E and Bond F)
- $X_D, X_E, X_F$  are the vectors of the independent variables (perceptions of environmental benefits for: baseline labelled green bond (Bond D), enhanced labelled green bond (Bond E), non-green conventional bond (Bond F) respectively).
- $\beta_0$  is a vector of intercepts for each dependent variable.
- $\beta_1, \beta_2, \beta_3$  are vectors of coefficients for each independent variable corresponding to each dependent variable.
- $\varepsilon$  is a vector of the error terms ( $\varepsilon_D, \varepsilon_E, \varepsilon_F$ , respectively)

*Multivariate regression model (MANOVA) equation for measuring injunctive norms related to disclosure (Scenario 3):*

$$Y = \beta_0 + \beta_1 X_G + \beta_2 X_H + \beta_3 X_I + \varepsilon$$

Where:

- Y is a vector of the three dependent variables (mean investment amounts in Bond G, Bond H and Bond I)
- $X_D, X_E, X_F$  are the vectors of the independent variables (preference of environmental disclosure reporting for: baseline labelled green bond (Bond G), enhanced labelled green bond (Bond H), non-reporting conventional bond (Bond I) respectively).
- $\beta_0$  is a vector of intercepts for each dependent variable.

- $\beta_1, \beta_2, \beta_3$  are vectors of coefficients for each independent variable corresponding to each dependent variable.
- $\varepsilon$  is a vector of the error terms ( $\varepsilon_G, \varepsilon_H, \varepsilon_I$ , respectively)

**Research Question 2:**

Our third research question was to ascertain what personal traits of retail investors have a mediating effect on their choice in green bond investments. To analyze this data, we used multivariate regression analysis (MANOVA) across all bonds in all scenarios (Bonds A to I):

**Multivariate regression model (MANOVA) equation for identifying mediating personal traits:**

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \dots + \beta_{26} X_{26} + \varepsilon$$

Where:

- $Y$  is a matrix of the dependent variables (mean investment amounts in Bond A to Bond I).
- $X_1 - X_2$  represents the variables related to risk tolerance (individual and institutional risk).
- $X_3 - X_{10}$  represents the variables related to investment portfolio preferences (investment horizon, investment attitude, investment portfolio stability preferences, investment philosophy and investment knowledge source (dummy coded across 4 levels)).
- $X_{11} - X_{21}$  represents the variables related to investment portfolio experience (investment in product types (dummy coded across 6 levels: stocks, bonds, ETFs, mutual funds, term deposits or none), and investment experience level in these products).
- $X_{22} - X_{26}$  represents the variables related to sociodemographic characteristics (gender, age group, education, employment experience in financial institutions, location).
- $\beta_0$  is a vector of intercepts for each dependent variable.
- $\beta_1, \beta_2, \beta_3 \dots \beta_{26}$  are matrices of coefficients for each group of independent variables.

- $\varepsilon$  is a matrix of error terms.

## 4.4. Findings

### 4.4.1. Respondent characteristics (Descriptive and Frequency Statistics)

Given above summary statistics, we highlight a few respondent characteristics and preferences that might help contextualize our findings (see Table 4.4). Most participants were men (66.9%), fell in the younger age groups of 18-45 years (89.3%), lived in the United States (98.4%) or had post-secondary degrees (overall 92.2% with a breakdown of – 61.5% having bachelor’s and 30% having master’s degrees and 0.7% having a Ph.D.). Surprisingly, most respondents (93%) claimed to have had current or previous experience working in the financial services industry.

In terms of their risk preferences, we found that respondents had an average risk tolerance of 6.09 for individual risk and 5.74 for institutional risk, out of a 10-point scale. With 60% of the respondents picking a score of greater than 5 for the individual risk, and a slightly lower or 56% picking a score of greater than 5 for institutional risk. This was expected as individual risk tolerance was anticipated be slightly higher than the institutional risk tolerance.

When it came to their investment portfolio preferences, we found that a cumulative 83.7% of participants had a *short* (49.5% picking 3-5 years) to *medium-term* (34.6% picking 5-10 years) investment horizon. In terms of their investment attitude, 61.9% of all participants had a *very conservative* (34.8%) to *conservative* (26.7%) attitude. A majority also *agreed with protecting their portfolio stability* over getting higher returns (56.5% agreed and 22.3% strongly agreed). Finally, when it came to investment philosophy of having stable investments, 47.6% were *comfortable with stable investments*, whereas 37.4% were *willing to withstand some fluctuations*.

In terms of their knowledge sources for investing, the top three most picked options were - *ESG information among other sources* (23.5%), using *both ESG and financial information* (14.7%), *financial information only* (10.4%) to make their investment decisions. In terms of their investments in various investment products, most of the participants seem to have had investment in bonds (75%), followed by stocks (72.6%) with a much smaller number of those investing in mutual funds (34.8%), ETFs (28%), term deposits (8.1%) and those with no investments (0.5%). Our expectation here was that most retail investors would have some level of experience with investment products given their knowledge about the financial markets and products. In relation to their experience level with these products, the highest category chosen by participants was A

*Lot* (4 out of 5 point-scale) of experience with stocks (41%), bonds (35.3%), ETFs (36.5%), mutual funds (36.3%) and term deposits (35.9%).

Based on these descriptive statistics, we assume that our participants seem to be quite savvy with understanding our survey description (including what a green bond is and how it might operate based on our pre-survey FAQ description) and comprehend the task at hand. Furthermore, we believe their experience with the various types of investment products might have made them more aware than the lay person about the pros and cons of investing in different types of financial products, including bonds. We acknowledge that this may produce some bias in the responses, however, our assumption is that since green bonds are not typically accessible financial product to an average retail investor, the effect of this bias is somewhat limited.

**Table 4.4: Summary statistics**

<b>Panel A: Continuous Data (Descriptive)</b>				<i>N=1105</i>
	<i>Mean</i>	<i>SE Mean</i>	<i>SD</i>	<i>Variance</i>
<b>Investment Across Bonds</b>				
Bond A	3632.00	47.25	1570.73	2467205
Bond B	3076.35	34.33	1141.34	1302651
Bond C	3291.65	46.49	1545.37	2388177
Bond D	3557.22	46.00	1528.98	2337769
Bond E	3161.10	41.33	1374.01	1887913
Bond F	3281.68	48.67	1617.83	2617387
Bond G	3586.82	46.10	1532.42	2348318
Bond H	3111	40	1342	1801060
Bond I	3301.76	48.533	1613.318	2602796
<b>Risk Tolerance</b>				
Individual Risk	6.09	.07	2.27	5.16
Institutional Risk	5.74	.07	2.23	4.99

**Panel B: Categorical Data (Frequency)**

<b>Main Variable Category</b>	<b>Sub-Category</b>	<b>Sub-Levels</b>	<b>N</b>	<b>Frequency %</b>
<b><i>Environmental Benefits Perception</i></b>	Baseline Performance Green Bond (Bond D)	Far below average	25	2.3%
		Somewhat below average	50	4.5%
		Average	335	30.3%
		Somewhat above average	545	49.3%
		Far above average	150	13.6%
	Enhanced Performance Green Bond (Bond E)	Far below average	8	0.7%
		Somewhat below average	65	5.9%
		Average	335	30.3%
		Somewhat above average	410	37.1%
		Far above average	287	26.0%
	Non-Green Conventional Bond (Bond F)	Far below average	45	4.1%
		Somewhat below average	79	7.1%
		Average	210	19.0%
		Somewhat above average	509	46.1%
		Far above average	262	23.7%
<b><i>Disclosure Reporting Preferences</i></b>	Baseline Reporting Green Bond (Bond G)	Far short of expectations	18	1.6%
		Short of expectations	63	5.7%
		Equals expectations	309	28.0%
		Exceeds expectations	562	50.9%
		Far exceeds expectations	153	13.8%
	Enhanced Reporting Green Bond (Bond H)	Far short of expectations	6	0.5%
		Short of expectations	40	3.6%



		Equals expectations	355	32.1%	
		Exceeds expectations	428	38.7%	
		Far exceeds expectations	276	25.0%	
	Non-Reporting Conventional Bond (Bond I)	Far short of expectations	36	3.3%	
		Short of expectations	86	7.8%	
		Equals expectations	183	16.6%	
		Exceeds expectations	520	47.1%	
		Far exceeds expectations	280	25.3%	
	<b><i>Investment Portfolio Preferences</i></b>	Investment Horizon	1-3 years	69	6.2%
			3-5 years	547	49.5%
5-10 years			382	34.6%	
10-20 years			71	6.4%	
20+ years			36	3.3%	
Investment Attitude		Very conservative	385	34.8%	
		Somewhat conservative	295	26.7%	
		Moderate	292	26.4%	
		Somewhat aggressive	92	8.3%	
		Very aggressive	41	3.7%	
Portfolio Stability Over Returns		Strongly agree	246	22.3%	
		Agree	624	56.5%	
		Neutral	197	17.8%	
		Disagree	29	2.6%	
		Strongly disagree	9	0.8%	

	Investment Philosophy	Comfortable with stable investments	526	47.6%	
		Willing to withstand fluctuations	413	37.4%	
		Seeking substantial investment return	120	10.9%	
		Seeking potentially high investment return	45	4.1%	
	Investment Knowledge	Do not make investment decisions	75	6.8%	
		Consult various data sources, including ESG or climate-related financial information	260	23.5%	
		Consult various financial sources of information	115	10.4%	
		Consult financial expert or use external advice	54	4.9%	
		What type of expert? ( <i>Open ended response</i> )	1	0.5%	
<b><i>Investment Experience</i></b>	Investment in Product Type	Stocks	802	72.6%	
		Bonds	829	75%	
		Exchange Traded Funds (ETFs)	309	28%	
		Mutual Funds	384	34.8%	
		Term Deposits	90	8.1%	
		None	6	0.5%	
	Investment Experience Level	Stocks	None at all	62	5.6%
			A little	118	10.7%
			A moderate amount	265	24.0%
			A lot	454	41.1%
			A great deal	170	15.4%
		Bonds	None at all	54	4.9%

			A little	104	9.4%
			A moderate amount	278	25.2%
			A lot	390	35.3%
			A great deal	246	22.3%
		ETFs	None at all	88	8.0%
			A little	115	10.4%
			A moderate amount	299	27.1%
			A lot	403	36.5%
			A great deal	161	14.6%
		Mutual Funds	None at all	118	10.7%
			A little	118	10.7%
			A moderate amount	241	21.8%
			A lot	397	35.9%
			A great deal	205	18.6%
		Term Deposits	None at all	118	10.7%
			A little	118	10.7%
			A moderate amount	241	21.8%
			A lot	397	35.9%
			A great deal	205	18.6%
		<b><i>Socioeconomic Traits</i></b>	Gender	Agender	n/a
Man	739			66.9%	
Woman	364			32.9%	
Transgender Man	n/a			n/a	

	Transgender Woman	n/a	n/a
	Non-binary	1	0.1%
	Two-Spirit	n/a	n/a
	Prefer to Self-Define	n/a	n/a
	Prefer Not to Answer	1	0.1%
Education	Not Completed High School	1	0.1%
	High School	84	7.6%
	Bachelor's Degree	680	61.5%
	Master's Degree	331	30.0%
	Ph.D.	8	0.7%
	Prefer Not to Answer	1	0.1%
Employment Experience in Financial Services Industry	Yes	1028	93.0%
	No	75	6.8%
Location	Canada	18	1.6%
	United States of America (USA)	1087	98.4%
Age Group	34 and under	437	39.5%
	35-45	550	49.8%
	46-55	69	6.2%
	56-65	39	3.5%
	66 and older	9	0.8%
	Prefer Not to Answer	1	0.1%

#### 4.4.2. Research Question 1

##### **Does the difference in bond framing effects influence their choice in green investments?**

As Table 4.1 highlights, the first bond in each of the three scenarios (Bonds A, D, and G) and includes wording reflecting a “labelled green bond” and can be understood as the baseline green bond in each scenario. This baseline choice also includes the lower coupon rate in scenario 1— with Bond A having the lowest coupon rate, and mid-level coupon rates in the other two scenarios (Bond D and G). Thus, a participant selecting these green bonds would be going against their rational economic choice and picking a bond solely with the intention of preferring the “green” label. In each scenario, the third bond or the non-green bond (Bonds C, F, and I) is labeled as a traditional bond with the highest coupon rate. Thus, this choice would be a more traditional, economically rational choice. The middle bond in each scenario (Bond B, E, and H) is a hybrid version of a green bond (with Bond B being an “unlabelled climate-aligned bond” and Bonds E and H being labelled green bonds but with enhanced environmental performance). However, in this case Bond B (Scenario 1 – “unlabelled climate-aligned bond” or an unlabelled green bond) has the mid-level coupon rate, whereas Bonds E and H have the lowest coupon rate (Scenario 2 and 3 – labelled green bonds with enhanced performance). Thus, a participant that selects hybrid green bonds in Scenarios 2 and 3 is also likely to go against their economic rational choice and prefer a green bond, but with the added caveat of having some extra level of “green” performance to it.

Within each scenario, we have manipulated the framing of the green bond to test investors’ sensitivity to nuances in the bond descriptions. Additionally, participants had to pass mandatory comprehension checks related to bond descriptions in each scenario, thereby further validating their exhibited bond preferences. Thus, we explore this first research question in two dimensions: first, whether there is a general difference between the first, second, and third bond types across the scenarios. And second, whether this is further differentiated within one or more of the scenarios based on their perception of a green bond’s “greenness”. In other words, the first-dimension tests whether, in general, investors perceive a differentiated value for **labelled green bonds** above the coupon rate. The second-dimension tests whether this is sensitive to alternative framed wording choices among labelled green bonds.

Visually, Figure 4.2 (Panel A and B) highlights that retail investment is highest for labelled green bonds across all scenarios (see Table 4.4. Panel A – Scenario 1 -  $M_{\text{BondA}}=3632$ ; Scenario 2 -  $M_{\text{BondD}}=3557.22$ ; Scenario 3 -  $M_{\text{BondG}}=3586.82$  versus Scenario 1 -  $M_{\text{BondB}}=3076.35$ ; Scenario 2 -  $M_{\text{BondE}}=3161.10$ ; Scenario 3 -  $M_{\text{BondH}}=3111$  and, Scenario 1 -  $M_{\text{BondC}}=3291.65$ ; Scenario 2 -  $M_{\text{BondF}}=3281.68$ ; Scenario 3 -  $M_{\text{BondI}}=3301.76$ ). Table 4.5, Panel A, provides the paired difference tests between the averages of different bond types (bonds A, D, and G or *baseline green bonds*; bonds B, E, and H or *hybrid green bonds*; and, bonds C, F, and I or *non-green bonds*, where  $p=0.012$  or  $<.001$ ) and is visually shown in Figure 4.2, Panel B.

Thus, we can conclude, generally, that retail investors chose the labelled green bond (or baseline green bond) as their highest investment category, even though it had the lowest financial return, when compared to the unlabeled climate-aligned bond and the traditional corporate bond. Interestingly, however, retail investors will select, on average, the non-green bonds (Bond C, F and I) with the highest financial return over the hybrid green bonds (Bond B, E and H). Based on this we infer that, in general, if only labelling is disclosed, retail investors tend to be antithetical to their economic interests and prefer a labelled green bond, even if it has the lowest financial return. However, when it comes to a more nuanced situation where greater details around the “greenness” of the green bond are disclosed – such as different performance levels (baseline versus enhanced) related to environmental benefits and reporting preferences – retail investors do not tend to factor such information into their decision-making process.

Next, we explore whether there are individual differences between the bonds. Recall that each scenario added a different frame to the three bond types, while maintaining the basic nature (e.g., baseline labeled green bond, hybrid green bond, and non-green bond). This was done to explore whether retail investors were able to discern the nuances of green bond framing. Thus, to further explore our first research question, we dissect the differences between the various bonds.

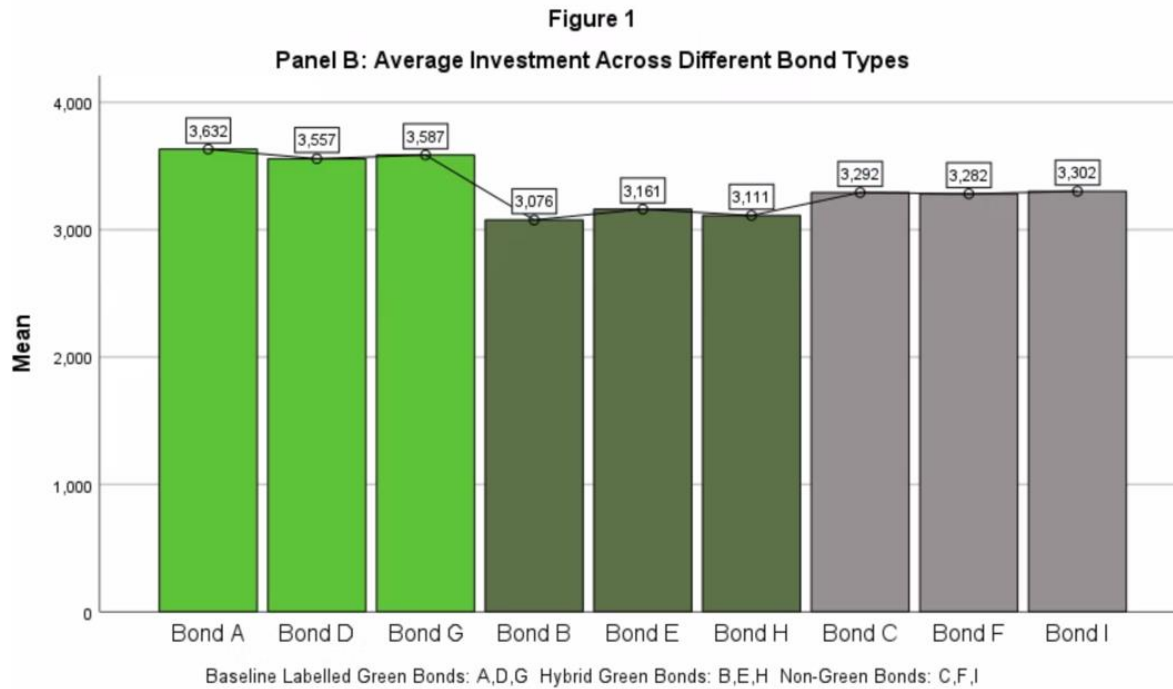
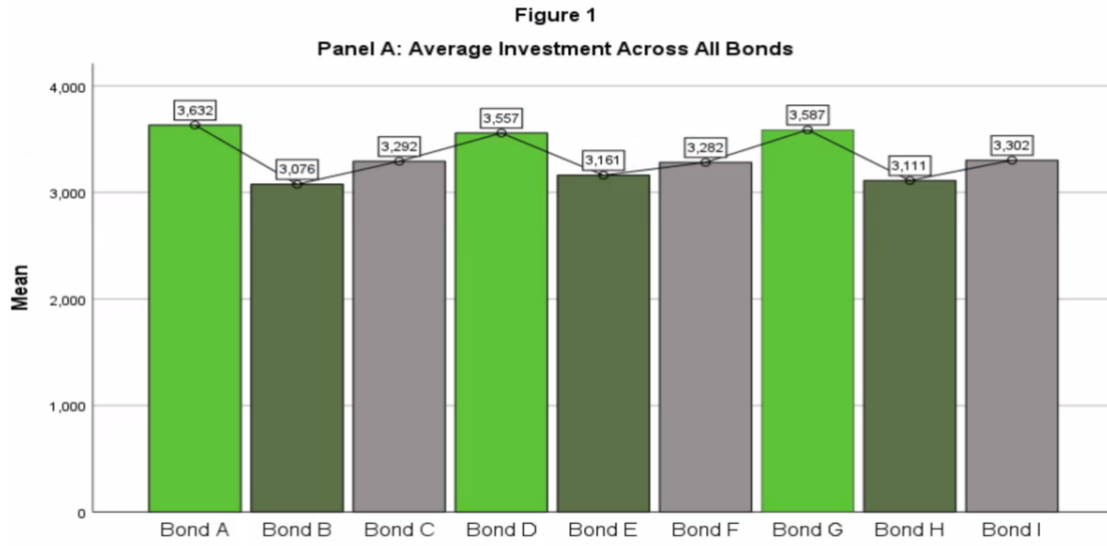
Notably, as shown in Table 4.5, Panel B, there are no significant differences between the first (Bonds A, D, and G; all  $p > 0.771$ ), second (Bonds B, E, and H; all  $p > 0.255$ ), and third bond types (Bonds C, F, and I; all  $p > 0.576$ ). However, within each scenario, all bonds are statistically different from each other ( $p > 0.044$ ), except for Bonds B and C, in Scenario 1 ( $p = 0.161$ ). Even though we do not have strong evidence to reject the null hypothesis that there is no difference between Bonds B and C, the results do suggest a trend towards Bond B having a lower

value than Bond C (but this trend is not statistically significant given the p-values). Hence, when it came to individual differences across bonds, the framing regarding labelling in Scenario 1 may not have had the intended impact for Bonds B and C.

Our overall response to RQ1 is as following:

- **Preference for Labelled Green Bonds:** Retail investors consistently show a preference for labelled green bond across all scenarios – indicating that bond framing as it relates to labelling has a positive and significant impact on their bond preferences. This shows that when presented with limited framing information (such as bond label and financial return), they tend to prioritize environmental considerations over financial returns.
- **Preference for Higher Financial Returns:** However, when additional framing around labelled green bonds is introduced, such as environmental benefits and reporting performance, they tend to factor in financial considerations over environmental considerations. In this case, they choose the green bond with the higher return over the one with a higher positive impact and the non-green bond.
- **Lack of Sensitivity to Nuanced Green Bond Framing:** The lack of significant differences between bond types (baseline green bond, hybrid green bond and non-green bond) across scenarios also indicates that retail investors do not fully understand the nuances in green bond framing. Hence, green bond framing linked to additional disclosures does not have the same influence on their choice as the labelling or the higher financial returns. However, we find there are significant differences between individual bonds within each scenario suggests that other factors beyond framing and coupon rate may be influencing investors' preferences or perceptions of the bonds.

In conclusion, the findings suggest that while retail investors generally prefer labelled green bonds, their investment decisions may not fully consider the nuances of green bond framing, particularly when financial returns are at stake. This indicates a potential gap between investors' environmental preferences and their investment decision-making processes.



**Figure 4.2: Mean investment across bonds and bond types (Authors' Construction)**

**Table 4.5: Paired Samples T-Test Results Across Scenarios and Bond Types**



**Panel A: Average of Bond Types Across Scenarios**

<i>Bond Pair Type (Average)</i>	<i>Mean</i>	<i>SD</i>	<i>SE Mean</i>	<i>95% CI</i>		<i>t</i>	<i>df</i>	<i>Two-sided p</i>
				<i>Lower</i>	<i>Upper</i>			
ADG – BEH (Baseline green bonds – Hybrid green bonds)	-4.58469	.32584	.01003	-4.60437	-4.56500	-457.015	1054	<.001
ADG – CFI (Baseline green bonds – Non-green bonds)	-4.61393	.44136	.01378	-4.64097	-4.58690	-334.848	1025	<.001
BEH – CFI (Hybrid green bonds – Non-green bonds)	-.03824	.48662	.01518	-.06803	-.00844	-2.518	1026	.012

**Panel B: Difference Between Individual Bonds**

<i>Bond Pair</i>	<i>Mean</i>	<i>SD</i>	<i>SE Mean</i>	<i>95% CI</i>		<i>t</i>	<i>df</i>	<i>Two-sided p</i>
				<i>Lower</i>	<i>Upper</i>			
<i>Scenario 1: Labelling</i>								
Bond A – Bond B	.04734	.25847	.00791	.03182	.06285	5.988	1068	<.001
Bond A – Bond C	.03578	.32639	.01005	.01605	.05551	3.559	1053	<.001
Bond B – Bond C	-.01120	.25926	.00799	-.02687	.00447	-1.403	1053	.161
<i>Scenario 2: Environmental Benefits Perception</i>								
Bond D – Bond E	.04765	.26295	.00808	.03179	.06350	5.897	1058	<.001
Bond D – Bond F	.03372	.30915	.00961	.01486	.05257	3.509	1034	<.001
Bond E – Bond F	-.01797	.28653	.00890	-.03543	-.00051	-2.020	1036	.044

*Scenario 3: Reporting Preferences*

Bond G – Bond H	.05290	.27068	.00830	.03662	.06918	6.375	1063	<.001
Bond G – Bond I	.03265	.31561	.00978	.01345	.05184	3.337	1040	<.001
Bond H – Bond I	-.02451	.29086	.00901	-.04219	-.00683	-2.720	1041	.007

*Type: Baseline Green Bonds*

Bond A – Bond D	-.00165	.18607	.00568	-.01279	.00949	-.291	1073	.771
Bond A – Bond G	-.00089	.19820	.00603	-.01273	.01094	-.148	1078	.882
Bond G – Bond D	-.00041	.18423	.00562	-.01144	.01062	-.074	1073	.941

*Type: Hybrid Green Bonds*

Bond B – Bond E	-.00155	.19238	.00589	-.01310	.01000	-.263	1067	.793
Bond B – Bond H	.00488	.18289	.00560	-.00610	.01587	.872	1066	.383
Bond H – Bond E	-.00684	.19629	.00601	-.01863	.00495	-1.139	1066	.255

*Type: Non-Green Bonds*

Bond C – Bond F	-.00234	.19467	.00601	-.01414	.00946	-.390	1047	.697
Bond C – Bond I	-.00351	.20344	.00626	-.01580	.00878	-.560	1054	.576
Bond I – Bond F	.00072	.19798	.00613	-.01130	.01275	.118	1042	.906

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### 4.4.3. Research Question 2

**Do retail investor's behavioral norms like pro-environmental personal norm and pro-reporting injunctive norm, have an explanatory effect when it comes to their choice in green bond investments?**

#### ***4.4.3.1. Personal Norm (ex-post proxy: Environmental Benefits Perception)***

We conducted a MANOVA to test whether retail investor's personal norm (with perception of environmental benefits taken as a proxy) were influenced by the framing of environmental benefits in Bond D (labelled green bond with positive baseline performance), Bond E (labelled green bond with positive enhanced performance) and Bond F (conventional bond with negative performance) to have a direct influence on their investment amounts across these bonds.

First, we performed a MANOVA with the original responses based on the five sub-levels (below average to above average), however, the cell sizes for some of the *far below* and *somewhat below* average sub-categories were quite small and hence could have led to unreliable estimates and increased variability in the data. This would have further caused problems when looking to generalize the findings. Since we were dealing with categorical data, we aggregated the categories of far below with somewhat below average into below average as well as far above with somewhat above average into above average. This allowed us to assess the results based on three categories of *above average*, *average* and *below average*, as well as improve the reliability of estimates. We then proceeded to perform the MANOVA with these new categories and using the log10 transformation of the dependent variable data for Bonds D, E, and F.

The intercept term in our multivariate analysis (in Table 4.6) suggests that there is a highly significant effect ( $p < .001$ ), indicating that there are significant overall differences among the groups on the combination of dependent variables. However, for individual independent variables (EnvBen\_D, EnvBen\_E, EnvBen\_F) and their interactions, the p-values suggest that not all effects are statistically significant. For instance, the interaction term EnvBen\_D\*EnvBen\_F has a p-value of .183, indicating it is not statistically significant. On the other hand, the two-way interactive effect of the enhanced bond (EnvBen\_E) and the non-green

bond (EnvBen\_F) seemed to show a highly significant effect as well. Similarly, the three-way interaction of environmental benefits perception of all bonds (EnvBen\_D\*EnvBen\_E\*EnvBen\_F) also showed a highlight significant effect. This was expected as the interaction across the bonds, especially the framing of the environmental benefits of the enhanced green bond and the lack of benefits of the non-green bond would influence the participants in their investment decisions.

For more detailed impact, we see the between subjects' effect and focus on the significant effect that the interactive terms have on investment into Bond E (enhanced green bond). To visualize this, we see Fig 4.3 (Panels A, B and C), where based on the interaction of their *above average perception of Bond E* (enhanced green bond) and their *below average perception of Bond F* (non-green bond) – they tend to invest differently across the three bonds – with an increasing investment trend (as their perception moves from average to towards above average) into Bond E (enhanced green bond having the highest EMM of 3.54, see Panel B), which is a highly significant result ( $p < .001$ ). Alternatively, they show a decreasing investment trend into Bond D (baseline green bond having the mid-level EMM of 3.50, see Panel A) as well as into Bond F (non-green bond having the lowest EMM of 3.41, see Panel C) – however these results are not significant. The highly significant result of investment into Bond E is in line with our expectations that those who perceive the enhanced green bond as expected (or understand the disclosure framing more appropriately) tend to invest in a manner that is in line with their beliefs.

#### ***4.4.3.1.1. Testing Robustness and Sensitivity of Results***

To perform robustness checks and assess sensitivity of the results, we also performed the non-parametric Kruskal-Wallis Test, since we had independent variables that had more than two levels each. The significant results indicated that based on the environmental benefits perception of the baseline green bond (Bond D) there were significant differences found in distribution of the investment amounts going to Bond D ( $p=0.009$ ), Bond E ( $p=0.003$ ) and Bond F ( $p<0.001$ ). When it came to the environmental benefits perception of the enhanced green bond (Bond E), we found significant differences for Bond E ( $p=0.003$ ) and F ( $p=0.012$ ) but not for Bond D ( $p=0.215$ ). And finally, based on the perception of the non-green bond (Bond F), we found that it only had a significant impact on investment into Bond E ( $p<0.001$ ), but not on Bond D ( $p=0.510$ ) or F

( $p=0.071$ ). These results further provide evidence to support that our results from the MANOVA are robust and not sensitive.

In conclusion, we have the following finding for personal norms:

- We find that retail investors cannot discern nuances across the two types of green bonds.
- However, when framing of an enhanced green bond (that has a positive environmental impact) is displayed in conjunction with a negative framing of a non-green bond, it can play a crucial role in influencing higher investment into the enhanced green bond.
- Based on these results, we can infer that those **retail investors who have significant pro-environmental personal norm and are able to correctly comprehend the framing nuances, will invest in line with their beliefs**, even if it is antithetical to their economic interests.

**Table 4.6: MANOVA results for environmental benefits perception.**

<b>Panel A: Multivariate Tests – Environmental Benefits Perception</b>						
<i>Source</i>		<i>Pillai's Trace Value</i>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p-value</i>
<b>Intercept</b>		.999	443285.289	3	1006	<.001**
<b>EnvBen_D</b>		.009	1.576	6	2014	.150
<b>EnvBen_E</b>		.011	1.931	6	2014	.072
<b>EnvBen_F</b>		.004	.732	6	2014	.624
<b>EnvBen_D * EnvBen_E</b>		.009	.780	12	3024	.672
<b>EnvBen_D*EnvBen_F</b>		.016	1.350	12	3024	.183
<b>EnvBen_E*EnvBen_F</b>		.028	2.396	12	3024	.004**
<b>EnvBen_D* EnvBen_E*EnvBen_F</b>		.042	2.063	21	3024	.003**

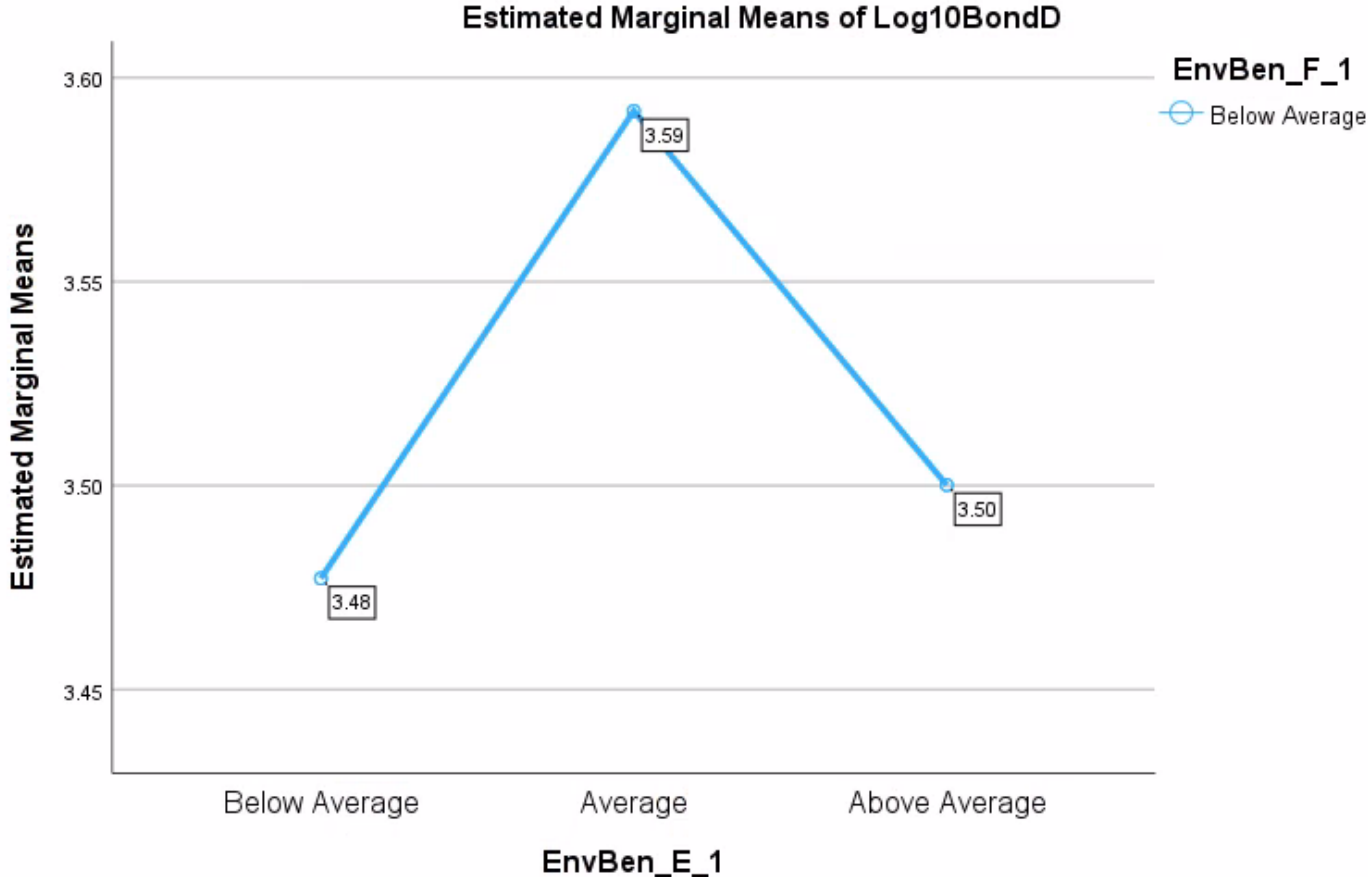
  

<b>Panel B: Between Subject Effects</b>						
<i>Source</i>	<i>Dependent Variable</i>	<i>Type III Sum of Squared</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p-value</i>
<b>Intercept</b>	Log10BondD	1875.588	1	1875.588	73352.315	<.001**
	Log10BondE	1845.031	1	1845.031	75184.954	<.001**
	Log10BondF	1892.401	1	1892.401	57481.184	<.001**
<b>EnvBen_D</b>	Log10BondD	.088	2	.044	1.716	.180
	Log10BondE	.063	2	.032	1.289	.276
	Log10BondF	.187	2	.093	2.839	.059
<b>EnvBen_E</b>	Log10BondD	.110	2	.055	2.158	.116

	Log10BondE	.117	2	.058	2.381	.093
	Log10BondF	.182	2	.091	2.763	.064
<b>EnvBen_F</b>	Log10BondD	.101	2	.050	1.972	.140
	Log10BondE	.011	2	.005	.216	.806
	Log10BondF	.079	2	.040	1.207	.300
<b>EnvBen_D*</b>	Log10BondD	.119	4	.030	1.162	.326
<b>EnvBen_E</b>	Log10BondE	.053	4	.013	.540	.706
	Log10BondF	.189	4	.047	1.432	.221
<b>EnvBen_D*</b>	Log10BondD	.146	4	.037	1.430	.222
<b>EnvBen_F</b>	Log10BondE	.161	4	.040	1.640	.162
	Log10BondF	.111	4	.028	.841	.499
<b>EnvBen_E*</b>	Log10BondD	.202	4	.050	1.973	.097
<b>EnvBen_F</b>	Log10BondE	.495	4	.124	5.044	<.001**
	Log10BondF	.120	4	.030	.913	.456
<b>EnvBen_D*</b>	Log10BondD	.339	7	.048	1.893	.067
<b>EnvBen_E*</b>	Log10BondE	.604	7	.086	3.516	<.001**
<b>EnvBen_F</b>	Log10BondF	.204	7	.029	.884	.518

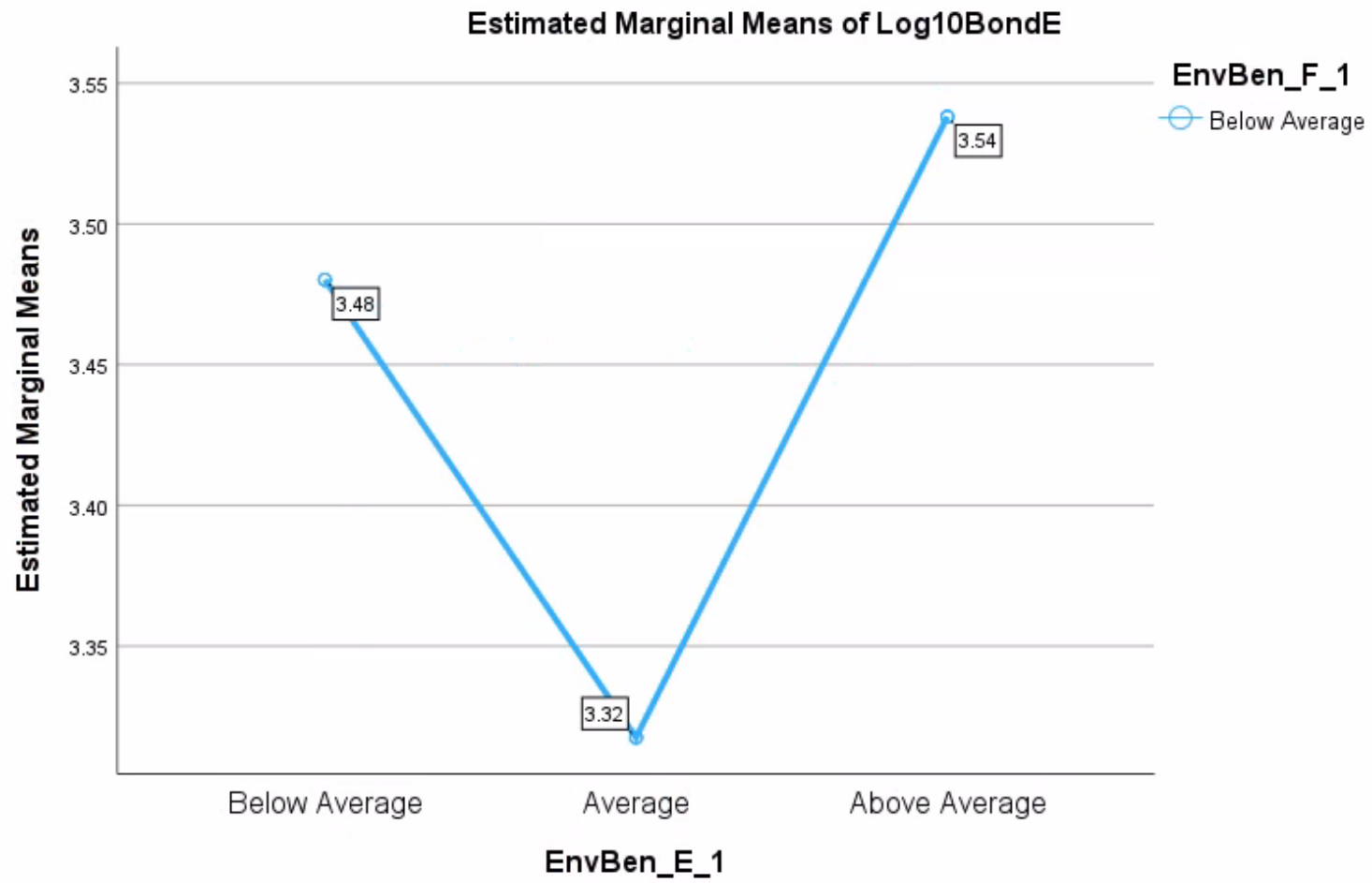
**Figure 4.3: Estimated marginal means of Bonds D, E and F based on the interaction effect of the above average enhanced benefits perception for Bond E with the below average perception for Bond F.**

Panel A: Interaction effect on the mean investment into Bond D (log10 transformed).

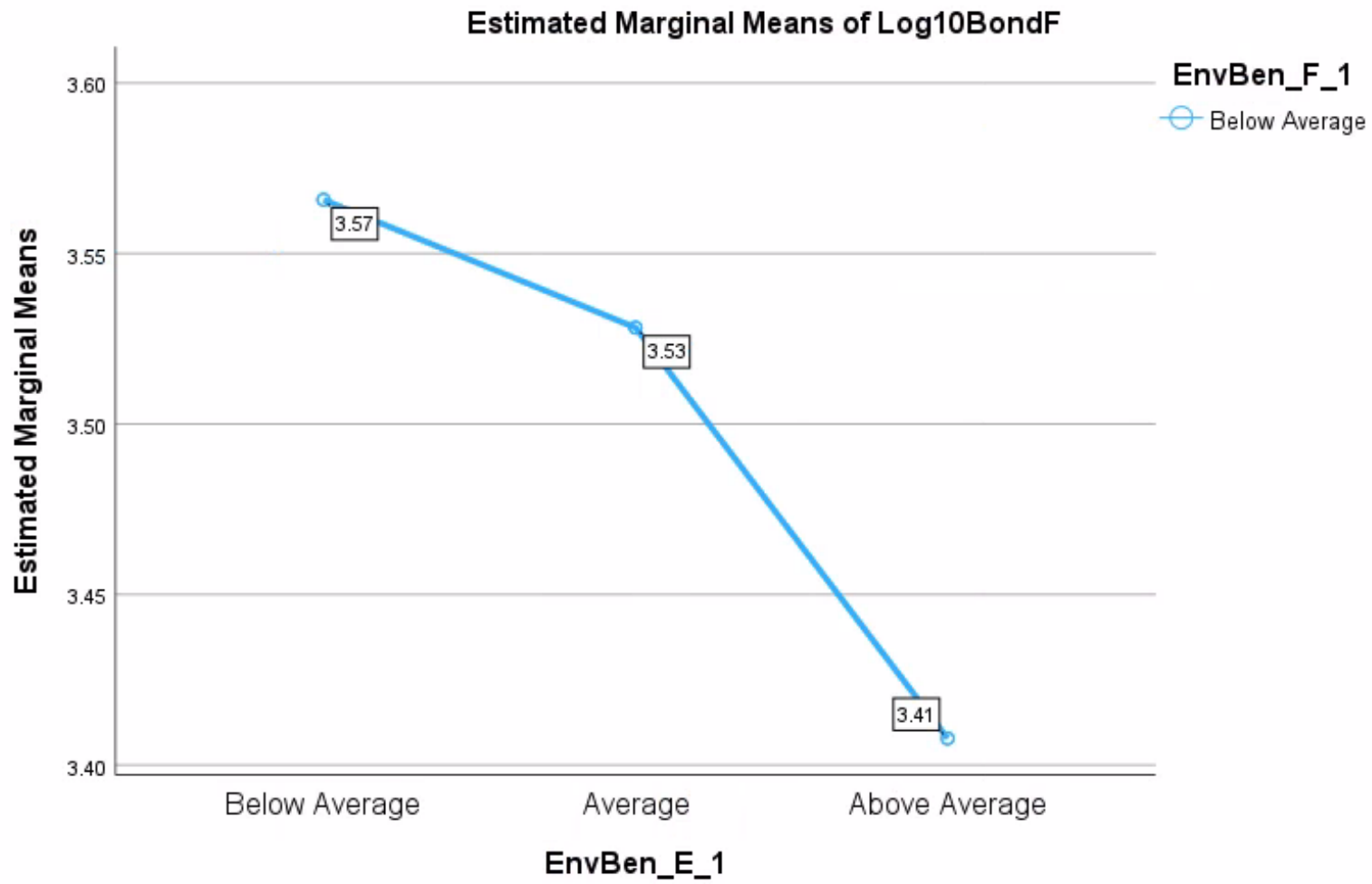




Panel B: Interaction effect on the mean investment into Bond E (log10 transformed).



Panel C: Interaction effect on the mean investment into Bond F (log10 transformed).



#### 4.4.3.2. *Injunctive Norm (ex-post proxy: Disclosure Reporting Preferences)*

We conducted a MANOVA to test whether retail investor's injunctive norm (preference of disclosure reporting levels taken as a proxy) were influenced by the framing of reporting performances across Bond G (labelled green bond with positive baseline performance), Bond H (labelled green bond with positive enhanced performance) and Bond I (conventional bond with no reporting performance) to have a direct influence on their investment amounts across these bonds.

Like the previous context, we performed a MANOVA with the original responses based on the five sub-levels (falls short of expectations to far exceeds expectations), however, the cell sizes for the *falls short of expectations* and *far exceeds expectations* sub-categories were quite small and would have further caused problems when looking to generalize the findings. Since we were dealing with categorical data, we aggregated the categories of far short of expectations with short of expectations into falls short of expectations as well as far exceeds expectations with exceeds expectations into a new category called exceeds expectations. This allowed us to assess the results based on three categories of *falls short of expectations*, *equals expectations*, and *exceeds expectations*, as well as improve the reliability of estimates. We then proceeded to perform the MANOVA with these new categories and using the log10 transformation of the dependent variable data for Bonds G, H, and I.

The intercept term in our multivariate analysis (in Table 4.7) suggests that there is a highly significant effect ( $p < .001$ ), indicating that there are significant overall differences among the groups on the combination of dependent variables. Except for marginally significant for the baseline green bond (EnvDis\_G), there are no significant effects on the individual independent variables (EnvDis\_H, EnvDis\_I) nor in their interactions. The multivariate model interaction terms between environmental disclosure factors are also not significant.

In the between-subject effects, the intercept has a highly significant effect on all dependent variables ( $p < 0.001$ ). Here, the environmental disclosure reporting framing (EnvDis\_G, EnvDis\_H, EnvDis\_I) shows mixed effects on the dependent variables. Some combinations of environmental reporting framing are significant, such as the disclosure framing of the baseline green bond and the enhanced green bond (EnvDis\_G\*EnvDis\_H) as well as a

three-way interaction of all the bonds (EnvDis\_G\*EnvDis\_H\*EnvDis\_I) and seem to significantly affect investment into Bond H.

To visualize this, we see Fig 4.4., where based on the interaction of their *exceeds expectations perception of Bond H* (enhanced green bond) and their *equals expectations perception of Bond G* (baseline green bond) – they tend to invest differently across the three bonds – with an increasing investment trend (as their perception moves from average to towards above average) into Bond H (enhanced green bond having the highest EMM of 3.56, see Panel B) and Bond G (baseline green bond having the mid-level EMM of 3.51, see Panel A) Alternatively, they show a decreasing investment trend into Bond I (non-green non-reporting bond having the lowest EMM of 3.44, see Panel C) These results are significant for their investment into Bond H, and are in line with our expectations that those who perceive the enhanced green bond as exceeds expectations (or tend to understand the disclosure framing more appropriately) seem to invest in a manner that is in line with their beliefs.

#### ***4.4.3.2.1. Testing Robustness and Sensitivity of Results***

For this context, we also performed the non-parametric Kruskal-Wallis Test. The results indicated that based on the preferences for environmental reporting disclosure of the baseline green bond (Bond G) there were significant differences found in distribution of the investment amounts going to Bond G ( $p=0.022$ ), Bond H ( $p < 0.001$ ) and Bond I ( $p < 0.001$ ). When it came to preferences for environmental reporting disclosure of the enhanced green bond (Bond H), we found significant differences for Bond H ( $p < 0.001$ ) and I ( $p=0.009$ ) but not for Bond G ( $p=0.286$ ). And finally, based on the perception of the non-reporting bond's disclosure framing (Bond F), we found that it had a significant impact on investment into Bond H ( $p < 0.001$ ) and Bond I ( $p=0.009$ ) but not on Bond G ( $p=0.693$ ). These results further provide evidence to support that our results from the MANOVA are robust and not sensitive to changes in analytical methods.

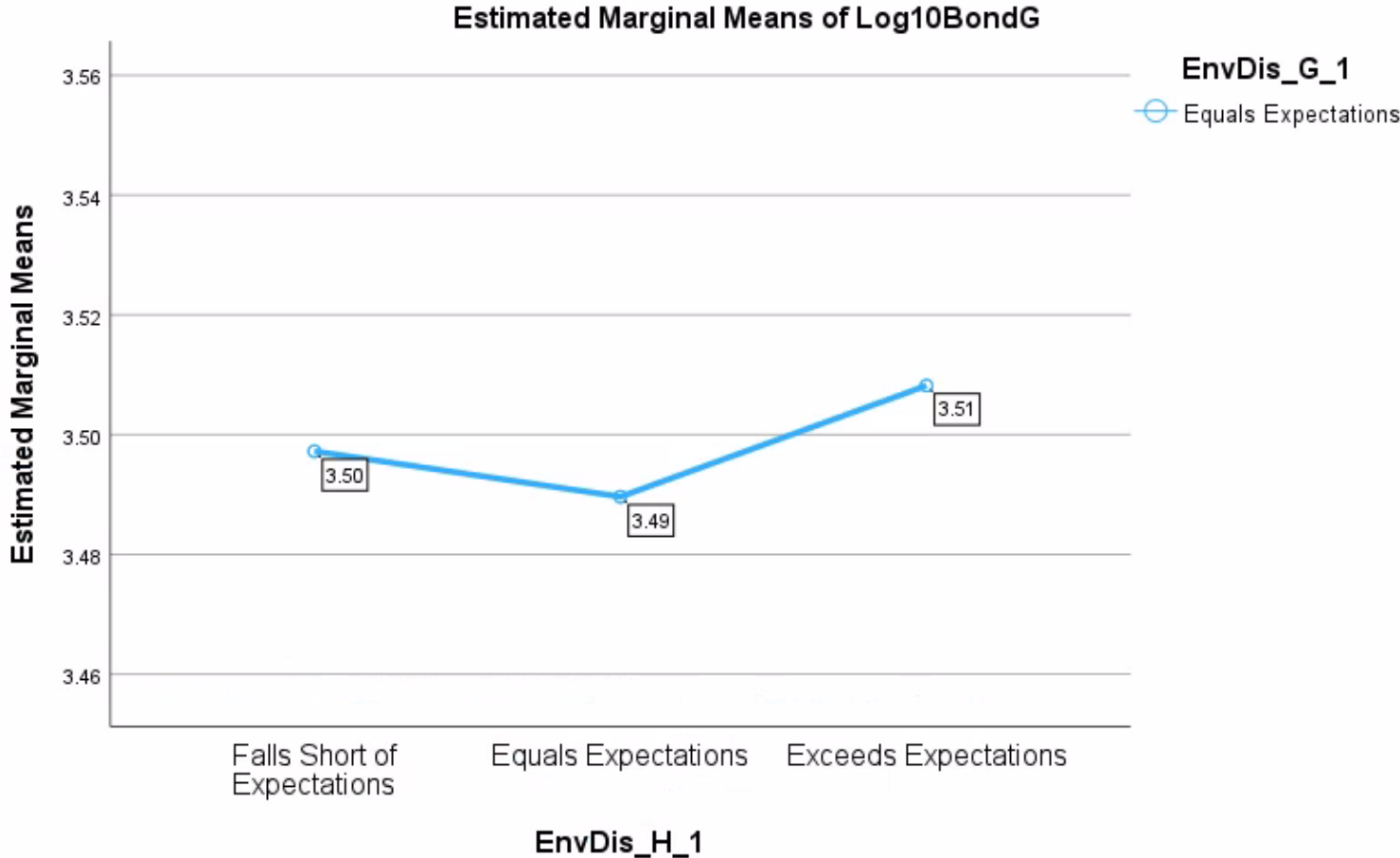
In conclusion, we have the following finding for injunctive norms:

- We find that retail investors cannot discern nuances in disclosure framing across the two types of green bonds.

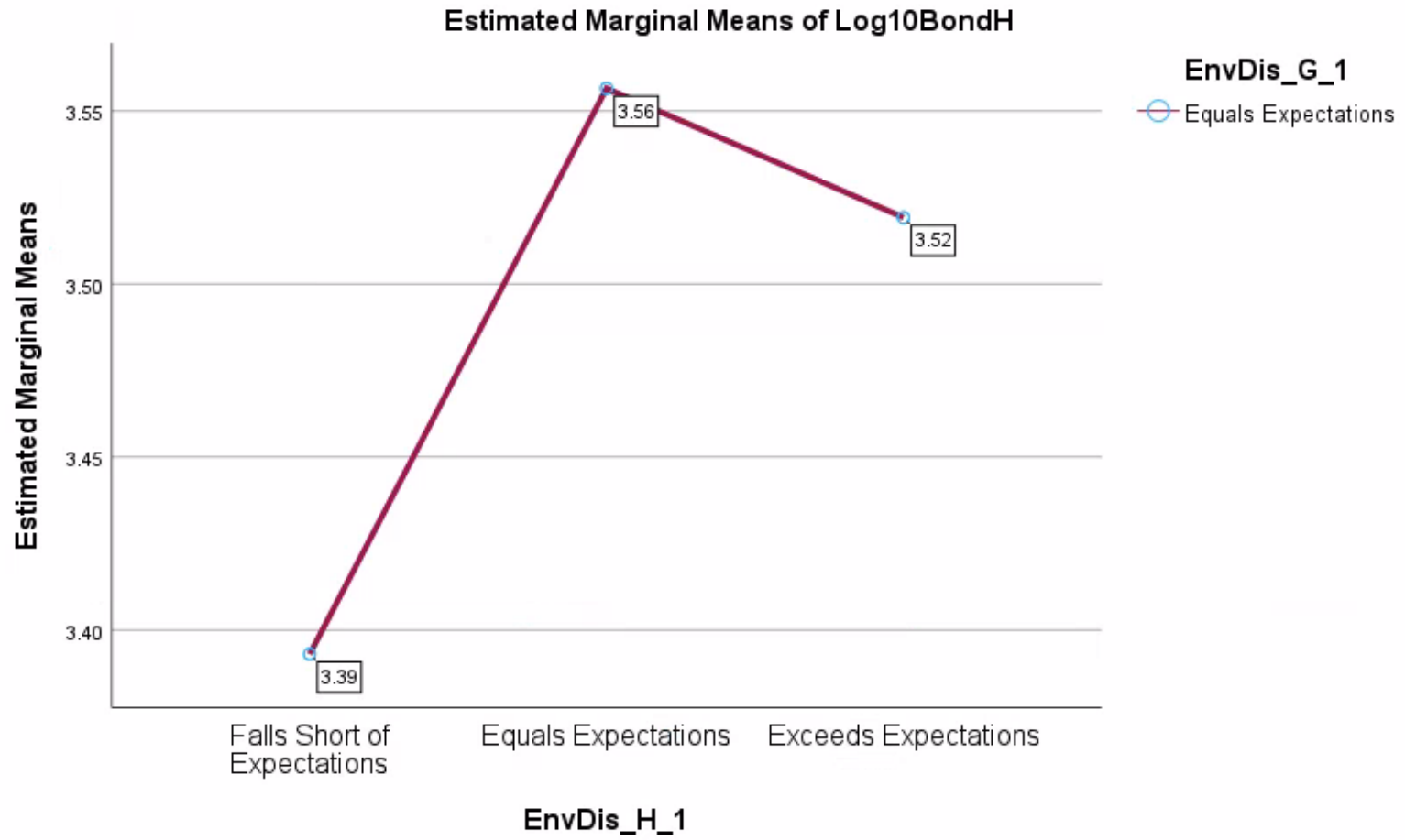
- However, when framing of an enhanced reporting green bond is displayed in conjunction with a non-reporting framing of a non-reporting conventional bond, it can play a crucial role in influencing higher investment into the enhanced reporting green bond.
- Based on these results, we can infer that those **retail investors who have significant injunctive norms as it relates to information disclosure reporting and are correctly able to comprehend the nuances in disclosure framing, will invest in line with their beliefs**, even if it is antithetical to their economic interests.

**Figure 4.4: Estimated marginal means of Bonds G, H and I based on the interaction effect of the equals expectation performance of Bond G's reporting with the exceeds expectations' perception of Bond H's reporting.**

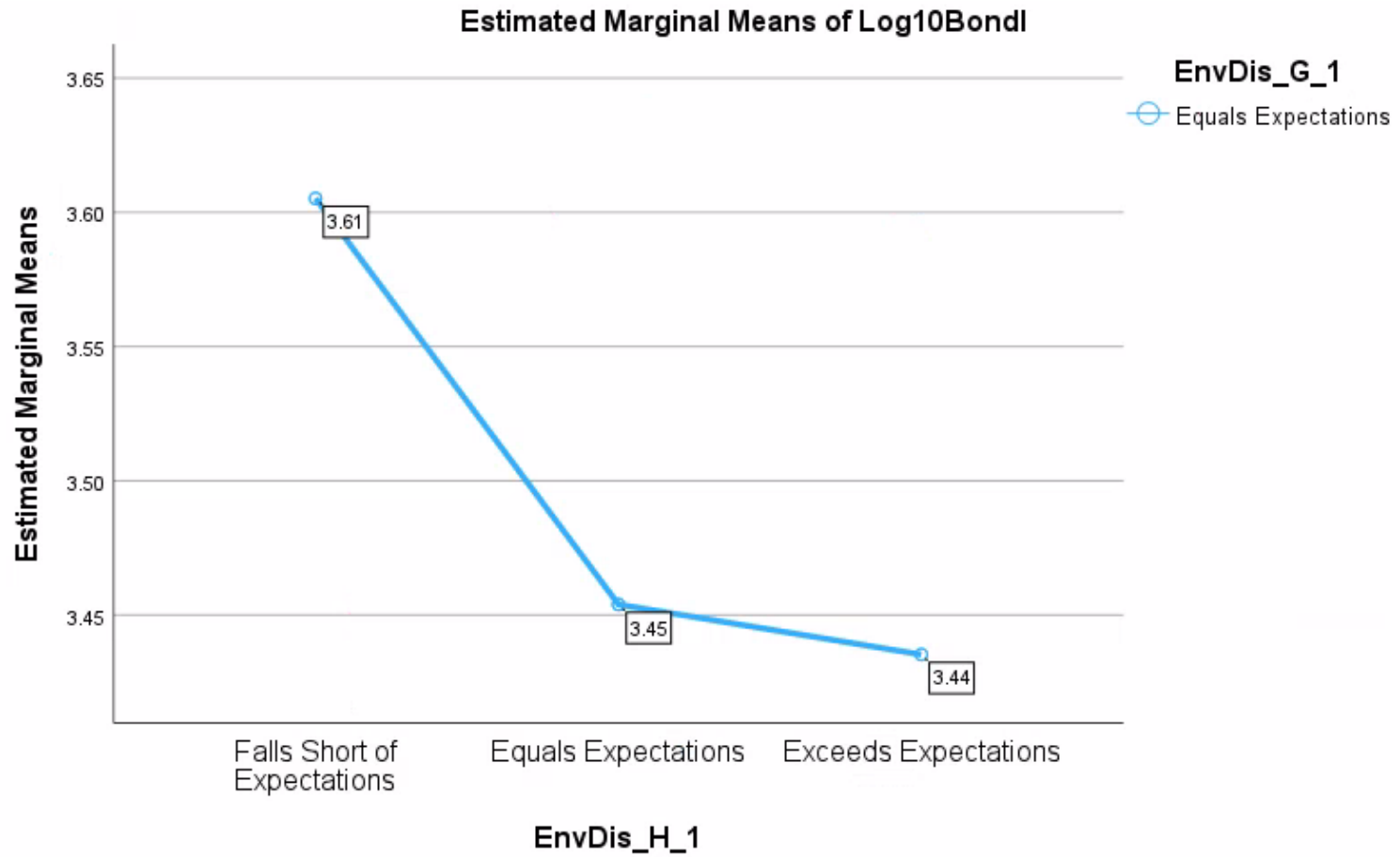
Panel A: Interaction effect on the mean investment into Bond H (log10 transformed).



Panel B: Interaction effect on the mean investment into Bond H (log10 transformed).



Panel C: Interaction effect on the mean investment into Bond I (log10 transformed).





**Table 4.7: MANOVA Results for disclosure reporting performance.**

<b>Panel A: Multivariate Tests – Disclosure Reporting Preferences</b>							
<i>Source</i>		<i>Pillai's Trace Value</i>		<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p-value</i>
<b>Intercept</b>		.999		309175.518	3	1011	<.00**
<b>EnvDis_G</b>		.012		2.059	6	2024	.055
<b>EnvDis_H</b>		.010		1.667	6	2024	.125
<b>EnvDis_I</b>		.008		1.331	6	2024	.240
<b>EnvDis_G*EnvDis_H</b>		.016		1.382	12	3039	.166
<b>EnvDis_G*EnvDis_I</b>		.007		.617	12	3039	.829
<b>EnvDis_H*EnvDis_I</b>		.010		.865	12	3039	.582
<b>EnvDis_G* EnvDis_H*EnvDis_I</b>		.028		1.214	24	3039	.217

<b>Between Subject Effects</b>						
<i>Source</i>	<i>Dependent Variable</i>	<i>Type III Sum of Squared</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p-value</i>
<b>Intercept</b>	Log10BondG	1622.586	1	1622.586	57332.876	<.001**
	Log10BondH	1576.327	1	1576.327	63787.063	<.001**
	Log10BondI	1640.613	1	1640.613	49083.259	<.001**
<b>EnvDis_G</b>	Log10BondG	.044	2	.022	.781	.458
	Log10BondH	.150	2	.075	3.039	.048*
	Log10BondI	.288	2	.144	4.303	.014*
<b>EnvDis_H</b>	Log10BondG	.032	2	.016	.561	.571

	Log10BondH	.096	2	.048	1.948	.143
	Log10BondI	.278	2	.139	4.165	.016*
<b>EnvDis_I</b>	Log10BondG	.004	2	.002	.065	.937
	Log10BondH	.130	2	.065	2.622	.073
	Log10BondI	.137	2	.068	2.043	.130
<b>EnvDis_G*</b>	Log10BondG	.075	4	.019	.665	.616
<b>EnvDis_H</b>	Log10BondH	.248	4	.062	2.511	.040*
	Log10BondI	.118	4	.029	.881	.475
<b>EnvDis_G*</b>	Log10BondG	.122	4	.030	1.073	.368
<b>EnvDis_I</b>	Log10BondH	.055	4	.014	.560	.692
	Log10BondI	.034	4	.008	.254	.907
<b>EnvDis_H*</b>	Log10BondG	.156	4	.039	1.380	.239
<b>EnvDis_I</b>	Log10BondH	.079	4	.020	.794	.529
	Log10BondI	.126	4	.031	.940	.440
<b>EnvDis_G*</b>	Log10BondG	.134	8	.017	.590	.787
<b>EnvDis_H*</b>	Log10BondH	.476	8	.059	2.406	.014*
<b>EnvDis_I</b>	Log10BondI	.290	8	.036	1.083	.372

#### 4.4.4. Research Question 3

### **What are the personal traits of retail investors that have a positive mediating effect on their preference for green bond investments?**

We used a MANOVA to identify which of the personal traits (risk tolerance, investment portfolio preferences, sociodemographic characteristics, and investment experience) showed a significant impact on the investment across all bonds. However, for the purposes of our research question, we will focus on the significant results for the baseline (labelled) and hybrid (labelled and unlabeled) green bonds only.

The overall multivariate test statistics for the intercept are presented in Table 4.8, Panel A. The large F-value (11838.392) and the significant p-value ( $p = 0.000$ ) suggest that there is a significant effect overall when considering the intercept. The following effects results also highlights the significance of predictor variables such as institutional risk ( $p=0.016$ ) investment attitude ( $p=0.000$ ), portfolio stability ( $p=0.038$ ), investment philosophy ( $p=0.014$ ), education ( $p=0.008$ ), investment in stocks ( $p=0.011$ ) and investment experience in stocks ( $p=0.031$ ), in influencing the overall investment outcome. Furthermore, in Panel B, we find that the independent variables have a statistically significant effect on most of the dependent variables (Bonds A to I), as evidenced by the significant p-values. This confirms our expectation that personal traits like risk tolerance, portfolio preferences, investment experience level and certain sociodemographic characteristics have a direct mediating effect on retail investors investment preference.

**Table 4.8: MANOVA Results for Predictive Personal Traits**

<b>Panel A: Multivariate Tests</b>					
<b>Effect</b>	<b>Pillai's Trace</b>	<b>F</b>	<b>df1</b>	<b>df2</b>	<b>p-value</b>
Intercept	0.993	11838.392	9	766	0.000
Ind_Risk	0.099	0.953	81	6966	0.598
Inst_Risk	0.154	1.348	90	6966	0.016**

Inv_Hor	0.059	1.285	36	3076	0.120
Inv_Att	0.095	2.083	36	3076	0.000**
Portfolio_Stability	0.067	1.459	36	3076	0.038**
Inv_Phil	0.059	1.700	27	2304	0.014**
Gender	0.008	.684	9	766	0.724
Education	0.076	1.655	36	3076	0.008**
Employment_FI	0.012	1.000	9	766	0.438
Location	0.018	1.562	9	766	0.122
Age_Group	0.045	0.978	36	3076	0.507
Inv_Stocks	0.027	2.396	9	766	0.011**
Inv_Bonds	0.009	.789	9	766	0.627
Inv ETFs	0.004	.347	9	766	0.959
Inv_MF	0.008	.651	9	766	0.753
Inv_TD	0.011	.964	9	766	0.468
InvKnow_NoDecs	0.005	.419	9	766	0.925
InvKnow_ESG	0.016	1.349	9	766	0.208
InvKnow_Fin	0.016	1.412	9	766	0.179
InvKnow_Expert	0.013	1.119	9	766	0.346
InvExp_Stocks	0.068	1.487	36	3076	0.031**
InvExp_Bonds	0.057	1.231	36	3076	0.163
InvExp ETFs	0.056	1.215	36	3076	0.178
InvExp_MF	0.062	1.346	36	3076	0.082
InvExp_TD	0.061	1.315	36	3076	0.100

N=918, Total Parameters=25

**Panel B: Between-Subjects Effects**

<b>Dependent Variable (log10)</b>	<b>Type III SS</b>	<b>MS</b>	<b>df</b>	<b>F</b>	<b>p</b>	<b>Adj R<sup>2</sup></b>
Bond A	3.834	0.051	75	1.957	0.000**	0.077
Bond B	2.473	0.033	75	2.080	0.000**	0.087
Bond C	4.421	0.059	75	1.941	0.000**	0.077
Bond D	2.596	0.035	75	1.409	0.016**	0.035
Bond E	2.435	0.032	75	1.263	0.073	0.023

Bond F	4.729	0.063	75	2.041	0.000**	0.084
Bond G	2.790	0.037	75	1.366	0.026**	0.031
Bond H	2.334	0.031	75	1.233	0.096	0.020
Bond I	3.857	0.051	75	1.657	0.001**	0.055

We now explore the direct effects of significant personal traits on the investment flowing into the baseline and hybrid green bonds. The results in Table 4.9 (Panels A, B and C) show parametric (multivariate test parameter estimates) and non-parametric results (Kruskal Wallis Test or Mann-Whitney U Test) for the significant predictor variables based on the type of the variable<sup>34</sup> (an extended version of results from all the PEQ variables is available to review in the appendix).

### Baseline (Labelled) Green Bonds

- **High level of investment experience in Bonds** seems to appear in two out of the three bonds (Bonds A and Bond D), and shows a significant positive association with investment in (baseline) labeled green bonds (when either only a green label is displayed, or when the disclosures are linked to the labelled green bond having baseline environmental performance), suggesting that individuals with more experience in bonds are more likely to invest in these types of bonds.
- **Low level of investment experience in Term Deposits**, also seems to appear in two out of the three bonds (Bonds A and Bond G) and shows a significant negative association with investment into these bonds.
- **Little to moderate levels of investment into ETFs**, also seem to show up as having a negative significant effect on the investment going towards baseline green bonds.
- **Investment into performance-related bonds** – For those who invest in the baseline reporting bond (Bond G), there is a negative association with a longer-term horizon. These results imply that *short-term horizon* green bond investors prefer less information disclosures (in contrast to higher or enhanced disclosures preferred over a longer-term) and

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<sup>34</sup> The reason why we have additional significant results with the non-parametric tests because of their robustness to violations in data distribution. Even though we have log10 transformed our data to reduce its violations of multivariate assumptions, we are interpreting both types of results as being integral for answering our research question. Hence, any results that are confirmed by both types of tests are given higher importance in predicting the personal traits of retail investor that prefer green bond investment.

are in line with our expectations as well. In addition, retail investors who did *not complete high school education* also show a negative relationship with investing in this type of bond. They also show a *positive relation with individual risk* (investment goes up as individual risk tolerance increases). This is in line with our expectations as we anticipate those who prefer the baseline reporting performance, but having a higher coupon rate, will likely have a stronger association with individual risk as they want to maximize their financial returns while investing in a labelled green bond.

**Main Finding for Baseline Labelled Green Bonds:** Overall, our findings for the baseline type of labeled green bonds suggests that retail investors with great deal of bond investment experience or a higher individual risk tolerance (for baseline reporting green bonds having a higher coupon rate) are more likely to invest in these types of bonds. Similarly, those having low to moderate experiences with term deposits or ETFs, not having completed high school, or having a short-term investment horizon, are less likely to invest in this type of bond.

### **Hybrid (Enhanced or Unlabeled) Green Bonds**

- **Risk Measures** – As Individual Risk increases, the amount invested in the unlabelled climate aligned bond goes down. On the other hand, as Institutional Risk increases, it has the opposite effect on Bond B, and investment increases. This indicates that when it comes to a risk measures, those who invest in the unlabeled green (climate-aligned) bond tend to have an inverse relation with individual risk (negative) and institutional risk (positive).
- **Investment Experience with Stocks** – With an increasing experience with stocks, there tends to be a negative relation with investment into Bond B. Similarly, based on Kruskal-Wallis Test, there is a significant effect of this predictor variable on Bond H as well, although we do not know the direction of the effect.
- **Investment Experience with Term Deposits** – With experience with term deposits, there tends to be a positive relation with investment into Bond However as experience increases, the strength of the effect tends to reduce. Similarly, based on Kruskal-Wallis Test, there is a significant effect of this predictor variable on Bond E as well, although we do not know the direction of the effect.

- **Investment into the unlabeled (climate-aligned) green bond:** When experience with mutual funds is low, there tends to be a positive relation with investment into Bond B. In contrast, if experience with mutual funds is high, then there is a negative impact on Bond B. Similarly, if investors did not use an expert as a knowledge source for investment advice, they tended to invest negatively in Bond B as well. This is in line with our expectation as those with more external input on their decision may be persuaded from looking at non-financial investment considerations.

**Main Finding for Hybrid Green Bonds:** Overall, our findings for the hybrid type of (labeled and unlabeled) green bonds suggests that retail investors having little to high experience with term deposits, no experience with mutual funds, and higher institutional risk tolerance, are more likely to invest in these types of green bonds. Similarly, those having an experience with stocks, moderate level of mutual fund experience or not consulting with financial experts for their investment decision-making, are less likely to invest in this type of bond.

**Table 4.9: Common Highly Significant Parametric and Non-Parametric Test Results for Baseline and Hybrid Green Bonds**

<i>Panel A - Risk Measures</i>							
<i>Individual Risk Tolerance</i>							
<b>Dependent Variable</b>	<b>Level</b>	<b>Parameter B</b>	<b>Std. Error</b>	<b>t-value</b>	<b>Sig.</b>	<b>95% Confidence Interval</b>	<b>Kruskal Wallis Test N=1105</b>
Log10A	3	0.111	0.045	2.478	.013**	[0.023, 0.199]	Kruskal-Wallis H= 13.089, df=10, p = .219
Log10B	3	-0.084	0.035	-2.398	.017**	[-0.152, -0.015]	Kruskal-Wallis H= 22.756, df=10, p = .012**
Log10D	8	0.032	0.036	0.907	.365	[-0.038, 0.103]	Kruskal-Wallis H= 22.511, df=10, p = .013**

*Panel A - Risk Measures*

*Individual Risk Tolerance*

<b>Dependent Variable</b>	<b>Level</b>	<b>Parameter B</b>	<b>Std. Error</b>	<b>t-value</b>	<b>Sig.</b>	<b>95% Confidence Interval</b>	<b>Kruskal Wallis Test N=1105</b>
Log10E	6	0.055	0.040	1.393	.164	[-0.023, 0.134]	Kruskal-Wallis H= 37.158, df=10, p < .001**
Log10G	5	0.090	0.041	2.189	.029**	[0.009, 0.171]	Kruskal-Wallis H= 23.353, df=10, p= .010**
Log10H	9	0.038	0.037	1.016	.310	[-0.035, 0.111]	Kruskal-Wallis H= 14.543, df=10, p =0.150

*Institutional Risk Tolerance*

Log10A	3	-0.099	0.052	-1.901	0.058	[-0.201, 0.003]	Kruskal-Wallis H= 26.013, df=10, p =0.004**
Log10B	2	0.100	0.044	2.274	0.023**	[0.014, 0.186]	Kruskal-Wallis H= 28.526, df=10, p =0.001**
Log10D	3	-0.051	0.051	-0.999	0.318	[-0.150, 0.049]	Kruskal-Wallis H= 29.129, df=10, p =0.001**
Log10E	1	-0.108	0.076	-1.411	0.159	[-0.258, 0.042]	Kruskal-Wallis H= 30.338, df=10, p <0.001**
Log10G	1	0.087	0.079	1.104	0.270	[-0.068, 0.241]	Kruskal-Wallis H= 18.600, df=10, p =0.027*
Log10H	1	-0.121	0.076	-1.598	0.111	[-0.270, 0.028]	Kruskal-Wallis H= 20.261, df=10, p =0.140

○ Highlighted boxes are significant across both parametric and non-parametric tests.



<b>Panel B: Baseline Green Bonds</b>						
<b>Labelled green bond (Bond A –Type: Baseline)</b>						
<b>Level</b>	<b>Parameter B</b>	<b>Std. Error</b>	<b>t-value</b>	<b>Sig.</b>	<b>95% Confidence Interval</b>	<b>Non-Parametric Tests N=1105</b>
[InvExp_Bonds=3]	0.073	0.018	4.061	0.000**	[0.038, 0.109]	Kruskal-Wallis H= 31.821, df=7, p<0.001**
[InvExp_TD =2]	-0.049	0.024	-2.040	0.042**	[-0.095, -0.002]	Kruskal-Wallis H= 22.981, df=8, p=0.003**
<b>Labelled green bond with baseline environmental benefits (Bond D – Type: Baseline)</b>						
[InvExp_Bonds=4]	0.033	0.016	2.022	0.044**	[0.001, 0.066]	Kruskal-Wallis H= 26.434, df=7, p<0.001**
[InvExp ETFs=2]	-0.072	0.025	-2.936	0.003**	[-0.120, -0.024]	Kruskal-Wallis H= 20.973, df=7, p=0.004**
[InvExp ETFs=3]	-0.047	0.020	-2.327	0.020**	[-0.086, -0.007]	
[Education=1]	-0.515	0.178	-2.898	0.004**	-0.864	Kruskal-Wallis H= 11.108, df=5, p=0.049**
<b>Labelled green bond with baseline disclosure reporting (Bond G – Type: Baseline)</b>						
[InvHor=1]	-0.104	0.050	-2.097	0.036**	[-0.201, -0.007]	Kruskal-Wallis H= 15.175, df=4, p=.004**
[InvExp_TD=1]	-0.084	0.034	-2.478	0.013**	[-0.150, -0.017]	Kruskal-Wallis H = 26.214, df=8, p<0.001**
[InvExp_TD =2]	-0.092	0.024	-3.765	0.000**	[-0.139, -0.044]	

<b>Panel B: Baseline Green Bonds</b>						
<b>Labelled green bond (Bond A –Type: Baseline)</b>						
<b>Level</b>	<b>Parameter B</b>	<b>Std. Error</b>	<b>t-value</b>	<b>Sig.</b>	<b>95% Confidence Interval</b>	<b>Non-Parametric Tests N=1105</b>
[InvExp_TD =3]	-0.049	0.020	-2.457	0.014**	[-0.089, -0.010]	

<b>Panel C: Hybrid Green Bonds</b>						
<b>Un-labelled climate aligned bond (Bond B)</b>						
[InvExp_Stocks=4]	-0.032	0.015	-2.163	0.031**	[-0.061, -0.003]	Kruskal-Wallis H= 19.287, df=8, p = .013**
[InvExp_MF=1]	0.062	0.024	2.573	0.010**	[0.015, 0.110]	Kruskal-Wallis H= 20.046, df=8, p =0.010**
[InvExp_MF=3]	-0.030	0.014	-2.194	0.029**	[-0.056, -0.003]	
[InvKnow_Expert =0]	-0.049	0.024	-2.074	0.038**	[-0.096, -0.003]	Mann-Whitney U Test Statistic= 33420.5, p=0.025**
<b>Labelled green bond with enhanced environmental benefits (Bond E)</b>						
Investment Horizon	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 25.981, df=4, p < .001**
Investment Attitude	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 24.055, df=4, p <0.001**
Employment_FI	n/a	n/a	n/a	n/a	n/a	Mann-Whitney U Test Statistic= 45927, p=.005**

<b>Panel C: Hybrid Green Bonds</b>						
<b>Un-labelled climate aligned bond (Bond B)</b>						
InvKnow_ESG	n/a	n/a	n/a	n/a	n/a	Mann-Whitney U Test Statistic=94694.5, p <0.001**
Inv_Stocks	n/a	n/a	n/a	n/a	n/a	Mann-Whitney U Test Statistic=133643.5, p =0.009**
Inv_MF	n/a	n/a	n/a	n/a	n/a	Mann-Whitney U Test Statistic=156510.5, p <0.001**
InvExp_Stocks	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 19.004, df=8, p =0.015**
InvExp_Bonds	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 23.428, df=8, p =0.001**
InvExp ETFs	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 22.111, df=7, p =0.002**
InvExp_TD	n/a	n/a	n/a	n/a	n/a	Kruskal-Wallis H= 22.001, df=8, p =0.005**
<b>Labelled green bond with enhanced disclosure reporting (Bond H)</b>						
[InvExp_TD=1]	0.102	0.033	3.135	0.002**	[0.038, 0.166]	Kruskal-Wallis H = 35.280, df=8, p<0.001**
[InvExp_TD =2]	0.073	0.023	3.105	0.002**	[0.027, 0.119]	
[InvExp_TD =3]	0.048	0.019	2.473	0.014**	[0.010, 0.086]	
[InvExp_TD =4]	0.036	0.017	2.093	0.037**	[0.002, 0.070]	

## 4.5. Discussion

We find that when retail investors are offered a variety of green vs. non-green bond investment options - they seem to consistently prefer higher investment into the labelled green bonds. This preference holds whether they are given varying information disclosures for each of the bonds – including *different labels* (labelled green bond or unlabeled climate-aligned bond versus conventional corporate bond), *different environmental impacts* (baseline or enhanced labelled green bonds with positive environmental impact versus. conventional corporate bond with a negative environmental impact) and *different disclosure reporting levels* (labelled green bonds with baseline or enhanced reporting versus conventional corporate bond with no reporting)<sup>35</sup>. This is in line with our literature on the socially responsible investor profile (Apostolakis et al., 2018; Diouf et al., 2016; Cheng et al., 2021) as well as our predictive validity framework where we expect retail investors will act antithetical to their rational economic interests (of not investing in the highest financial return non-green bond). We name this effect as the ‘green bond label effect’ and based on our finding confirm its significant and positive influence on the overall investment preferences of a retail investor.

Using behavioral finance theoretical literature, we find that this the ‘green label effect’ can be attributed to two effects – one is to feel a ‘warm glow’ effect of investing in a socially responsible financial products like green bonds (that markets itself on having a positive environmental impact) and the other is because of the dual systems theory which suggests that when faced with new and nuanced information, individual’s make use mental short-cuts or heuristics (called System 1 thinking) to make decisions (Tversky & Kahneman, 1974). Across all scenarios, the first bond was always the labelled green bond and investors choose to invest the highest in that bond, regardless of its financial return. In this case,

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<sup>35</sup> Based on the descriptive statistics – with mean for each bond in each scenario following the order of investment of highest in Bond Type 1 (labelled green bond/ labelled green bond with baseline performance), second in Bond Type 3 (non-green conventional corporate bond), and least in Bond Type 2 (hybrid green bond – unlabelled in scenario 1 and having enhanced performance in scenarios 2 and 3).

investors used an anchoring heuristic to base their investment into the labelled green bond (regardless of it having a baseline performance level). As highlighted in our literature review, anchoring is a common behavioral bias and the default option (first bond) also holds power over perception of environmental benefits when it comes to socially responsible investing (Gajewski, Heimann & Meunier, 2022)<sup>36</sup>. In the first scenario they chose the green bond with a lowest return, but in the other two scenarios they preferred the green bond with the higher return. In addition, they also invested the next highest amount into the non-green bond with the highest coupon rate – which further indicates that although green labelling matters, financial considerations are also seen as an important factor into investment decision-making. Hence, we find that there is a significant relationship of bond framing effects, especially as it relates to a ‘green label’, in influencing the intrinsic decision-making process of retail investors.

To further explain this, we used an explanatory effect and a mediation model in our predictive framework. For the explanatory effect, we looked at whether the unique bond framing across the second and third scenarios led to a norm activation of pro-environmental preferences and injunctive norms for reporting performance respectively, and whether this could help explain the investment into green bonds. We found that most retail investors cannot differentiate between the performance-related nuances (whether it is environmental benefits or reporting preferences) of a green bond. They tend to invest based on the previously explained heuristics, rather than on their perception of a green bond’s “greenness” or one having an enhanced reporting performance.

However, when we looked more closely at the investment behavior of those who correctly interpreted the nuances in framing<sup>37</sup>, we found that they tend to invest in line with their beliefs and invest more in the enhanced labelled green bond, even if it was antithetical

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<sup>37</sup> For the environmental benefits perception scenario (scenario 2), we expected them to perceive the baseline green bond as being average, the enhanced green bond as being above average and the non-green bond being below average. Similarly for the reporting performance scenario (scenario 3), we expected them to find the baseline green bond equaling their expectations, the enhanced green bond exceeding their expectations and the non-reporting non-green bond to falling below their expectations of reporting performance.

to their rational interests. This was a significant finding for both types of scenarios – where investment into the enhanced green bond was higher when they were able to appropriately perceive the expected performance levels of the various bonds. In this case, we can explain that norm-activation model for pro-environmental personal norms and injunctive social norms for reporting were activated in some retail investors, which further led to influencing their investment behavior. However, since this was not seen across majority of the retail investors, who invested higher amounts in the labelled green bonds but did not pick the appropriate perception responses for the various bond. We attribute this reaction to the highly complex framing of green bond information disclosures, which ultimately led to these investors making their decisions based on heuristics rather than perception of performance. Based on this, we conclude that framing effects are less likely to hold across most retail investors when there is a complex set of information present and a choice of similar but slightly nuanced investment options are provided. However, for those who appropriately interpreted the framing, the activation of their behavioral norms to allow for pro-environmental preferences was in line with the findings in literature (Jiang, Kuang, & Vitalis, 2019; Diouf, Hebb & Touré, 2016; Garg, Goel, Sharma, & Rana, 2022).

Finally, when it comes to the mediating effects of personal traits on predicting the green bond preference of a retail investor, we find that not all expected traits had a significant effect on green bond investments. However, certain traits like risk tolerance and investment experience levels with products (bonds, term deposits, ETFs and mutual funds) were found to be highly robust and showed a significant relationship. For instance, we found that higher experience investing in bonds was a significant predictor of those who preferred a green bond based on its labelling framing. In the same labelling scenario, retail investors that were also influenced by risk tolerance measures (with investment into the hybrid green bond or Bond B increasing with higher institutional risk and lower individual risk). This shows that if a retail investor segment of the market is to be tapped into for scaling sustainable finance, there is a need to incorporate personal traits like previous experience with bond investment and risk tolerance, into the marketing of this product. However, with the ability to do so, there is also

a high risk of greenwashing and hence signals the need to incorporate more market accountability, either indirectly through consumer protection organizations or more directly through regulatory policies and audits of the green bond issuers and retail investment platforms.

## 4.6. Conclusion

By conducting an online discrete choice experimental survey, we found that retail investors will go against their rationale economic interests to show investment demand for a labelled green bond. Our study is the first academic setting to not only test their demand as it relates to green bonds, but also understand whether retail investors are ready to truly engage with the complexities of this market when it comes to evaluating and assessing various types and disclosures related to a green bond. We find that the biggest motivation for retail investors to invest in this market is based on the unique labelling aspect of a green bond. The green bond label carries power when it comes to influencing decision-making, especially when it is shown as the default option (leading to a combination of heuristics and Systems 1 thinking influencing the retail investor mindset). We frame this effect as the ‘green label effect’ and showcase its influence over the individual level decision-making frameworks of investors. However, our findings also imply that retail investors are susceptible to greenwashing risks, with those who would like to market a bond as green (and even sell it at a profit or use the ‘greenium’ to their advantage) but may not have the appropriate credentials or accountability in place to do so.

The findings in the second and third scenarios, where we found that retail investors were not able to identify the nuances of varying bond impacts and disclosures, also suggests that retail investors are in a more vulnerable situation when it comes to participating in this market. Even though retail investor participation is crucial to grow and scale sustainable finance more effectively, it should be done with the appropriate safeguards in place. For instance, we recommend the need for market oversight and improving the user-friendliness of climate-related financial disclosures to help educate and inform the retail investor about the benefits (or lack of) investing in certain bond types. This should be done with the

involvement of a regulator or a more neutral oversight body (like a consumer protection agency) using the policymaking process to influence industry best practice, especially given the significant power that a green bond label has over retail investors.

Our study also has practical implications for potential green bond issuers or country-level markets that want to tap into the retail investors setting. Given our identification of the green bond retail investor profile, we recommend that retail investor investment platforms, green bond issuers or financial institutions that sell green bonds could incorporate a new institutional risk tolerance scale when it comes to assessing demand for sustainable finance products. Given that this significantly predicted how investment flowed into green bonds, we recommend that measuring personal traits and investment characteristics like institutional risk score or longer investment horizon and more conservative attitude can help identify potential market segment for retail-level green bonds.

Based on our findings, we conclude that it can be beneficial for the financial sector to offer sustainable finance investment products to its customers, as the interest in this financial product is increasing among the retail investor space. However, this should be done with some level of caution as there was evidence of retail investors being vulnerable to a risk of greenwashing. In outlining our novel findings, we contribute to the fast-growing literature on the green bond market as well as add to the theoretical literature on how framing affects investment decisions and activates certain behavioral biases. By using an inter-disciplinary approach and examining the overlooked retail investor setting, we introduce our new conceptual framework, which incorporates behavior and norm-based decision-making into the evaluation and assessment of sustainable finance products at the individual level.

**MANUSCRIPT ENDS**



## Chapter 5

### Conclusion

This dissertation explores various aspects of what affects the perception and growth of the green bond market. While literature linked to green bonds has exploded in the last five years, this dissertation has a unique perspective in contributing to the *how*, *what*, and *why* questions surrounding this instrument and market.

Using our first paper, we identified the *how* by outlining the current state and future role of public institutions and stakeholders, like financial market regulators, in directly influencing green bond market growth as an institutional pressure driven response to market regulations and policymaking. Using a difference-in-difference (DID) model, the study found that there was a direct and positive influence of green bond regulatory policies on the annual growth of issuances in the Chinese green bond market. This impact was also significant and positive for certain issuer characteristics like being government-owned, from a green industry, or for financial sector issuers. Based on these findings, the study demonstrated the importance of regulatory policies as an impetus to grow the green bond market, especially in an institutional context where coercive pressures are known to be successful. The study implications are in line with the literature when it comes to the role of a top-down institutionally-driven approach in stimulating green investment (Wang et al., 2020; Bhandary et al., 2021; Jiguang & Zhiqun, 2011; Weber, 2017; Zhang et al., 2011; Zhao & Xu, 2012; Aizawa & Yang, 2010; Cui, Geobey, Weber, & Lin, 2018) as well as highlighting the key influence of financial regulators like central banks and other financial supervisory regulators in this process (Park, 2018; Zhang, 2020).

Our second paper identifies the various stakeholder- and legitimacy-linked motivations and bottlenecks in *what* creates a bottom-up demand in the green bond market. Using a concurrent mixed methodological approach, the study uses an online survey and semi-structured interviews with key market stakeholders and experts to identify the drivers

and barriers of the green bond market in Canada. Based on a case study approach, it finds the main driver of green bond markets being its reputational benefit for its stakeholders, and the main barrier being its legitimacy-linked transaction costs. A key finding of this study is the need for Canadian bonds to prove additionality or green impact as compared to its global peers. By introducing an innovative accounting-based conceptual framework, the study provides the basis for future research into stakeholder and legitimacy-linked drivers and barriers affecting this market, especially in an institutional context that prioritizes bottom-up market growth. The study findings are in line with literature on the country-level and global barriers of green bonds like higher transaction costs for issuers and facing market infancy in terms of low liquidity and high risk of greenwashing (Deschryver and de Mariz., 2020; Casanovas, 2022). Furthermore, it is also in line with literature that focuses on the drivers of the market, including ‘greenium’ and sustainability-linked benefits associated with green bonds (Agliardi and Agliardi, 2021; Duarte, 2021; Maltais and Ntkvist, 2020). However, our second paper goes further by identifying several other drivers and barriers in this market, and then using the case study of Canada to highlight their influence at the country-level green bond market. Furthermore, it introduces the concept of transition taxonomy into the academic literature by linking its implications with the Canadian green bond market. This is a unique contribution to the academic literature as it sets the basis for future examination of how transition taxonomies will further impact the growth of existing country-level green bond markets, and particularly raise questions related to legitimacy as well as reducing greenwashing risks.

Lastly, the third paper looks at *why* investment in the labelled green bond market is currently booming in sustainable finance and proceeds to identify inherent behavioral-biases and heuristics as well as personal traits in influencing the investment decision-making process at the individual level. Since no previous academic research has connected the green bond market or even other sustainable finance markets to the behavioral level drivers and biases for decision-making, our study provides novel contribution to the literature. Similarly, the retail level perspective on this market is underexamined and has only been evaluated in the context of Indian retail investors, where the awareness around green bonds is relatively

nascent and there is no current retail level access to the market either. Our study fills these research gaps by using a discrete choice experiment that combines experimental hypothetical scenarios, which test the various unique framing effects found in the green bond market, i.e., labelling, environmental benefits perception, and disclosure reporting, with the individual level behavioral norms and personal traits that are driving the pro-green bond investment behavior of retail investors. Using paired t-tests, we find there is a significant influence of the ‘green label effect’ on the overall preferences of retail investors. To understand the explanatory effects of norm activation, we use multivariate analysis of variance (MANOVA) and find that when framing is perceived appropriately, there is an activation of pro-environmental personal norms and pro-reporting injunctive norms, which leads to greater preference for enhanced performance green bonds (greener in environmental benefits or having higher disclosures performance) at the cost of losing higher financial returns. However, most retail investors cannot distinguish between the nuances in framing of performance-based green bonds, and hence tend to invest based on anchoring heuristics and Systems 1 thinking rather than on framing effects. Finally, our findings related to personal traits show that those having a higher risk tolerance (individual for baseline and institutional risk for hybrid), a great deal of investment experience with bonds, and a little to a high amount of experience with term deposits (for hybrid green bonds only – as they equate enhanced performance as being the safer or more balanced financial option) – can predict higher investment into green bonds. Alternatively, we find that those having a higher individual risk tolerance (for hybrid green bonds), a shorter-term horizon, not finishing high school education, not consulting financial experts as a source of knowledge, or a lot of experience with stocks, mutual funds, or a little to moderate experience with term deposits (for baseline green bonds only)– will be less likely to prefer green bonds.

Our findings for the ‘green label effect’ are in line with literature on framing effects and its impact on personal and injunctive norm activation (Jiang, Kuang, & Vitalis, 2019; Garg, Goel, Sharma, & Rana, 2022; Gajewski, Heimann & Meunier, 2022; Tversky & Kahneman, 1974; Bassen, Gödker, Lüdeke-Freund & Oll, 2019; Gödker & Mertins, 2018) as well as the mediating effect of personal traits on socially responsible investment preferences

of investors (Dreyer, Sharma & Smith, 2023; Masters, 1989; Diouf, Hebb & Touré, 2016; Apostolakis et al., 2018; Cheng et al., 2021).

By identifying these three key drivers in how this market develops, namely the *how*, *what*, and *why*, this dissertation is the first comprehensive scholarship to focus on the multi-faceted view of the green bond market based on its various stakeholders as well as in the setting of policymaking and governance. Not only does it provide the theoretical framework to incorporate academic theory into the field of sustainable finance and green bonds, but it also has significant contributions to theory and relevant practical and knowledge-related outcomes, which are further highlighted below.

## 5.1. Contributions to Theory

This dissertation provides several unique contributions to institutional theory, stakeholder and legitimacy theories and dual systems theory of decision-making. For instance, our first paper can highlight the role of regulatory impact on growing this market through an institutional coercive pressure approach (DiMaggio & Powell, 1983). As explained by institutional theory, this approach is used by powerful stakeholders to shape organizational behaviour and practices (Tolbert & Zucker, 1996). Our research provides a real-world example of how powerful institutional pressures (regulatory policies) can be successful in certain contexts (top-down based market setting) and whether this approach applies to the green bond market.

Using our second paper, we contribute to the stakeholder and legitimacy theories by connecting theoretical concepts to the green bond market drivers and barriers. The theoretical concepts in stakeholder theory are normative and instrumental approaches in stakeholder disclosure reporting (Donaldson & Preston, 1995), whereas action and presentation aspects of legitimacy (Manetti and Bellucci, 2018) are concepts within legitimacy theory. By using the case study setting of Canada, we applied these stakeholder-linked theoretical concepts to the opportunities present in the Canadian market. Furthermore, we presented the various legitimacy aspects of sustainability transition and suggested how stakeholders address these through their roles in the market. This contribution is unique as no other literature on this

topic connects both stakeholder and legitimacy aspects to this market so comprehensively, neither does it apply it in a country-specific context.

Our third paper contributes novel findings to the behavioral finance literature (framing effects and anchoring heuristics) and more specifically to the dual systems theory of decision-making. Our findings on the framing effect of the green bond label provide evidence that decision-making is done to feel a ‘warm glow’ effect in investing into an SRI product as well as processing any complex bond framing information by using an anchoring heuristics or mental short-cut found in System 1 thinking. These findings contribute to the theoretical literature by adding the green bond market as another case study on how irrational decision-making can occur at the individual level and confirms findings from other behavioral finance studies as well (Gajewski, Heimann & Meunier, 2022; Tversky & Kahneman, 1974; Jiang, Kuang, & Vitalis, 2019). Furthermore, our findings are also indicative of the impact of norm activation and its effect on antithetical or economically irrational investment behavior. Our findings have significant contribution to theory, as it presents the case of how norm activation only works in certain contexts, where disclosure framing is simpler and more limited rather than complex and lengthy in nature. Furthermore, we introduce the concept of the ‘green label effect’ as a standalone theoretical concept, and this is seen to be a key incentive for investment into this market, especially at the individual behavioral level.

Finally, we also contribute to the academic literature in identifying specific personal traits that are indicative of green bond investments. Given that previous literature has identified these characteristics in the retail investor setting (Diouf, Hebb & Touré, 2016; Garg, Goel, Sharma, & Rana, 2022), our research is the first to connect it to the green bond setting as well. Our findings are in line with the literature, however, add further context by incorporating new traits into the assessment of green bond investors – including how experience level in certain investment product matters and the positive role of using external financial consultants as knowledge sources as influencing the overall investment mindset of a retail investor when it comes to green bonds. Given that these findings were not highlighted previously in other studies, our contribution is unique and presents a new theoretical

framework for understanding behavioral biases and drivers of individual-level decision-making.

## 5.2. Key Practical and Knowledge Contributions of the Research

The dissertation's overarching knowledge and practical contributions are linked to the following aspects:

### **i. Supply and demand side policy tools for green bond markets**

To our knowledge, no other research agenda has looked at answering both the demand and supply side drivers and barriers of the green bond market. This dissertation is a novel contribution in understanding how a sustainable finance market can be developed from the ground up and scaled further by using policy instruments and stakeholder incentives.

Our findings in the first and second paper provide direct contribution to how policy tools like green bond regulations are useful in the context where top-down approaches are seen to be successful. For instance, this type of regulator-driven approach might work in countries like India and Bangladesh, where regulators like central banks are more pro-active in their approach to defining key investment priority areas (Saravade & Weber, 2020; Weber & Chowdury, 2020; Weber, 2017). More recently, the regulation-driven approach has been used by the European Union to establish guidelines that includes green bond standards. This is indicative of the supply side approach where green bonds will be at the forefront of upcoming policy and regulatory changes as it relates to sustainable finance globally. This dissertation provides an analytical view of the policies that are effective and the contexts in which they are successful, and therefore, provides a key contribution when it comes to the supply side tools that can be used for scaling this market effectively.

On the demand side policy tools, the dissertation provides a view of the bottom-up facilitation of this market growth as well as the individual-level drivers for investment into green bonds. We find that green bonds can be an essential tool to address the opportunities present in the future low-carbon economy. However, to do so, policy incentives need to incorporate the demand-side drivers of this market, including its ability to provide various

stakeholders with the reputational benefits of being associated with the market. The contribution of the second paper comes in the form of analyzing a country-level green bond market and highlighting how context specific policy recommendations are useful in engaging more substantially with this market on the demand-side.

**ii. Identifying key and highly influential stakeholders of this market.**

This dissertation is the first comprehensive analysis on the various stakeholders in this market and their direct and indirect role in establishing market growth and legitimacy. Our first paper's contribution comes in the form of examining the primary role of regulators and policymakers in setting the climate finance agenda and creating the direct incentives for market growth among issuers. Similarly, our second paper looks at the role of market actors like issuers, investors, policymakers, and rating agencies in defining the overall narrative of the green bond market. The contribution of this paper comes in the form of providing a country-level case study of this market and then delving deeper into the nuances of stakeholder salience (stakeholder engagement and legitimacy) as it relates to sustainable finance and the low-carbon transition of a carbon-intensive economy. Although there has been some engagement in the literature on transitions, there is no research that has connected this to the green bond market or to a context like Canada (a carbon-intensive developed economy). The recommendations of this research should be applicable to other contexts where advanced economies are looking to transition but there is a constraint in the form of addressing various stakeholder and legitimacy-linked concerns.

The third paper's contribution to knowledge comes in the form of its unique experimental design, which has been used to test the individual-level biases and drivers in decision-making. This type of contribution is a first-of-its-kind in the academic literature as it relates to the green bond market and sustainable finance. Not many research studies have incorporated this inter-disciplinary approach in connecting a sustainable finance market to behavioral finance approaches. Given the unique framing benefit that a green bond label

provides, our paper is also the first to identify the behaviour-action gap when it comes to individual-level stakeholder engagement for this market.

### **iii. Unique methodological contributions**

The dissertation provides contributions when it comes to advancing methods and methodological approaches related to analyzing the green bond market. For instance, with our second paper, we highlighted a triangulation method that can be useful when creating a case study on a country-level green bond market. This approach has not been previously showcased in the academic literature and hence is a novel contribution to the methodology being used to study this market. The third paper is also quite unique in its contributions to methodology on experimental survey design, as it highlights the three different green bond drivers (labelling, environmental benefits perception and reporting performance) in a three-scenario format. Furthermore, it links the behavioral norms and personal characteristics of the retail investor with their investment actions. This type of experimental set-up is a novel contribution to the literature on discrete choice experiments, which focus mostly on areas like health economics, agriculture, environmental economics and more recently on finance and accounting (Díaz-Caro, Crespo-Cebada, Goenechea, Sanguino, 2023). To our knowledge, this type of experimental set up has never been produced for a sustainable finance debt market like the green bond. This is the major contribution of our paper when it comes to creating a new foundation for examining behavioral biases and drivers of green bonds through experimental discrete choice surveys.

### **5.3. Limitations**

Although this dissertation highlights several theoretical, practical, and knowledge-related implications that are unique and novel in nature, it faces certain limitation. One of the major limitations of this research is the lack of ability to generalize the findings more broadly. The only paper that allows some level of generalizations is the third paper, as it is based on an average retail investor mindset rather than a certain contextual setting of the market. Both the previous papers are more context specific to China and Canada, and hence



cannot be directly applied to other green bond markets without testing the robustness of these findings in different institutional or country-market level contexts.

For our third paper, the limitations were linked to the experimental design and testing the robustness of our findings. Although we applied various statistical tests to ensure validity in results, the design of our survey instrument could have been refined with further rounds of pilot testing. Given the lack of randomization of our disclosure vignettes, there may have been some level of demand effect in the choice of investments. Furthermore, we believe that certain questions of the survey, those related to the behavioral norms, were only appropriately perceived by a small number of participants, and not by most of the participants. Hence, we think this may have caused some noise in the data. Further tweaking of the instrument design by retesting the question related to behavioral norms, would allow us to further confirm the robustness of our results and more strongly allow for generalization of our research findings linked to behavioral norms.

## 5.4. Future Research Directions

This dissertation has provided several contributions to the literature on green bonds and highlighted the critical perspective on the *how*, *what*, and *why* of stakeholder participation in this market. Across the three manuscripts, we have highlighted the future research avenues within the green bond market in leveraging the drivers and barriers of sustainable finance more broadly.

First, future research should expand on the role of public policy in this market, with an emphasis on how institutional pressures are engaged with and where they could hamper market growth. This research can allow us to understand the context-specific nature of institutional power and its role in scaling up sustainable finance in time to avoid the “hot house world” of climate change and global warming.

Secondly, appropriate policy tools and stakeholder engagement should also be identified to help assess the requirements of market growth, where a top-down approach may not necessarily work. Future research should focus on the doing more case study-linked

analysis of this market, especially in major advanced economies like the US or in the EU, where major financial stakeholders (like corporations and institutional investors) tend to operate and there is a balanced mix of policy instruments at play for market support and oversight.

Thirdly, future research needs to incorporate more inter-disciplinary work – whether it be through behavioral finance or using more scientifically-focused tools and approaches (e.g., life cycle assessments (LCAs) for measuring green bond ‘additionality’ or environmental impact as well as the role of this market in the global circular economy) in identifying the impact of various sustainable finance instruments. This will contribute to the understanding the value-add of sustainable finance as we shift towards the low-carbon and climate-resilient economy.

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# Appendices

## Appendix A

**Table 1. Interviewees' profile (For Chapter 3)**

	<b>Participant Category</b>	<b>Interviewee Coding</b>	<b>Job Description</b>
1	<b>Issuers</b>	ISS_01	Executive Director & Chief Investment Officer
2		ISS_02	Marketing and Impact Strategist
3		ISS_03	General Manager, Economic Development & Culture
4		ISS_04	Head, Climate & Sustainable Finance
5	<b>Investors</b>	INV_01	Vice President, Sustainable Investing
6		INV_02	Senior Advisor
7		INV_03	Director, Corporate Engagement
8		INV_04	Partner & Director, Sustainable Investments
9	<b>Third-Party Rating Agencies</b>	TPR_01	Director, Advisory Services
10		TPR_02	Chief Executive Officer
11		TPR_03	Head of Research
12		TPR_04	Director, Capital Markets Engagement

13		TPR_05	Managing Director
14	<b>Academics/Policy Makers</b>	AMO_01	Chief Executive Officer
15		AMO_02	Professor, Finance
16		AMO_03	Associate Professor
17		AMO_04	Distinguished Research Fellow
18		AMO_05	Director, Climate Change and Emerging Environmental Topics
19		AMO_06	Adjunct Professor, Finance
20		AMO_07	Head of the Centre
21		AMO_08	Director, Climate Finance and Science
22		AMO_09	Senior Counsel

### Supplementary File 1

**Table 2: Nvivo coding summary of qualitative data (For Chapter 3)**

Type	Barriers	Referenced	Drivers	Referenced
<b>Financial</b>	Higher Financial Costs	3	Greenium	3
	Additional Services Costs	5	Monetizing Environmental Impact	5
	Expertise or Training-related Costs	1	Reducing Investment Risk	4
	Lack of Short-term Profits	2		
	Risk of Stranded Assets	1		



<b>Total</b>		12		12
<b>Environmental</b>	Lack of Climate Adaptation	1	Addressing Climate Opportunities	1
	Lack of Eligible Projects or Assets	1	Lowering Environmental Risk	1
	Lack of Impact Additionality	2		
<b>Total</b>		4		2
<b>Reputational</b>	Greenwashing Risks	12	Demand for Sustainable Finance (SF)	11
	Transition-related Greenwashing	6	Diversity in Market Participants	3
			Green Marketing/Public Commitments	5
			Stakeholder Engagement	9
<b>Total</b>		18		28
<b>Transactional</b>	Governance Costs	20	Governance Benefits	3
	Social Costs	9	Social Benefits	6
<b>Total</b>		29		9

## Appendix B

**Table 3. Extended MANOVA Results for All PEQs (For Chapter 4)**

<i>Individual Risk</i>							
<i>Dependent Variable</i>	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<b><i>Log10A</i></b>	[Ind_Risk=1]	.178	.106	1.680	.093	-.030	.386
	[Ind_Risk=2]	.094	.049	1.909	.057	-.003	.190
	[Ind_Risk=3]	.111	.045	2.478	.013**	.023	.199
	[Ind_Risk=4]	.095	.042	2.244	.025**	.012	.178
	[Ind_Risk=5]	.102	.040	2.529	.012**	.023	.182
	[Ind_Risk=6]	.113	.040	2.826	.005**	.035	.192
	[Ind_Risk=7]	.101	.038	2.615	.009**	.025	.176
	[Ind_Risk=8]	.093	.037	2.506	.012**	.020	.165
	[Ind_Risk=9]	.093	.038	2.467	.014**	.019	.168
	[Ind_Risk=10]	0	.	.	.	.	.
<b><i>Log10B</i></b>	[Ind_Risk=1]	-.059	.082	-.718	.473	-.221	.103
	[Ind_Risk=2]	-.074	.038	-1.926	.054	-.148	.001
	[Ind_Risk=3]	-.084	.035	-2.398	.017	-.152	-.015
	[Ind_Risk=4]	-.086	.033	-2.600	.010	-.150	-.021
	[Ind_Risk=5]	-.053	.031	-1.677	.094	-.115	.009
	[Ind_Risk=6]	-.036	.031	-1.166	.244	-.098	.025
	[Ind_Risk=7]	-.033	.030	-1.102	.271	-.092	.026
	[Ind_Risk=8]	-.023	.029	-.791	.429	-.079	.034

	[Ind_Risk=9]	-.027	.029		-.929	.353	-.085	.030
	[Ind_Risk=10]	0	.		.	.	.	.
<b>Log10C</b>	[Ind_Risk=1]	-.096	.114		-.839	.402	-.320	.128
	[Ind_Risk=2]	-.046	.053		-.869	.385	-.150	.058
	[Ind_Risk=3]	-.039	.048		-.810	.418	-.134	.056
	[Ind_Risk=4]	-.046	.046		-1.019	.309	-.136	.043
	[Ind_Risk=5]	-.045	.044		-1.041	.298	-.131	.040
	[Ind_Risk=6]	-.070	.043		-1.614	.107	-.155	.015
	[Ind_Risk=7]	-.053	.041		-1.289	.198	-.135	.028
	[Ind_Risk=8]	-.074	.040		-1.862	.063	-.152	.004
	[Ind_Risk=9]	-.064	.041		-1.579	.115	-.144	.016
	[Ind_Risk=10]	0	.		.	.	.	.
	<b>Log10D</b>	[Ind_Risk=1]	.087	.103		.847	.397	-.115
[Ind_Risk=2]		.028	.048		.586	.558	-.065	.121
[Ind_Risk=3]		.016	.043		.373	.709	-.069	.101
[Ind_Risk=4]		.028	.041		.692	.489	-.052	.109
[Ind_Risk=5]		.017	.039		.422	.673	-.060	.094
[Ind_Risk=6]		.013	.039		.340	.734	-.063	.090
[Ind_Risk=7]		.023	.037		.623	.534	-.050	.096
[Ind_Risk=8]		.032	.036		.907	.365	-.038	.103
[Ind_Risk=9]		.047	.037		1.277	.202	-.025	.119
[Ind_Risk=10]		0	.		.	.	.	.
<b>Log10E</b>		[Ind_Risk=1]	.009	.105		.084	.933	-.197
	[Ind_Risk=2]	.026	.049		.535	.593	-.069	.121

	[Ind_Risk=3]	.047	.044	1.059	.290	-.040	.134
	[Ind_Risk=4]	.000	.042	-.003	.998	-.082	.082
	[Ind_Risk=5]	.029	.040	.719	.472	-.050	.108
	[Ind_Risk=6]	.055	.040	1.393	.164	-.023	.134
	[Ind_Risk=7]	.034	.038	.880	.379	-.041	.108
	[Ind_Risk=8]	.053	.037	1.440	.150	-.019	.125
	[Ind_Risk=9]	.058	.038	1.545	.123	-.016	.132
	[Ind_Risk=10]	0	.	.	.	.	.
<b>Log10F</b>	[Ind_Risk=1]	-.054	.115	-.471	.638	-.280	.172
	[Ind_Risk=2]	-.042	.053	-.791	.429	-.147	.062
	[Ind_Risk=3]	-.042	.049	-.864	.388	-.138	.054
	[Ind_Risk=4]	-.050	.046	-1.095	.274	-.140	.040
	[Ind_Risk=5]	-.043	.044	-.973	.331	-.129	.044
	[Ind_Risk=6]	-.056	.044	-1.293	.196	-.142	.029
	[Ind_Risk=7]	-.046	.042	-1.097	.273	-.128	.036
	[Ind_Risk=8]	-.075	.040	-1.877	.061	-.154	.003
	[Ind_Risk=9]	-.100	.041	-2.439	.015	-.181	-.020
	[Ind_Risk=10]	0	.	.	.	.	.
<b>Log10G</b>	[Ind_Risk=1]	.253	.108	2.339	.020	.041	.465
	[Ind_Risk=2]	.075	.050	1.490	.137	-.024	.173
	[Ind_Risk=3]	.110	.046	2.409	.016	.020	.200
	[Ind_Risk=4]	.064	.043	1.479	.140	-.021	.148
	[Ind_Risk=5]	.090	.041	2.189	.029	.009	.171
	[Ind_Risk=6]	.092	.041	2.256	.024	.012	.173

	[Ind_Risk=7]	.095	.039	2.413	.016	.018	.172
	[Ind_Risk=8]	.097	.038	2.570	.010	.023	.171
	[Ind_Risk=9]	.082	.039	2.119	.034	.006	.158
	[Ind_Risk=10]	0	.	.	.	.	.
<b>Log10H</b>	[Ind_Risk=1]	.118	.104	1.137	.256	-.086	.323
	[Ind_Risk=2]	.017	.048	.359	.720	-.077	.112
	[Ind_Risk=3]	-6.870E-5	.044	-.002	.999	-.086	.086
	[Ind_Risk=4]	.019	.042	.463	.643	-.062	.101
	[Ind_Risk=5]	.002	.040	.045	.964	-.076	.080
	[Ind_Risk=6]	.027	.039	.674	.500	-.051	.104
	[Ind_Risk=7]	.026	.038	.679	.497	-.049	.100
	[Ind_Risk=8]	.026	.036	.717	.473	-.045	.097
	[Ind_Risk=9]	.038	.037	1.016	.310	-.035	.111
	[Ind_Risk=10]	0	.	.	.	.	.
<b>Log10I</b>	[Ind_Risk=1]	.118	.104	1.137	.256	-.086	.323
	[Ind_Risk=2]	.017	.048	.359	.720	-.077	.112
	[Ind_Risk=3]	-6.870E-5	.044	-.002	.999	-.086	.086
	[Ind_Risk=4]	.019	.042	.463	.643	-.062	.101
	[Ind_Risk=5]	.002	.040	.045	.964	-.076	.080
	[Ind_Risk=6]	.027	.039	.674	.500	-.051	.104
	[Ind_Risk=7]	.026	.038	.679	.497	-.049	.100
	[Ind_Risk=8]	.026	.036	.717	.473	-.045	.097
	[Ind_Risk=9]	.038	.037	1.016	.310	-.035	.111
	[Ind_Risk=10]	0	.	.	.	.	.

<i>Institutional Risk</i>							
<i>Dependent Variable</i>	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<b>Log10A</b>	[Inst_Risk=0]	0.007	0.179	0.037	0.971	-0.344	0.358
	[Inst_Risk=1]	0.036	0.077	0.472	0.637	-0.115	0.188
	[Inst_Risk=2]	-0.062	0.056	-1.097	0.273	-0.173	0.049
	[Inst_Risk=3]	-0.099	0.052	-1.901	0.058	-0.201	0.003
	[Inst_Risk=4]	-0.001	0.050	-0.012	0.991	-0.098	0.097
	[Inst_Risk=5]	-0.063	0.049	-1.285	0.199	-0.158	0.033
	[Inst_Risk=6]	-0.035	0.049	-0.729	0.467	-0.131	0.060
	[Inst_Risk=7]	-0.020	0.048	-0.421	0.674	-0.114	0.074
	[Inst_Risk=8]	0.008	0.047	0.167	0.868	-0.085	0.100
	[Inst_Risk=9]	0.002	0.047	0.040	0.968	-0.090	0.094
<b>Log10B</b>	[Inst_Risk=0]	-0.009	0.139	-0.065	0.949	-0.282	0.264
	[Inst_Risk=1]	0.048	0.060	0.802	0.423	-0.070	0.166
	[Inst_Risk=2]	0.100	0.044	2.274	0.023	0.014	0.186
	[Inst_Risk=3]	0.139	0.041	3.434	0.001	0.060	0.219
	[Inst_Risk=4]	0.066	0.039	1.706	0.088	-0.010	0.142
	[Inst_Risk=5]	0.114	0.038	3.008	0.003	0.040	0.189
	[Inst_Risk=6]	0.107	0.038	2.829	0.005	0.033	0.181
	[Inst_Risk=7]	0.078	0.037	2.091	0.037	0.005	0.151
	[Inst_Risk=8]	0.088	0.037	2.393	0.017	0.016	0.160

	[Inst_Risk=9]	0.084	0.037	2.294	0.022	0.012	0.155
<b>Log10C</b>	[Inst_Risk=0]	0.096	0.193	0.498	0.618	-0.282	0.474
	[Inst_Risk=1]	0.027	0.083	0.331	0.741	-0.136	0.191
	[Inst_Risk=2]	0.063	0.061	1.033	0.302	-0.057	0.182
	[Inst_Risk=3]	0.059	0.056	1.057	0.291	-0.051	0.170
	[Inst_Risk=4]	0.028	0.054	0.518	0.605	-0.078	0.133
	[Inst_Risk=5]	0.054	0.053	1.020	0.308	-0.050	0.157
	[Inst_Risk=6]	0.029	0.052	0.563	0.573	-0.073	0.132
	[Inst_Risk=7]	0.039	0.051	0.754	0.451	-0.062	0.140
	[Inst_Risk=8]	-0.010	0.051	-0.199	0.842	-0.110	0.090
	[Inst_Risk=9]	0.006	0.051	0.120	0.905	-0.093	0.105
<b>Log10D</b>	[Inst_Risk=0]	0.139	0.173	0.803	0.422	-0.201	0.480
	[Inst_Risk=1]	0.062	0.075	0.830	0.407	-0.085	0.209
	[Inst_Risk=2]	0.005	0.055	0.085	0.932	-0.103	0.112
	[Inst_Risk=3]	-0.051	0.051	-0.999	0.318	-0.150	0.049
	[Inst_Risk=4]	0.010	0.048	0.214	0.831	-0.085	0.105
	[Inst_Risk=5]	0.000	0.047	0.005	0.996	-0.093	0.093
	[Inst_Risk=6]	0.004	0.047	0.084	0.933	-0.088	0.096
	[Inst_Risk=7]	-0.004	0.046	-0.079	0.937	-0.095	0.087
	[Inst_Risk=8]	0.017	0.046	0.372	0.710	-0.073	0.107
	[Inst_Risk=9]	0.036	0.045	0.800	0.424	-0.053	0.126
<b>Log10E</b>	[Inst_Risk=0]	0.155	0.177	0.872	0.383	-0.193	0.503
	[Inst_Risk=1]	-0.108	0.076	-1.411	0.159	-0.258	0.042
	[Inst_Risk=2]	0.023	0.056	0.406	0.685	-0.087	0.133

	[Inst_Risk=3]	0.038	0.052	0.744	0.457	-0.063	0.140
	[Inst_Risk=4]	0.025	0.049	0.512	0.609	-0.072	0.122
	[Inst_Risk=5]	0.015	0.048	0.307	0.759	-0.080	0.110
	[Inst_Risk=6]	0.048	0.048	0.990	0.323	-0.047	0.142
	[Inst_Risk=7]	0.016	0.047	0.330	0.741	-0.077	0.109
	[Inst_Risk=8]	0.039	0.047	0.830	0.407	-0.053	0.131
	[Inst_Risk=0]	0.155	0.177	0.872	0.383	-0.193	0.503
<b>Log10F</b>	[Inst_Risk=0]	-0.473	0.194	-2.435	0.015	-0.855	-0.092
	[Inst_Risk=1]	0.032	0.084	0.382	0.703	-0.132	0.196
	[Inst_Risk=2]	-0.006	0.061	-0.102	0.919	-0.127	0.114
	[Inst_Risk=3]	0.057	0.057	1.003	0.316	-0.054	0.168
	[Inst_Risk=4]	0.001	0.054	0.011	0.991	-0.106	0.107
	[Inst_Risk=5]	0.019	0.053	0.352	0.725	-0.085	0.123
	[Inst_Risk=6]	0.013	0.053	0.250	0.803	-0.090	0.117
	[Inst_Risk=7]	0.032	0.052	0.623	0.533	-0.070	0.134
	[Inst_Risk=8]	-0.012	0.051	-0.236	0.813	-0.113	0.088
	[Inst_Risk=9]	-0.055	0.051	-1.069	0.285	-0.155	0.046
<b>Log10G</b>	[Inst_Risk=0]	-0.059	0.183	-0.326	0.745	-0.418	0.299
	[Inst_Risk=1]	0.087	0.079	1.104	0.270	-0.068	0.241
	[Inst_Risk=2]	-0.011	0.058	-0.186	0.852	-0.124	0.102
	[Inst_Risk=3]	-0.016	0.053	-0.292	0.771	-0.120	0.089
	[Inst_Risk=4]	0.013	0.051	0.260	0.795	-0.087	0.113
	[Inst_Risk=5]	-0.008	0.050	-0.159	0.874	-0.106	0.090
	[Inst_Risk=6]	0.014	0.050	0.273	0.785	-0.084	0.111



	[Inst_Risk=7]	0.000	0.049	-0.009	0.993	-0.096	0.095
	[Inst_Risk=8]	0.047	0.048	0.967	0.334	-0.048	0.141
	[Inst_Risk=9]	0.042	0.048	0.877	0.381	-0.052	0.136
<b>Log10H</b>	[Inst_Risk=0]	0.217	0.176	1.235	0.217	-0.128	0.562
	[Inst_Risk=1]	-0.121	0.076	-1.598	0.111	-0.270	0.028
	[Inst_Risk=2]	-0.023	0.055	-0.413	0.680	-0.132	0.086
	[Inst_Risk=3]	-0.045	0.051	-0.879	0.380	-0.146	0.056
	[Inst_Risk=4]	-0.006	0.049	-0.127	0.899	-0.102	0.090
	[Inst_Risk=5]	-0.002	0.048	-0.039	0.969	-0.096	0.092
	[Inst_Risk=6]	-0.003	0.048	-0.061	0.951	-0.097	0.091
	[Inst_Risk=7]	-0.011	0.047	-0.236	0.814	-0.103	0.081
	[Inst_Risk=8]	-0.011	0.046	-0.231	0.817	-0.102	0.080
	[Inst_Risk=9]	-0.001	0.046	-0.012	0.990	-0.091	0.090
<b>Log10I</b>	[Inst_Risk=0]	-0.387	0.195	-1.986	0.047	-0.770	-0.004
	[Inst_Risk=1]	0.033	0.084	0.388	0.698	-0.132	0.197
	[Inst_Risk=2]	0.066	0.062	1.075	0.283	-0.055	0.187
	[Inst_Risk=3]	0.103	0.057	1.821	0.069	-0.008	0.215
	[Inst_Risk=4]	0.031	0.054	0.566	0.571	-0.076	0.137
	[Inst_Risk=5]	0.027	0.053	0.516	0.606	-0.077	0.132
	[Inst_Risk=6]	0.040	0.053	0.757	0.449	-0.064	0.144
	[Inst_Risk=7]	0.055	0.052	1.048	0.295	-0.048	0.157
	[Inst_Risk=8]	0.013	0.051	0.260	0.795	-0.087	0.114
	[Inst_Risk=9]	-0.025	0.051	-0.499	0.618	-0.126	0.075

<i>Labelled Green Bond (Bond A)</i>							
Predictor Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<i>Portfolio Preferences</i>							
Investment Horizon	[InvHor=1]	-0.043	0.049	-0.884	0.377	-0.138	0.052
	[InvHor=2]	-0.035	0.042	-0.825	0.410	-0.118	0.048
	[InvHor=3]	-0.056	0.043	-1.301	0.194	-0.139	0.028
	[InvHor=4]	-0.034	0.050	-0.682	0.496	-0.131	0.063
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	0.030	0.034	0.881	0.379	-0.037	0.098
	[InvAtt=2]	0.006	0.035	0.165	0.869	-0.064	0.075
	[InvAtt=3]	-0.029	0.035	-0.832	0.406	-0.099	0.040
	[InvAtt=4]	-0.039	0.038	-1.014	0.311	-0.113	0.036
	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortStab =1]	0.068	0.072	0.944	0.346	-0.074	0.210
	[PortStab =2]	0.072	0.071	1.014	0.311	-0.068	0.213
	[PortStab =3]	0.101	0.072	1.407	0.160	-0.040	0.242
	[PortStab =4]	0.128	0.084	1.527	0.127	-0.037	0.292
	[PortStab=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	0.047	0.035	1.343	0.180	-0.022	0.116
	[InvPhil=2]	0.030	0.035	0.851	0.395	-0.039	0.099
	<b>[InvPhil=3]</b>	<b>0.082</b>	<b>0.037</b>	<b>2.191</b>	<b>0.029**</b>	<b>0.009</b>	<b>0.155</b>
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							

Stocks	[Inv_Stocks]	0.027	0.014	1.933	0.054	0.000	0.054
Bonds	[Inv_Bonds]	-0.004	0.015	-0.275	0.783	-0.035	0.026
ETFs	[Inv_ETFs=0]	-0.005	0.014	-0.327	0.744	-0.033	0.024
Mutual Funds	[Inv_MF=0]	0.004	0.013	0.292	0.770	-0.022	0.030
Term Deposits	[Inv_TD=0]	-0.002	0.023	-0.105	0.916	-0.048	0.043
<i>Experience Level with Product</i>							
Stocks	[InvExp_Stocks=1]	0.003	0.034	0.078	0.938	-0.065	0.070
	[InvExp_Stocks=2]	0.002	0.026	0.071	0.944	-0.049	0.052
	[InvExp_Stocks=3]	0.019	0.021	0.897	0.370	-0.022	0.060
	<b>[InvExp_Stocks=4]</b>	<b>0.038</b>	<b>0.019</b>	<b>2.019</b>	<b>0.044**</b>	<b>0.001</b>	<b>0.075</b>
	[InvExp_Stocks=5]	0 <sup>a</sup>					
Bonds	[InvExp_Bonds=1]	0.077	0.040	1.948	0.052	-0.001	0.155
	[InvExp_Bonds=2]	0.050	0.029	1.740	0.082	-0.006	0.106
	<b>[InvExp_Bonds=3]</b>	<b>0.073</b>	<b>0.018</b>	<b>4.061</b>	<b>0.000**</b>	<b>0.038</b>	<b>0.109</b>
	<b>[InvExp_Bonds=4]</b>	<b>0.041</b>	<b>0.017</b>	<b>2.414</b>	<b>0.016</b>	<b>0.008</b>	<b>0.074</b>
	[InvExp_Bonds=5]	0 <sup>a</sup>					
ETFs	[InvExp_ETFs=1]	-0.004	0.037	-0.110	0.913	-0.076	0.068
	[InvExp_ETFs=2]	-0.020	0.025	-0.794	0.427	-0.070	0.030
	[InvExp_ETFs=3]	-0.020	0.021	-0.948	0.344	-0.060	0.021
	[InvExp_ETFs=4]	-0.023	0.019	-1.184	0.237	-0.060	0.015
	[InvExp_ETFs=5]	0 <sup>a</sup>					
Mutual Funds	[InvExp_MF=1]	-0.012	0.031	-0.398	0.691	-0.074	0.049
	[InvExp_MF=2]	0.001	0.022	0.036	0.971	-0.042	0.044
	[InvExp_MF=3]	0.032	0.017	1.825	0.068	-0.002	0.066

	[InvExp_MF=4]	0.020	0.015	1.304	0.193	-0.010	0.050
	[InvExp_MF=5]	0 <sup>a</sup>					
Term Deposits	[InvExp_TD=1]	-0.036	0.033	-1.085	0.278	-0.101	0.029
	<b>[InvExp_TD =2]</b>	<b>-0.049</b>	<b>0.024</b>	<b>-2.040</b>	<b>0.042**</b>	<b>-0.095</b>	<b>-0.002</b>
	[InvExp_TD =3]	-0.021	0.020	-1.065	0.287	-0.059	0.018
	[InvExp_TD =4]	-0.010	0.018	-0.539	0.590	-0.044	0.025
	[InvExp_TD =5]	0 <sup>a</sup>					
<i>Investment Knowledge Source</i>							
No Decisions	[InvKnow_NoDecs=0]	-0.016	0.026	-0.607	0.544	-0.067	0.035
	[InvKnow_NoDecs=1]	0 <sup>a</sup>					
ESG and more	[InvKnow_ESG=0]	0.028	0.016	1.753	0.080	-0.003	0.058
	[InvKnow_ESG=1]	0 <sup>a</sup>					
Financial Sources Only	[InvKnow_Financial=0]	0.039	0.021	1.879	0.061	-0.002	0.081
	[InvKnow_Financial=1]	0 <sup>a</sup>					
Financial Expert	[InvKnow_Expert=0]	0.048	0.031	1.580	0.115	-0.012	0.108
	[InvKnow_Expert=1]	0 <sup>a</sup>					
<i>Socioeconomic Characteristics</i>							
Gender	[Gender=1]	0.287	0.196	1.463	0.144	-0.098	0.671
	[Gender=2]	0.283	0.197	1.438	0.151	-0.103	0.669
	[Gender=5]	0 <sup>a</sup>					
Employment Experience	[EmployFI=1]	0.036	0.031	1.152	0.250	-0.025	0.097
	[EmployFI=2]	0 <sup>a</sup>					
Location	[Location=1]	-0.037	0.043	-0.860	0.390	-0.120	0.047
	[Location=2]	0 <sup>a</sup>					

Age Group	[AgeGroup=1]	<b>-0.177</b>	<b>0.061</b>	<b>-2.895</b>	<b>0.004**</b>	<b>-0.296</b>	<b>-0.057</b>
	[AgeGroup=2]	<b>-0.166</b>	<b>0.061</b>	<b>-2.730</b>	<b>0.006**</b>	<b>-0.286</b>	<b>-0.047</b>
	[AgeGroup=3]	<b>-0.175</b>	<b>0.065</b>	<b>-2.694</b>	<b>0.007**</b>	<b>-0.302</b>	<b>-0.047</b>
	[AgeGroup=4]	<b>-0.177</b>	<b>0.068</b>	<b>-2.604</b>	<b>0.009**</b>	<b>-0.311</b>	<b>-0.044</b>
	[AgeGroup=5]	0 <sup>a</sup>					
	[AgeGroup=6]	0 <sup>a</sup>					
Education	[Education=1]	-0.045	0.183	-0.246	0.806	-0.405	0.315
	[Education=2]	0.016	0.074	0.211	0.833	-0.129	0.160
	[Education=3]	0.033	0.071	0.463	0.644	-0.106	0.171
	[Education=7]	0.023	0.071	0.328	0.743	-0.115	0.162

*Unlabelled Climate-Aligned Bond (Bond B)*

Predictor Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<i>Portfolio Preferences</i>							
Investment Horizon	[InvHor=1]	-0.010	0.038	-0.273	0.785	-0.085	0.064
	[InvHor=2]	-0.009	0.033	-0.260	0.795	-0.073	0.056
	[InvHor=3]	0.015	0.033	0.458	0.647	-0.050	0.080
	[InvHor=4]	-0.019	0.039	-0.494	0.621	-0.095	0.057
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	-0.010	0.027	-0.384	0.701	-0.063	0.042
	[InvAtt=2]	0.009	0.028	0.318	0.750	-0.045	0.063
	[InvAtt=3]	0.015	0.028	0.549	0.583	-0.039	0.069
	[InvAtt=4]	0.019	0.030	0.655	0.513	-0.039	0.077

	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortfolioStability=1]	-0.073	0.056	-1.292	0.197	-0.183	0.038
	[PortfolioStability=2]	-0.079	0.056	-1.425	0.154	-0.188	0.030
	[PortfolioStability=3]	-0.054	0.056	-0.962	0.336	-0.163	0.056
	[PortfolioStability=4]	-0.073	0.065	-1.115	0.265	-0.201	0.055
	[PortfolioStability=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	-0.001	0.027	-0.050	0.960	-0.055	0.052
	[InvPhil=2]	0.026	0.027	0.936	0.350	-0.028	0.079
	[InvPhil=3]	-0.015	0.029	-0.514	0.608	-0.072	0.042
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							
Stocks	[Inv_Stocks=0]	-0.013	0.011	-1.196	0.232	-0.034	0.008
Bonds	<b>[Inv_Bonds=0]</b>	<b>-0.026</b>	<b>0.012</b>	<b>-2.198</b>	<b>0.028**</b>	<b>-0.050</b>	<b>-0.003</b>
ETFs	[Inv_ETFs=0]	-0.003	0.011	-0.248	0.804	-0.025	0.019
Mutual Funds	[Inv_MF=0]	0.004	0.010	0.410	0.682	-0.016	0.025
Term Deposits	[Inv_TD=0]	-0.015	0.018	-0.834	0.405	-0.050	0.020
<i>Experience Level with Product</i>							
Stocks	[InvExp_Stocks=1]	-0.034	0.027	-1.279	0.201	-0.087	0.018
	[InvExp_Stocks=2]	-0.005	0.020	-0.260	0.795	-0.044	0.034
	[InvExp_Stocks=3]	-0.007	0.016	-0.445	0.656	-0.039	0.025
	<b>[InvExp_Stocks=4]</b>	<b>-0.032</b>	<b>0.015</b>	<b>-2.163</b>	<b>0.031**</b>	<b>-0.061</b>	<b>-0.003</b>
	[InvExp_Stocks=5]	0 <sup>a</sup>					
Bonds	[InvExp_Bonds=1]	-0.006	0.031	-0.203	0.839	-0.067	0.054
	[InvExp_Bonds=2]	-0.029	0.022	-1.313	0.190	-0.073	0.014

	[InvExp_Bonds=3]	0.001	0.014	0.088	0.930	-0.026	0.029
	[InvExp_Bonds=4]	-0.005	0.013	-0.412	0.680	-0.031	0.021
	[InvExp_Bonds=5]	0 <sup>a</sup>					
ETFs	[InvExp_ETFs=1]	-0.012	0.029	-0.403	0.687	-0.068	0.045
	[InvExp_ETFs=2]	-0.019	0.020	-0.957	0.339	-0.058	0.020
	[InvExp_ETFs=3]	-0.013	0.016	-0.820	0.413	-0.045	0.018
	[InvExp_ETFs=4]	-0.021	0.015	-1.399	0.162	-0.050	0.008
	[InvExp_ETFs=5]	0 <sup>a</sup>					
Mutual Funds	<b>[InvExp_MF=1]</b>	<b>0.062</b>	<b>0.024</b>	<b>2.573</b>	<b>0.010**</b>	<b>0.015</b>	<b>0.110</b>
	[InvExp_MF=2]	0.012	0.017	0.709	0.479	-0.021	0.046
	<b>[InvExp_MF=3]</b>	<b>-0.030</b>	<b>0.014</b>	<b>-2.194</b>	<b>0.029**</b>	<b>-0.056</b>	<b>-0.003</b>
	[InvExp_MF=4]	-0.006	0.012	-0.536	0.592	-0.030	0.017
	[InvExp_MF=5]	0 <sup>a</sup>					
Term Deposits	[InvExp_TD=1]	0.021	0.026	0.804	0.422	-0.030	0.071
	[InvExp_TD =2]	0.023	0.019	1.219	0.223	-0.014	0.059
	[InvExp_TD =3]	-0.009	0.015	-0.599	0.549	-0.039	0.021
	[InvExp_TD =4]	0.018	0.014	1.275	0.203	-0.009	0.044
	[InvExp_TD =5]	0 <sup>a</sup>					
<i>Investment Knowledge Source</i>							
No Decisions	[InvKnow_NoDecs =0]	0.024	0.020	1.154	0.249	-0.016	0.063
ESG and more	[InvKnow_ESG =0]	0.018	0.012	1.433	0.152	-0.006	0.042
Financial Sources Only	[InvKnow_Financial =0]	-0.030	0.016	-1.832	0.067	-0.062	0.002
Financial Expert	<b>[InvKnow_Expert =0]</b>	<b>-0.049</b>	<b>0.024</b>	<b>-2.074</b>	<b>0.038**</b>	<b>-0.096</b>	<b>-0.003</b>
<i>Socioeconomic Characteristics</i>							

Gender	[Gender=1]	-0.157	0.153	-1.028	0.304	-0.456	0.143
	[Gender=2]	-0.160	0.153	-1.048	0.295	-0.461	0.140
Employment Experience	[EmployFI=0]	0.011	0.024	0.443	0.658	-0.037	0.059
Location	<b>[Location = 0]</b>	<b>0.072</b>	<b>0.033</b>	<b>2.171</b>	<b>0.030**</b>	<b>0.007</b>	<b>0.137</b>
Age Group	[AgeGroup=1]	0.033	0.047	0.702	0.483	-0.060	0.127
	[AgeGroup=2]	0.037	0.047	0.784	0.433	-0.056	0.130
	[AgeGroup=3]	0.054	0.051	1.070	0.285	-0.045	0.153
	[AgeGroup=4]	0.054	0.053	1.022	0.307	-0.050	0.158
Education	[Education=1]	-0.049	0.143	-0.341	0.733	-0.329	0.232
	[Education=2]	-0.057	0.057	-0.995	0.320	-0.170	0.055
	[Education=3]	-0.024	0.055	-0.444	0.657	-0.132	0.084
	[Education=7]	-0.012	0.055	-0.210	0.834	-0.120	0.096

***Labelled Green Bond with Baseline Environmental Benefits (Bond D)***

Predictor Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<i>Portfolio Preferences</i>							
Investment Horizon	[InvHor=1]	-0.037	0.047	-0.779	0.436	-0.129	0.056
	[InvHor=2]	-0.026	0.041	-0.641	0.522	-0.107	0.054
	[InvHor=3]	-0.052	0.041	-1.257	0.209	-0.133	0.029
	[InvHor=4]	-0.008	0.048	-0.161	0.872	-0.102	0.087
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	0.037	0.033	1.100	0.272	-0.029	0.102



	[InvAtt=2]	0.046	0.034	1.333	0.183	-0.022	0.113
	[InvAtt=3]	0.045	0.034	1.312	0.190	-0.022	0.113
	[InvAtt=4]	0.029	0.037	0.779	0.436	-0.044	0.101
	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortfolioStability=1]	0.017	0.070	0.245	0.807	-0.120	0.155
	[PortfolioStability=2]	0.018	0.069	0.260	0.795	-0.118	0.154
	[PortfolioStability=3]	0.033	0.069	0.480	0.631	-0.103	0.170
	[PortfolioStability=4]	0.106	0.081	1.299	0.194	-0.054	0.265
	[PortfolioStability=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	-0.011	0.034	-0.310	0.757	-0.077	0.056
	[InvPhil=2]	0.013	0.034	0.383	0.702	-0.054	0.080
	[InvPhil=3]	0.006	0.036	0.155	0.877	-0.065	0.077
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							
Stocks	[Inv_Stocks=0]	0.009	0.014	0.674	0.501	-0.017	0.036
Bonds	[Inv_Bonds=0]	-0.006	0.015	-0.375	0.708	-0.035	0.024
ETFs	[Inv_ETFs=0]	-0.010	0.014	-0.707	0.480	-0.037	0.018
Mutual Funds	[Inv_MF=0]	-0.014	0.013	-1.087	0.277	-0.040	0.011
Term Deposits	[Inv_TD=0]	0.012	0.022	0.533	0.594	-0.032	0.056
<i>Experience Level with Product</i>							
Stocks	[InvExp_Stocks=1]	0.034	0.033	1.032	0.302	-0.031	0.100
	[InvExp_Stocks=2]	0.016	0.025	0.645	0.519	-0.033	0.065
	[InvExp_Stocks=3]	-0.038	0.020	-1.883	0.060	-0.078	0.002
	[InvExp_Stocks=4]	-0.001	0.018	-0.037	0.970	-0.037	0.035

	[InvExp_Stocks=5]	0 <sup>a</sup>					
Bonds	[InvExp_Bonds=1]	0.006	0.038	0.157	0.875	-0.069	0.082
	[InvExp_Bonds=2]	0.039	0.028	1.392	0.164	-0.016	0.093
	<b>[InvExp_Bonds=3]</b>	<b>0.039</b>	<b>0.018</b>	<b>2.247</b>	<b>0.025**</b>	<b>0.005</b>	<b>0.074</b>
	<b>[InvExp_Bonds=4]</b>	<b>0.033</b>	<b>0.016</b>	<b>2.022</b>	<b>0.044**</b>	<b>0.001</b>	<b>0.066</b>
	[InvExp_Bonds=5]	0 <sup>a</sup>					
ETFs	[InvExp_ETFs=1]	-0.064	0.036	-1.789	0.074	-0.134	0.006
	<b>[InvExp_ETFs=2]</b>	<b>-0.072</b>	<b>0.025</b>	<b>-2.936</b>	<b>0.003**</b>	<b>-0.120</b>	<b>-0.024</b>
	<b>[InvExp_ETFs=3]</b>	<b>-0.047</b>	<b>0.020</b>	<b>-2.327</b>	<b>0.020**</b>	<b>-0.086</b>	<b>-0.007</b>
	[InvExp_ETFs=4]	-0.029	0.018	-1.562	0.119	-0.065	0.007
	[InvExp_ETFs=5]	0 <sup>a</sup>					
Mutual Funds	[InvExp_MF=1]	0.042	0.030	1.391	0.165	-0.017	0.101
	[InvExp_MF=2]	0.019	0.021	0.872	0.383	-0.023	0.060
	[InvExp_MF=3]	0.030	0.017	1.791	0.074	-0.003	0.063
	[InvExp_MF=4]	0.023	0.015	1.576	0.115	-0.006	0.052
	[InvExp_MF=5]	0 <sup>a</sup>					
Term Deposits	[InvExp_TD=1]	0.001	0.032	0.038	0.970	-0.062	0.064
	[InvExp_TD =2]	-0.020	0.023	-0.877	0.381	-0.066	0.025
	[InvExp_TD =3]	0.001	0.019	0.055	0.956	-0.036	0.038
	[InvExp_TD =4]	0.010	0.017	0.570	0.569	-0.024	0.043
	[InvExp_TD =5]	0 <sup>a</sup>					
<i>Investment Knowledge Source</i>							
No Decisions	[InvKnow_NoDecs =0]	0.001	0.025	0.031	0.975	-0.049	0.051
ESG and more	[InvKnow_ESG =0]	0.014	0.015	0.944	0.345	-0.016	0.044

Financial Sources Only	[InvKnow_Financial =0]	0.038	0.020	1.877	0.061	-0.002	0.078
Financial Expert	[InvKnow_Expert =0]	0.054	0.030	1.815	0.070	-0.004	0.112
<i>Socioeconomic Characteristics</i>							
Gender	[Gender=1]	0.023	0.190	0.119	0.905	-0.350	0.395
	[Gender=2]	0.020	0.191	0.106	0.916	-0.354	0.394
Employment Experience	[EmployFI=1]	0.015	0.030	0.484	0.629	-0.045	0.074
Location	[Location = 1]	-0.031	0.041	-0.754	0.451	-0.112	0.050
Age Group	[AgeGroup=1]	-0.080	0.059	-1.360	0.174	-0.196	0.036
	[AgeGroup=2]	-0.086	0.059	-1.460	0.145	-0.202	0.030
	[AgeGroup=3]	-0.074	0.063	-1.179	0.239	-0.198	0.049
	[AgeGroup=4]	-0.041	0.066	-0.622	0.534	-0.171	0.089
Education	<b>[Education=1]</b>	<b>-0.515</b>	<b>0.178</b>	<b>-2.898</b>	<b>0.004**</b>	<b>-0.864</b>	<b>-0.166</b>
	[Education=2]	0.025	0.071	0.347	0.729	-0.115	0.165
	[Education=3]	0.064	0.068	0.929	0.353	-0.071	0.198
	[Education=7]	0.076	0.068	1.112	0.266	-0.058	0.211

***Labelled Green Bond with Enhanced Environmental Benefits (Bond E)***

Predictor Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<i>Portfolio Preferences</i>							
Investment Horizon	[InvHor=1]	-0.086	0.048	-1.776	0.076	-0.180	0.009
	[InvHor=2]	-0.061	0.042	-1.446	0.148	-0.143	0.022
	[InvHor=3]	-0.044	0.042	-1.030	0.303	-0.127	0.039

	[InvHor=4]	-0.058	0.049	-1.180	0.238	-0.154	0.038
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	-0.034	0.034	-1.008	0.314	-0.101	0.033
	[InvAtt=2]	0.001	0.035	0.041	0.968	-0.067	0.070
	[InvAtt=3]	0.000	0.035	0.013	0.989	-0.069	0.069
	[InvAtt=4]	0.023	0.038	0.603	0.547	-0.051	0.097
	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortfolioStability=1]	-0.079	0.072	-1.106	0.269	-0.220	0.061
	[PortfolioStability=2]	-0.078	0.071	-1.102	0.271	-0.217	0.061
	[PortfolioStability=3]	-0.057	0.071	-0.808	0.419	-0.197	0.082
	[PortfolioStability=4]	-0.058	0.083	-0.699	0.485	-0.221	0.105
	[PortfolioStability=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	0.031	0.035	0.885	0.376	-0.037	0.099
	[InvPhil=2]	0.047	0.035	1.340	0.181	-0.022	0.115
	[InvPhil=3]	0.042	0.037	1.131	0.258	-0.031	0.115
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							
Stocks	[Inv_Stocks=0]	-0.025	0.014	-1.789	0.074	-0.052	0.002
Bonds	[Inv_Bonds=0]	-0.009	0.015	-0.569	0.570	-0.039	0.021
ETFs	[Inv_ETFs=0]	0.010	0.014	0.725	0.469	-0.018	0.038
Mutual Funds	[Inv_MF=0]	-0.009	0.013	-0.712	0.477	-0.036	0.017
Term Deposits	[Inv_TD=0]	0.005	0.023	0.224	0.823	-0.040	0.050
<i>Experience Level with Product</i>							
Stocks	[InvExp_Stocks=1]	-0.017	0.034	-0.502	0.616	-0.084	0.050

	[InvExp_Stocks=2]	-0.004	0.025	-0.163	0.870	-0.054	0.046
	[InvExp_Stocks=3]	0.013	0.021	0.633	0.527	-0.028	0.054
	[InvExp_Stocks=4]	-0.020	0.019	-1.079	0.281	-0.057	0.017
	[InvExp_Stocks=5]	0 <sup>a</sup>					
<b>Bonds</b>	[InvExp_Bonds=1]	0.020	0.039	0.499	0.618	-0.058	0.097
	[InvExp_Bonds=2]	-0.051	0.028	-1.799	0.072	-0.107	0.005
	[InvExp_Bonds=3]	-0.001	0.018	-0.066	0.948	-0.036	0.034
	[InvExp_Bonds=4]	-0.015	0.017	-0.917	0.359	-0.049	0.018
	[InvExp_Bonds=5]	0 <sup>a</sup>					
<b>ETFs</b>	[InvExp ETFs=1]	0.002	0.036	0.056	0.955	-0.070	0.074
	[InvExp ETFs=2]	0.002	0.025	0.063	0.950	-0.048	0.051
	[InvExp ETFs=3]	0.013	0.020	0.620	0.536	-0.027	0.053
	[InvExp ETFs=4]	0.006	0.019	0.324	0.746	-0.031	0.043
	[InvExp ETFs=5]	0 <sup>a</sup>					
<b>Mutual Funds</b>	[InvExp_MF=1]	-0.017	0.031	-0.543	0.587	-0.077	0.044
	[InvExp_MF=2]	-0.016	0.022	-0.728	0.467	-0.059	0.027
	[InvExp_MF=3]	-0.015	0.017	-0.880	0.379	-0.049	0.019
	[InvExp_MF=4]	-0.016	0.015	-1.077	0.282	-0.046	0.013
	[InvExp_MF=5]	0 <sup>a</sup>					
<b>Term Deposits</b>	[InvExp_TD=1]	0.028	0.033	0.859	0.391	-0.036	0.093
	[InvExp_TD =2]	-0.007	0.024	-0.301	0.764	-0.053	0.039
	[InvExp_TD =3]	-0.009	0.019	-0.477	0.633	-0.047	0.029
	[InvExp_TD =4]	0.001	0.017	0.062	0.951	-0.033	0.035
	[InvExp_TD =5]	0 <sup>a</sup>					

		<i>Investment Knowledge Source</i>					
No Decisions	[InvKnow_NoDecs =0]	0.015	0.026	0.566	0.571	-0.036	0.066
ESG and more	[InvKnow_ESG =0]	0.021	0.016	1.324	0.186	-0.010	0.051
Financial Sources Only	[InvKnow_Financial =0]	0.011	0.021	0.513	0.608	-0.030	0.052
Financial Expert	[InvKnow_Expert =0]	-0.025	0.030	-0.819	0.413	-0.084	0.035
		<i>Socioeconomic Characteristics</i>					
Gender	[Gender=1]	0.109	0.194	0.562	0.574	-0.272	0.490
	[Gender=2]	0.099	0.195	0.509	0.611	-0.283	0.482
Employment Experience	[EmployFI=1]	-0.016	0.031	-0.526	0.599	-0.077	0.045
Location	[Location = 1]	0.079	0.042	1.863	0.063	-0.004	0.162
Age Group	[AgeGroup=1]	-0.075	0.060	-1.236	0.217	-0.193	0.044
	[AgeGroup=2]	-0.064	0.060	-1.068	0.286	-0.183	0.054
	[AgeGroup=3]	-0.065	0.064	-1.007	0.314	-0.191	0.062
	[AgeGroup=4]	-0.067	0.068	-0.996	0.320	-0.200	0.065
Education	[Education=1]	-0.134	0.182	-0.735	0.463	-0.490	0.223
	[Education=2]	-0.082	0.073	-1.117	0.264	-0.225	0.062
	[Education=3]	-0.063	0.070	-0.903	0.367	-0.201	0.074
	[Education=7]	-0.057	0.070	-0.812	0.417	-0.194	0.081

<i>Labelled Green Bond with Baseline Reporting Performance (Bond G)</i>							
Predictor Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower	Upper
<i>Portfolio Preferences</i>							

Investment Horizon	[InvHor=1]	<b>-0.104</b>	<b>0.050</b>	<b>-2.097</b>	<b>0.036**</b>	<b>-0.201</b>	<b>-0.007</b>
	[InvHor=2]	-0.041	0.043	-0.955	0.340	-0.126	0.043
	[InvHor=3]	-0.038	0.044	-0.865	0.387	-0.123	0.048
	[InvHor=4]	-0.051	0.051	-1.017	0.309	-0.151	0.048
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	0.004	0.035	0.119	0.905	-0.065	0.073
	[InvAtt=2]	-0.005	0.036	-0.127	0.899	-0.075	0.066
	[InvAtt=3]	0.007	0.036	0.198	0.843	-0.064	0.078
	[InvAtt=4]	-0.026	0.039	-0.679	0.497	-0.102	0.050
	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortfolioStability=1]	0.106	0.074	1.442	0.150	-0.038	0.251
	[PortfolioStability=2]	0.092	0.073	1.268	0.205	-0.051	0.236
	[PortfolioStability=3]	0.103	0.073	1.413	0.158	-0.040	0.247
	[PortfolioStability=4]	0.123	0.086	1.442	0.150	-0.045	0.291
	[PortfolioStability=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	-0.023	0.036	-0.652	0.514	-0.093	0.047
	[InvPhil=2]	-0.026	0.036	-0.716	0.474	-0.096	0.045
	[InvPhil=3]	-0.028	0.038	-0.744	0.457	-0.103	0.046
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							
Stocks	[Inv_Stocks=0]	0.015	0.014	1.034	0.302	-0.013	0.043
Bonds	[Inv_Bonds=0]	8.521E-05	0.016	0.005	0.996	-0.031	0.031
ETFs	[Inv ETFs=0]	0.009	0.015	0.595	0.552	-0.020	0.038
Mutual Funds	[Inv_MF=0]	-0.013	0.014	-0.952	0.342	-0.040	0.014

Term Deposits	[Inv_TD=0]	0.004	0.024	0.166	0.868	-0.042	0.050
		<i>Experience Level with Product</i>					
Stocks	[InvExp_Stocks=1]	0.033	0.035	0.942	0.347	-0.036	0.102
	[InvExp_Stocks=2]	-0.002	0.026	-0.095	0.924	-0.054	0.049
	[InvExp_Stocks=3]	0.019	0.021	0.884	0.377	-0.023	0.061
	<b>[InvExp_Stocks=4]</b>	<b>0.039</b>	<b>0.019</b>	<b>1.991</b>	<b>0.047**</b>	<b>0.001</b>	<b>0.076</b>
	[InvExp_Stocks=5]	0 <sup>a</sup>					
Bonds	[InvExp_Bonds=1]	0.040	0.041	0.990	0.322	-0.039	0.120
	[InvExp_Bonds=2]	-0.001	0.029	-0.047	0.963	-0.059	0.056
	[InvExp_Bonds=3]	0.023	0.018	1.226	0.221	-0.014	0.059
	[InvExp_Bonds=4]	0.018	0.017	1.021	0.308	-0.016	0.052
	[InvExp_Bonds=5]	0 <sup>a</sup>					
ETFs	[InvExp_ETFs=1]	0.041	0.038	1.094	0.275	-0.033	0.115
	[InvExp_ETFs=2]	-0.029	0.026	-1.137	0.256	-0.080	0.021
	[InvExp_ETFs=3]	-0.028	0.021	-1.350	0.178	-0.070	0.013
	<b>[InvExp_ETFs=4]</b>	<b>-0.038</b>	<b>0.019</b>	<b>-1.961</b>	<b>0.050**</b>	<b>-0.076</b>	<b>3.108E-05</b>
	[InvExp_ETFs=5]	0 <sup>a</sup>					
Mutual Funds	[InvExp_MF=1]	-0.014	0.032	-0.446	0.656	-0.077	0.048
	[InvExp_MF=2]	0.009	0.022	0.419	0.676	-0.035	0.053
	[InvExp_MF=3]	0.012	0.018	0.686	0.493	-0.023	0.047
	[InvExp_MF=4]	-0.004	0.016	-0.285	0.776	-0.035	0.026
	[InvExp_MF=5]	0 <sup>a</sup>					
Term Deposits	<b>[InvExp_TD=1]</b>	<b>-0.084</b>	<b>0.034</b>	<b>-2.478</b>	<b>0.013**</b>	<b>-0.150</b>	<b>-0.017</b>
	<b>[InvExp_TD =2]</b>	<b>-0.092</b>	<b>0.024</b>	<b>-3.765</b>	<b>0.000**</b>	<b>-0.139</b>	<b>-0.044</b>



	[InvExp_TD =3]	<b>-0.049</b>	<b>0.020</b>	<b>-2.457</b>	<b>0.014**</b>	<b>-0.089</b>	<b>-0.010</b>
	[InvExp_TD =4]	-0.029	0.018	-1.598	0.110	-0.064	0.007
	[InvExp_TD =5]	0 <sup>a</sup>					
<i>Investment Knowledge Source</i>							
No Decisions	[InvKnow_NoDecs =0]	-0.024	0.027	-0.910	0.363	-0.077	0.028
ESG and more	[InvKnow_ESG =0]	0.018	0.016	1.112	0.267	-0.014	0.049
Financial Sources Only	[InvKnow_Financial =0]	0.011	0.021	0.513	0.608	-0.031	0.053
Financial Expert	[InvKnow_Expert =0]	0.026	0.031	0.820	0.412	-0.036	0.087
<i>Socioeconomic Characteristics</i>							
Gender	[Gender=1]	-0.097	0.200	-0.485	0.628	-0.489	0.296
	[Gender=2]	-0.110	0.201	-0.547	0.585	-0.504	0.284
Employment Experience	[EmployFI=1]	0.032	0.032	1.007	0.314	-0.031	0.095
Location	[Location = 1]	0.018	0.043	0.420	0.674	-0.067	0.104
Age Group	[AgeGroup=1]	-0.043	0.062	-0.690	0.490	-0.165	0.079
	[AgeGroup=2]	-0.046	0.062	-0.733	0.464	-0.168	0.076
	[AgeGroup=3]	-0.015	0.066	-0.234	0.815	-0.146	0.115
	[AgeGroup=4]	-0.046	0.070	-0.667	0.505	-0.183	0.090
Education	[Education=1]	-0.040	0.187	-0.213	0.831	-0.407	0.327
	[Education=2]	0.046	0.075	0.607	0.544	-0.102	0.193
	[Education=3]	0.095	0.072	1.320	0.187	-0.046	0.237
	[Education=7]	0.083	0.072	1.157	0.248	-0.058	0.225

<b>Labelled Green Bond with Enhanced Reporting Performance (Bond H)</b>							
<b>Predictor Variable</b>	<b>Parameter</b>	<b>B</b>	<b>Std. Error</b>	<b>t</b>	<b>Sig.</b>	<b>95% Confidence Interval</b>	
						<b>Lower</b>	<b>Upper</b>
<i>Portfolio Preferences</i>							
Investment Horizon	[InvHor=1]	-0.039	0.048	-0.811	0.418	-0.133	0.055
	[InvHor=2]	-0.028	0.042	-0.671	0.502	-0.109	0.054
	[InvHor=3]	0.002	0.042	0.055	0.956	-0.080	0.085
	[InvHor=4]	-0.018	0.049	-0.366	0.714	-0.113	0.078
	[InvHor=5]	0 <sup>a</sup>					
Investment Attitude	[InvAtt=1]	0.062	0.034	1.839	0.066	-0.004	0.128
	[InvAtt=2]	0.068	0.035	1.948	0.052	-0.001	0.136
	[InvAtt=3]	0.054	0.035	1.550	0.122	-0.014	0.122
	[InvAtt=4]	0.041	0.037	1.112	0.267	-0.032	0.115
	[InvAtt=5]	0 <sup>a</sup>					
Portfolio Stability	[PortfolioStability=1]	-0.100	0.071	-1.413	0.158	-0.240	0.039
	[PortfolioStability=2]	-0.119	0.070	-1.699	0.090	-0.257	0.019
	[PortfolioStability=3]	-0.076	0.070	-1.085	0.278	-0.215	0.062
	[PortfolioStability=4]	-0.074	0.082	-0.893	0.372	-0.235	0.088
	[PortfolioStability=5]	0 <sup>a</sup>					
Investment Philosophy	[InvPhil=1]	0.051	0.034	1.498	0.135	-0.016	0.119
	[InvPhil=2]	0.059	0.034	1.717	0.086	-0.008	0.127
	[InvPhil=3]	0.057	0.037	1.566	0.118	-0.015	0.129
	[InvPhil=4]	0 <sup>a</sup>					
<i>Investment Product Type</i>							

Stocks	[Inv_Stocks=0]	-0.004	0.014	-0.299	0.765	-0.031	0.023
Bonds	[Inv_Bonds=0]	-0.025	0.015	-1.639	0.102	-0.055	0.005
ETFs	[Inv_ETFs=0]	0.001	0.014	0.085	0.932	-0.027	0.029
Mutual Funds	[Inv_MF=0]	0.012	0.013	0.880	0.379	-0.014	0.038
Term Deposits	[Inv_TD=0]	0.015	0.023	0.654	0.513	-0.030	0.059
		<i>Experience Level with Product</i>					
Stocks	[InvExp_Stocks=1]	-0.014	0.034	-0.405	0.686	-0.080	0.053
	[InvExp_Stocks=2]	-0.004	0.025	-0.163	0.871	-0.054	0.045
	[InvExp_Stocks=3]	0.007	0.021	0.331	0.741	-0.034	0.047
	[InvExp_Stocks=4]	-0.030	0.019	-1.605	0.109	-0.066	0.007
	[InvExp_Stocks=5]	0 <sup>a</sup>					
Bonds	[InvExp_Bonds=1]	0.043	0.039	1.111	0.267	-0.033	0.120
	[InvExp_Bonds=2]	-0.005	0.028	-0.170	0.865	-0.060	0.050
	[InvExp_Bonds=3]	0.012	0.018	0.649	0.516	-0.023	0.046
	[InvExp_Bonds=4]	-0.015	0.017	-0.899	0.369	-0.048	0.018
	[InvExp_Bonds=5]	0 <sup>a</sup>					
ETFs	[InvExp_ETFs=1]	0.002	0.036	0.045	0.964	-0.069	0.073
	[InvExp_ETFs=2]	0.009	0.025	0.344	0.731	-0.040	0.057
	[InvExp_ETFs=3]	0.001	0.020	0.032	0.974	-0.039	0.040
	[InvExp_ETFs=4]	0.026	0.019	1.378	0.169	-0.011	0.062
	[InvExp_ETFs=5]	0 <sup>a</sup>					
Mutual Funds	[InvExp_MF=1]	-0.018	0.031	-0.598	0.550	-0.078	0.042
	[InvExp_MF=2]	-0.008	0.022	-0.357	0.721	-0.050	0.035
	[InvExp_MF=3]	-0.019	0.017	-1.097	0.273	-0.052	0.015

	[InvExp_MF=4]	0.004	0.015	0.261	0.794	-0.026	0.033
	[InvExp_MF=5]	0 <sup>a</sup>					
Term Deposits	<b>[InvExp_TD=1]</b>	<b>0.102</b>	<b>0.033</b>	<b>3.135</b>	<b>0.002**</b>	<b>0.038</b>	<b>0.166</b>
	<b>[InvExp_TD =2]</b>	<b>0.073</b>	<b>0.023</b>	<b>3.105</b>	<b>0.002**</b>	<b>0.027</b>	<b>0.119</b>
	<b>[InvExp_TD =3]</b>	<b>0.048</b>	<b>0.019</b>	<b>2.473</b>	<b>0.014**</b>	<b>0.010</b>	<b>0.086</b>
	<b>[InvExp_TD =4]</b>	<b>0.036</b>	<b>0.017</b>	<b>2.093</b>	<b>0.037**</b>	<b>0.002</b>	<b>0.070</b>
	[InvExp_TD =5]	0 <sup>a</sup>					
<i>Investment Knowledge Source</i>							
No Decisions	[InvKnow_NoDecs =0]	0.017	0.026	0.656	0.512	-0.034	0.067
ESG and more	[InvKnow_ESG =0]	0.013	0.015	0.843	0.399	-0.017	0.043
Financial Sources Only	[InvKnow_Financial =0]	0.004	0.021	0.215	0.830	-0.036	0.045
Financial Expert	[InvKnow_Expert =0]	-0.029	0.030	-0.957	0.339	-0.088	0.030
<i>Socioeconomic Characteristics</i>							
Gender	[Gender=1]	0.117	0.192	0.609	0.542	-0.261	0.495
	[Gender=2]	0.105	0.193	0.541	0.588	-0.275	0.484
Employment Experience	[EmployFI=1]	-0.013	0.031	-0.427	0.670	-0.073	0.047
Location	[Location = 1]	0.029	0.042	0.694	0.488	-0.053	0.111
Age Group	[AgeGroup=1]	-0.065	0.060	-1.088	0.277	-0.183	0.052
	[AgeGroup=2]	-0.051	0.060	-0.846	0.398	-0.168	0.067
	[AgeGroup=3]	-0.073	0.064	-1.141	0.254	-0.198	0.052
	[AgeGroup=4]	-0.076	0.067	-1.141	0.254	-0.208	0.055
Education	[Education=1]	-0.042	0.180	-0.236	0.814	-0.396	0.311
	[Education=2]	-0.004	0.072	-0.051	0.960	-0.146	0.138
	[Education=3]	-0.012	0.069	-0.170	0.865	-0.148	0.124

	[Education=7]	-0.001	0.069	-0.019	0.985	-0.137	0.135
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