ESG, THE 2008 GLOBAL FINANCIAL CRISIS AND ACCESS TO EXTERNAL FINANCE BY CANADIAN FIRMS

by

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Declaration of Original and Data Authenticity

This thesis is a presentation of my original research work under the direct supervision of Dr. Leandro Freylejer of the Univeristy of Northern British Columbia (UNBC). Wherever contributions of other researchers are involved, I make every effort to indicate that clearly, with due acknowledgement of collaborative research and discussions. I affirm that the data reported herein are authentic and accurate. This thesis has not been submitted to any other academic institution for the award of any degree or diploma.

Abstract

This study examines the impact of restricted access to credit on the Environmental, Social, and Governance (ESG) performance of Canadian firms, using the 2008 financial crisis as a stress test. The analysis is guided by two competing perspectives: the Resource Constraint View and the Strategic Value View. I employ the Difference-in-Differences (DiD) methodology to assess how financial constraints resulting from the crisis influenced ESG performance.

My findings reveal a significant negative impact on the Environmental pillar, confirming that financial constraints led firms to deprioritise environmental commitments. However, the effects on the combined ESG score, as well as the Social and Governance pillars, are less robust**,** indicating that the relationship between credit access and these dimensions is more complex. These results align with the Resource Constraint View, suggesting that firms prioritise financial stability over sustainability commitments during periods of economic distress.

Further analysis shows that Return on Assets is positively associated with ESG and Social performance, indicating that financially healthier firms are better able to maintain sustainability efforts. Firm Size is positively correlated with all ESG dimensions, highlighting that larger firms are more capable of investing in ESG initiatives. Additionally**,** the presence of an Audit Board Committee is strongly linked to higher Governance scores, underscoring the role of effective oversight in fostering strong ESG performance.

This study emphasises the critical role of access to external credit in shaping ESG outcomes, particularly in the environmental domain during economic downturns. The findings highlight the need for supportive financial environments to sustain corporate sustainability efforts.

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Dedication

I dedicate this work to my son, Jayden Kabutey Teye-Ali. You are my greatest inspiration and the light of my life. May this achievement remind you that with faith, hard work, and determination, no dream is too big to achieve. Always aim high, my son, and never stop believing in yourself.

Chapter One: Introduction

1.1 Background of the study

Globally, the demand by stakeholders for companies to conduct business sustainably and disclose non-financial information beyond their financial statements has taken centre stage since 2004. For firms to take responsible actions against the rising environmental and social issues across the globe, the then United Nations (UN) Secretary General, Kofi Annan, invited 18 leading financial institutions to come up with strategies and recommendations that would ensure that companies compete fairly in making financial gains and not at the expense of destruction to their catchment areas. The report by these financial institutions dotted across nine countries birthed the term Environmental, Social, and Governance (ESG) in the 2004 Global Compact Report titled “Who Cares Wins: Connecting Financial Markets to a Changing World".

The inaugural report by the eminent financial institutions was anchored on the reasoning that (financial) companies that are competitive in addressing environmental, social, and governance issues can largely increase shareholder value. This is because they can anticipate and manage risk well, have access to new markets, and contribute successfully to the development and growth of the communities in which they operate (Global Compact, 2004). Since 2004, investors have been paying keen attention to ESG investing. By ESG investing, I mean “an investment approach that goes beyond the analysis of traditional financial indicators by incorporating ESG factors into the investment process (i.e., the process of selecting and managing an investment portfolio). Of course, ESG considerations are not entirely new, and, in various ways, many investors have long incorporated some of these issues into their investment frameworks” (Lopez et al., 2020, p. 10). Nevertheless, Zumente and Bistrova

(2021) argue that companies are becoming more conscious of sustainability issues and are not only reporting business activities beyond their financial statements but are also integrating their sustainability roles into their mission statements as global demand for sustainable conduct of business is growing.

Since 2004, Canada has witnessed increasing investor demand for ESG-aligned investments, reflected in the rapid growth of sustainable finance. For instance, Canadian banks launched ESG-related financial products, such as green bonds and sustainability-linked loans (Government of Canada, 2024a) , in early 2019. However, challenges remain, particularly in balancing financial performance with environmental commitments, such as in the oil and gas sector, a major contributor to Canada's economy. Addressing greenwashing, ensuring standardised ESG metrics, and enhancing regulatory oversight are ongoing priorities of the Canadian government and regulatory agencies. Therefore, green investment decisions of boards and their respective companies are largely based on the availability of resources and the expected impact these investments would have on the long-term sustainability of the companies.

The 2008 global financial crisis served as a stress test for Canadian firms, providing a natural experiment to examine their financial resilience and ethical priorities. The crisis represented a significant external shock that tested firms' ability to maintain operational stability while upholding commitments to environmental, social, and governance (ESG) practices. Firms faced heightened financial constraints during this period due to tightened credit markets, reduced investor confidence, and broader economic uncertainty. This environment created unique conditions to analyse how varying levels of financial constraints influenced firms' investments in sustainability and governance initiatives. For some firms, ESG performance

became secondary to immediate survival, while others demonstrated robust ESG strategies that contributed to long-term financial resilience.

This shock offers valuable insights into the relationship between financial constraints and corporate behaviour regarding ESG practices. Under financial stress, firms may have leveraged their available resources to prioritise ESG investments, viewing sustainability and governance as essential to maintaining stakeholder trust and mitigating future risks. This is what I describe in this study as the Strategic Value view. Conversely, firms may have deprioritised ESG activities to conserve capital, revealing the trade-offs firms make when navigating crises and prioritising their survival today over investing in sustainability activities. This latter description is termed as the Resource Constraint View in my study. By treating the financial crisis as a "natural experiment," I will highlight how external shocks can shape corporate decision-making and ESG outcomes, shedding light on the dynamic interplay between financial stability and sustainable business practices in times of economic distress and uncertainty in the business environment across varying economic sectors in Canada.

Sustainable behaviour by corporate entities has taken centre stage in recent corporate financial reports. This is because governments, regulatory agencies, institutions, and many individual investors agree that paying attention to ESG issues has a greater positive influence on the success of enterprises (Arun et al., 2022). According to the United Nations' 2019 report, corporate Chief Executive Officers (CEOs) globally consider ESG-related issues as paramount to business success. In recent times concerns for the impact of business decisions on the environment, society, and corporate governance quality (ESG criteria) is not only a crucial element on the agenda of governments and regulatory institutions; it is also a critical component of the decision-making of the most important asset managers around the world

(Governance, 2017; Lavin & Montecinos-Pearce, 2021). Khan (2022) posits that businesses need to conduct their operations by respecting the rights of society and maintaining a harmful-free biosphere.

The ESG criteria represent a set of standards for a company's operations that investors and other stakeholders use to assess its sustainability and ethical impact. Environmental factors address a company's impact on the natural environment, social factors pertain to its relationships with employees, suppliers, customers, and communities, and governance involves the internal practices and policies that govern a company, including executive pay, audits, and the rights of shareholders.

A combination of regulatory changes, investor preferences, and societal expectations drive the growing emphasis on ESG considerations. Regulatory bodies worldwide are introducing frameworks that mandate the disclosure of ESG-related information, influencing how companies report on their sustainability practices. Investors increasingly prioritise ESG criteria in their investment decisions, seeking to identify companies that manage environmental and social risks effectively and exhibit strong governance practices. This shift is partly a response to the growing recognition that companies with robust ESG practices are likely to be more resilient and better positioned for long-term success. This is why the Strategic Value View would be the ideal scenario under economic stress, irrespective of the need for immediate survival.

ESG gained global momentum after the 2008 global financial crisis and, more recently, after the COVID-19 pandemic. The financial crisis caused global uncertainties for years. This led to disruptions in the financial markets, constrained both corporate and national budgets, persistent

deficits in government spending, and rising public debts. According to Lindquist, de Vries and Wanna (2015), the nature of the generational effect of the global crisis gives credence to academics and researchers to research more into the crisis to "provide order and discipline and some strategic direction in the face of competing demands and future challenges" amidst recent environmental and employee well-being concerns. Therefore, the global financial crisis is a natural experiment that would help me to ascertain how access to external finance can affect the ESG adoption and performance of firms given the benefits of ESG adoption to firms' long-term survival.

The term "The Great Recession" referred to the global financial crisis that profoundly impacted the world's economy between 2007 and 2008. This crisis stemmed from high-risk mortgage lending and the widespread trading of mortgage-backed financial assets. The repercussions of this crisis included the collapse of companies, government bailouts, and a significant decline in global economic activity. This economic recession has been regarded as the most significant global economic setback since the Great Depression of the 1930s. Throughout the crisis, the global credit market was non-operational for approximately four weeks (Arner, 2009).

Over the past two decades, the Canadian economy has experienced significant fluctuations influenced by external shocks such as the 2008 global financial crisis and the COVID-19 pandemic. These events did not only disrupt business operations across industries but also impact firms' access to external credit. The overall impact on the country's Gross Domestic Product (GDP) has largely been documented where the GDP growth rate of Canada fell from a high of 3.21 in 2005 to negative 2.9% in 2009. Figure 1 illustrates the shock that the financial crisis of 2008 had on the GDP growth rate in Canada.

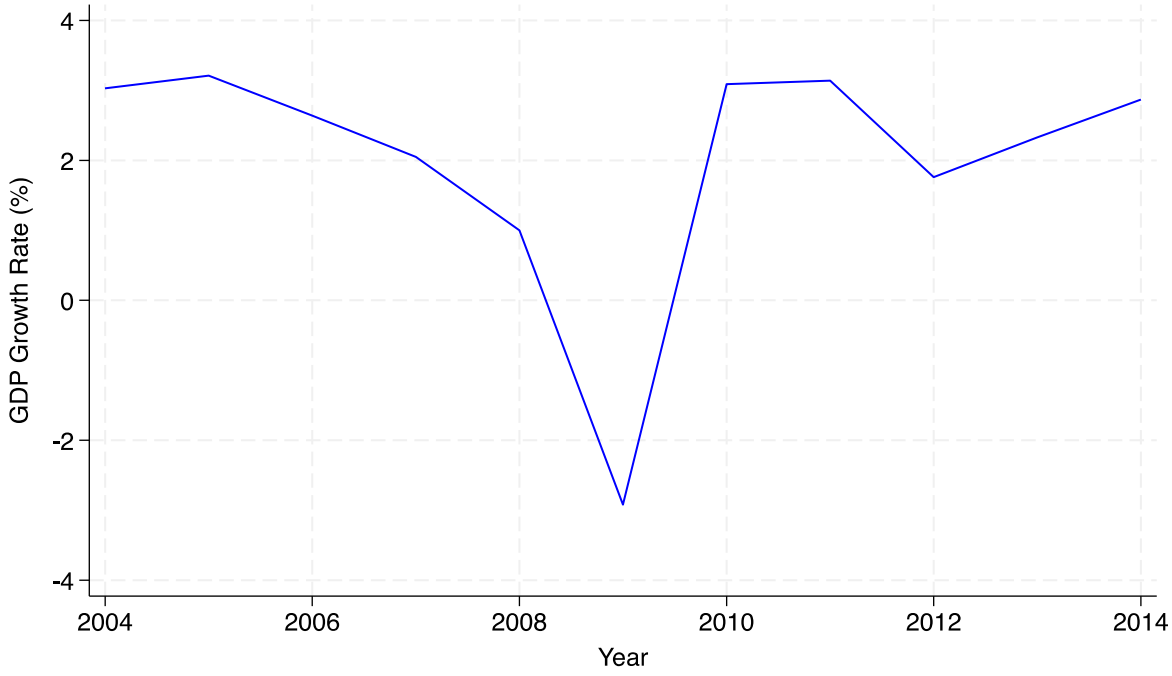

Figure 1: GDP Growth Rate in Canada

Data Source: World Development Indicators (WDI)

The global financial crisis of 2008, in particular, caused sharp contractions in economic growth between 2007 and 2009. During this period, Canadian firms faced significant financial constraints, as access to external credit became limited due to tightened lending conditions (OECD, 2009). The negative growth observed during this crisis mirrors the decline in global demand and the subsequent credit crunch, which affected firms' investment capacity and operational sustainability.

The interaction between environmental, social, and governance (ESG) considerations and firms' ability to access external credit has gained prominence in the aftermath of these economic shocks. Investors and creditors increasingly assess ESG performance as part of risk evaluations, influencing capital availability and cost. For Canadian firms, maintaining strong ESG practices can mitigate financial risks and improve resilience during economic downturns (CPA Canada, 2021).

ESG reporting in Canada is presently voluntary, though investors and other stakeholders have become ESG-conscious in their investment choices. The new Corporate Sustainability Reporting Directive (CSRD) of the European Union (EU) mandates companies within and outside the Union to report on ESG practices. PWC Canada (2023) explains three ways by which Canadian firms are affected by the CSRD directive. Firstly, if a Canadian firm or its subsidiary is listed in the EU-regulated market; Secondly, if the firm exceeds any two of the following conditions that makes the company a large one. If it has a subsidiary in the EU with total assets of €20m, a net turnover of €40m, and an average of 250 employees as of 31st July 2023. Finally, if the firm has a large EU parent or the entity is an EU holding company.

In the EU, there is a rapid shift from voluntary ESG reporting to compulsory ESG reporting as initiated by the recent adoption of the CSRD in the European Union (EU) in 2022 (KPMG, 2022; Nicolo et al., 2023). However, Canada and North America are generally largely behind in progressing with ESG report standardization and framework adoption. Interestingly, a KPMG (2023) survey indicates that 63% of manufacturing companies in Canada are struggling with strategies to reduce their carbon footprint, while about 62% say they are not ready to achieve net-zero carbon emissions by the year 2050, as enshrined in the Canadian Net-Zero Emissions Accountability Act (CNZEAA).

1.2 Problem statement and motivation

The incentives to adopt ESG have been discussed in varied literature across many jurisdictions globally (Alareeni & Hamdan, 2020; Aydoğmuş et al., 2022; Bodhanwala & Bodhanwala, 2018; Moalla & Dammak, 2023; Pellegrini et al., 2019; Zhou et al., 2022). These incentives include firm value enhancement (Aydoğmuş et al., 2022), firm profitability and financial

performance (Alareeni & Hamdan, 2020; Pellegrini et al., 2019), stock volatility (Moalla & Dammak, 2023), and cost reduction (Pellegrini et al., 2019).

Despite the increasing importance of ESG adoption and usage in investment decisions, financially constrained firms often struggle to prioritise long-term sustainability goals over short-term liquidity needs. The 2008 global financial crisis exacerbated these challenges by tightening credit markets, leaving firms with limited access to external financing. In this environment, Canadian firms faced difficult trade-offs: Should they maintain or improve ESG performance to attract socially responsible investors, or should they focus on short-term operational success by deprioritising ESG initiatives to preserve financial viability?

The interesting question to answer is to what extent do highly financially constrained Canadian firms epitomise the resource constraint view (Campbell et al., 2012) and prioritise current survival during economic crises or lean towards the strategic value view. According to the latter view, in times of economic crisis, highly financially constrained firms would still invest in ESG initiatives to enhance their reputation and appeal more to external stakeholders (Lins et al., 2017).

Existing literature has largely focused on the relationship between ESG performance and financial outcomes in stable periods (Cao & Leung, 2020; Cheng et al., 2014a) , leaving a gap in understanding how financial crises impact this relationship. Additionally, studies seldom consider the role of financial constraints, as measured by indices like the Kaplan-Zingales (KZ) Index, in shaping the ESG-credit constraints nexus. This gap is particularly relevant for Canada, where resource-dependent firms may experience unique ESG pressures and financial challenges during crises.

The important role of ESG in accessing external funds by firms has been established by Cheng et al. (2014) and Xu and Kim (2022). According to Cheng et al. (2014), better engagement and transparency regarding the relationship between companies and their respective communities through ESG enhances the reduction in the capital constraints of firms. They argue that firms have reduced capital constraints because they can disclose credible Corporate Social Responsibility (CSR) practices, ensuring transparency and reducing information asymmetry.

Xu and Kim (2022), on the other hand, conclude that firms facing financial constraints tend to increase their toxic emissions because of the high cost associated with environmental abatement. These firms trade off the costs of environmental abatement against potential legal liabilities; hence, relaxing financial constraints leads to toxic release reduction by listed firms in the United States. Their study gives evidence to the fact that firms with tighter financial constraints are more likely to increase toxic emissions, hence, these firms would have lower ESG performance, especially under the environmental pillar.

In addition to the above, a comprehensive review of the literature by Carnevale and Drago (2024) sheds light on the fact that lenders often penalise firms with poor ESG performance by charging higher loan spreads. While this finding underscores the importance of ESG performance in influencing borrowing costs, this study takes a different perspective by examining the reverse relationship: how access to external credit influences ESG performance as I use an exogenous shock to avoid potential endogeneity problems. Specifically, I hypothesise that restricted access to external credit following the 2008 global financial crisis negatively impacted Canadian firms' ESG performance. This is because financially constrained firms, facing limited credit availability, likely lack the incentive for long-term ESG initiatives to allocate scarce resources toward immediate survival needs. The findings of Carnevale and

Drago (2024) indirectly support this hypothesis as they suggest that firms with poor ESG performance face higher borrowing costs, which could further exacerbate financial constraints during a crisis. This creates a scenario where restricted credit access reduces firms' ability to invest in ESG activities, leading to weaker ESG performance.

This study aims to shed light on how the 2008 crisis influenced the ability of Canadian firms to maintain or improve their ESG performance in the face of financial constraints. The findings highlight whether ESG performance was influenced by the intensity of financial constraints faced by the selected companies in my sample or otherwise.

Tsai and Wu (2022) using the MSCI ESG dataset for US companies underscored how different dimensions of Corporate Social Responsibility (CSR) shift during a crisis. The authors assert that, during financial crises, the trust in society becomes very low with limited financial resources. Companies that invest more in corporate social responsibility activities related to employee relations and product characteristics increase their firm’s financial performance. In contrast, a laggard CSR investment leads to a decrease in the value of companies during crisis periods. Interestingly, the research also finds that companies with poor employee relations had better financial performance during the 2008 financial crisis.

Despite the growing importance of ESG factors in corporate decision-making and credit assessments, there is limited empirical research examining how access to external credit influences ESG performance, particularly in the context of Canadian firms. This thesis addresses this gap by investigating the impact of restricted access to external credit on ESG performance, using the 2008 global financial crisis as an exogenous shock. The study is particularly timely, as Canadian firms continue to face external and global shocks, such as the

COVID-19 pandemic, the Russia- Ukraine War, and the threat of tariffs from a longstanding trading partner, the United States of America. These events highlight the critical role that external finance plays in a firm's ability to meet both short-term operational needs and long-term strategic goals, including sustainable business practices. By exploring how the 2008 crisis influenced the relationship between credit access and ESG performance, this research aims to uncover the mechanisms through which financial constraints during crises shape firms' ability to invest in and maintain ESG initiatives. Ultimately, this study seeks to contribute to the academic and practical understanding of how financial constraints during crises shape firms' ability to invest in and maintain ESG performance, a topic of increasing relevance in a world where sustainable business conduct is becoming a priority.

1.3 Research Objectives

Based on the prior introduction and research problem, I intend to pursue the following objectives in this study.

1. To leverage the role of the 2008 financial crisis as an exogenous shock in Canada to estimate the causal effect of financial constraints on ESG performance.
2. To analyse the effect of differential access to external credit as a result of the 2008 global financial crisis on the Environmental (E), Social (S), and Governance (G) performance of Canadian firms. This objective contributes to the ongoing debate between the *resource constraint view,* which argues that financially constrained firms are forced to scale back ESG investments during crises-and the *strategic view*, which sees ESG as a long-term value driver that firms continue to prioritise even under constrained conditions.
3. To estimate the relationship between governance issues and ESG performance.

1.4 Significance of the research

In the wake of the recent global crisis and the rapid demand by regulators and investors for sustainable production, the study aims to underscore the importance of ESG to the resiliency of firms during domestic and international crises. The findings underscore the need for government-backed ESG financing mechanisms, such as tax incentives, green bonds, and sustainability-linked loans, to ensure ESG resilience in economic downturns (See Chapter Five). Firms should integrate ESG into their core business models rather than treating it as an optional investment. Evidence from Chapter Four highlights that firms with audit committees and structured governance frameworks were more resilient in sustaining ESG post-crisis.

The study aims to support the argument for stronger ESG regulations in North America, particularly in Canada, which is globally known for ethical production and financial stability. Additionally, one of my aims is to augment the global effort of integrating ESG considerations into firms' practices to enhance sustainable practices that are beneficial to businesses, not only in times of crisis but also in the long term.

1.5 Research Scope and Limitations

The study focuses on the 2008 financial crisis as an exogenous shock, limiting the scope to short-term ESG responses rather than long-term trends. ESG measurement is restricted to the London Stock Exchange Group (LSEG) database, which relies on voluntary disclosures, leading to potential data gaps. The LSEG also updates the scores periodically when new

information is received, which may affect the results when the subsequent study is conducted based on the availability of new ESG results.

Future research should consider cross-country comparisons, incorporating regions with stricter ESG mandates (e.g., EU, US) to enhance generalizability.

1.6 Contributions to research

Despite the limitations discussed earlier, this study offers valuable historical insights into how restricted access to external credit during the 2008 global financial crisis influenced the ESG performance of Canadian firms. By examining the relationship between credit constraints and ESG performance, the study sheds light on the challenges firms face in maintaining long-term sustainability initiatives during periods of financial distress. Specifically, my findings highlight how financial constraints during the crisis may have forced firms to deprioritise ESG investments, thereby compromising their long-term financial stability and sustainability.

1.6.1 Conceptual Contributions

This study demonstrates that an increase in credit constraint leads to worsening ESG performance during economic crises. This finding supports the argument that financial stability is a key driver of sustainability practices, as firms facing financial pressures are more likely to cut back on non-financial investments, such as ESG initiatives. By linking credit constraints to ESG performance, the study enriches the literature on the trade-offs firms make between financial survival and long-term sustainability during periods of economic uncertainty.

The study also provides empirical support for the Resource Constraint View, showing that financially constrained firms deprioritise ESG investments during economic downturns, particularly environmental initiatives. It also expands existing ESG literature by incorporating

governance mechanisms as moderating factors, revealing that firms with strong governance structures (audit committees) sustain ESG better than those without (See Chapter Four).

1.6.2 Practical Implications

Practically, the findings have significant implications for policymakers, investors, and corporate managers. For policymakers, the study highlights the need for targeted financial support or incentives for firms with high credit constraints during economic downturns, ensuring that ESG commitments are not abandoned. For investors, the results underscore the importance of considering financial health when evaluating firms' ESG performance, particularly during crises. For corporate managers, the study emphasises the need to balance financial stability with sustainability goals, even in challenging economic conditions. This study also demonstrates the importance of regulatory incentives and financial interventions in mitigating ESG trade-offs during crises.

1.6.3 Methodological Contributions

Methodologically, this study contributes to the field by applying the Difference-in-Differences (DiD) framework to isolate the causal effect of credit constraints on ESG performance. The DiD estimation helps to establish a causal relationship between credit constraints and ESG outcomes, providing a more rigorous empirical framework compared to previous correlational studies. The use of a placebo test strengthens the robustness of the findings, ensuring that the observed effects are unique to the financial crisis period and not driven by pre-existing trends or spurious factors. This approach provides a rigorous empirical framework for future research

on the causal relationships between financial constraints and sustainability outcomes. Also, the study uses the Kaplan-Zingales (KZ) Index to classify the level of firms' financial constraints, providing a detailed view of firm-level credit dependency.

1.6.4 Contextual Contribution

Finally, this study uniquely contributes to the ESG literature by focusing on Canadian firms, a context often underrepresented in existing research dominated by U.S. and European studies. Canada's distinct regulatory environment and market characteristics provide fresh insights into how firms navigate ESG challenges during financial crises. The findings reveal that Canadian firms with restricted credit access during the 2008 crisis experienced significant declines in ESG performance, highlighting the critical role of external credit in sustaining ESG initiatives.

By linking Canada's unique economic and regulatory landscape to ESG outcomes, my research enriches the global understanding of how external shocks impact sustainability practices and underscores the importance of financial resilience in maintaining long-term ESG commitments.

1.6.5 Overall Significance

Overall, this research underscores the importance of balancing financial health with sustainability goals, particularly during periods of economic stress. It highlights the critical role of access to external credit in supporting firms' efforts to achieve sustainable business practices and long-term resilience. By providing empirical evidence on the impact of credit constraints

on ESG performance, the study offers actionable perspectives for stakeholders seeking to promote sustainability in the face of financial challenges.

1.7 Organisation of the Study

This research in Chapter One begins with the background of the study, a discussion of the research problem, the objectives and hypotheses of the study, the significance of the study, and the scope and limitations of the research. In Chapter Two, I review existing theoretical and recent empirical literature on ESG, the Canadian economy, the 2008 global financial crisis, and access to external credit. This chapter enables me to advance the needed support in terms of theories, concepts, and frameworks that are relevant to this study. I am, therefore, able to answer the unanswered question of how Canadian firms behave towards ESG investments and performance when they are faced with credit constraints during periods of financial crisis.

I discussed the econometric model that was used in the study in Chapter 3. I also discuss why the Difference-in-Differences estimation technique is well-suited for this study. Detailed descriptions of all the variables are provided. In Chapter Four, I discuss the findings based on the result of the econometric model. I then summarise the findings from the study, draw varied conclusions and make policy recommendations for stakeholders such as investors, governments, and policy-makers to conclude the study in Chapter Five.

Chapter Two: Literature Review

2.1 Introduction

This chapter reviews the various theoretical foundations of ESG and access to external credit, the Canadian economy and the 2008 financial crisis. The chapter also gives empirical evidence of existing literature on ESG and access to credit.

2.2 Theoretical Frameworks Connecting ESG and Access to Credit

The relationship between ESG factors and access to external credit has gained significant attention in corporate finance (Cheng et al., 2014b; Devalle, 2017; Houston & Shan, 2022; Luo et al., 2023). Several key theories have been developed to explain how ESG practices affect access to credit and vice versa. Namely, the stakeholder theory, signaling theory, and agency theory, among others. Each of these theories offers a unique perspective on how ESG factors influence creditworthiness, either by reducing perceived risks, signalling long-term sustainability, or enhancing internal governance.

2.2.1 Stakeholder Theory

Stakeholder theory (ST), developed by Edward Freeman in 1984 (Freeman, 2010b), posits that companies must balance the interests of various stakeholders such as shareholders, employees, customers, communities, and the environment in their decision-making processes. When companies manage these stakeholder relationships effectively, they reduce potential risks and enhance long-term value creation. Since its inception, the theory has been used in various disciplines such as business administration (Cragg, 2002; Freeman, 2010a; Harrison et al., 2015), sustainability (Cheng et al., 2014b; S. Kim & Li, 2021; Limkriangkrai et al., 2017), urban studies (Andersen & Nielsen, 2009; Beck, 2023), and law (Herron & Powell, 2024; Keay,

2010). Its broad influence has contributed to promoting a stakeholder-oriented approach in these areas, leading to the theory's development as both multidisciplinary and interdisciplinary. The study by Beck (2024) on stakeholder theory discusses its evolution by highlighting the development of key constructs and definitions over time. Initially defined by Freeman in 1984, the concept of stakeholders has since diverged significantly. For instance, Clarkson (1995) expanded the definition to include individuals or groups with ownership, rights, or interests in a corporation, emphasizing a broader temporal perspective. Additionally, Starik (1995) argued for the inclusion of non-human entities as stakeholders, defining them as any naturally occurring entity that affects or is affected by organizational performance. The study also notes that there are numerous overlapping definitions of stakeholders, with many studies categorizing them as influencers, recipients, claimants, or collaborators. This diversity in definitions reflects the complexity and evolving nature of stakeholder theory, which now encompasses various dimensions such as stakeholder salience (power, urgency, legitimacy), mutual trust, and stakeholder value creation.

A recent study by Gutterman (2023) is based on stakeholder theory, which posits that firms operate within a social ecosystem where various stakeholders, including customers, creditors, and employees, play crucial roles. The theory suggests that the realization of firm values is dependent on the support and trust of these stakeholders. The study employed the theory to categorize stakeholders into different groups that influence the organization's mission. The researcher emphasised the importance of actively engaging with these stakeholders and developing sustainability strategies that take their interests and impacts into account. The study referenced normative models for categorizing stakeholders and highlighted the need for understanding and intervening in the practices of value chain partners to achieve sustainable outcomes. His findings indicated that effective stakeholder engagement leads to improved

organizational performance and sustainability. Organizations that recognize and address the needs and expectations of their stakeholders are more likely to succeed in a competitive environment. Additionally, the study highlighted that strong stakeholder relationships are essential for mitigating risks associated with global challenges and fostering a more sustainable world. One of the limitations of the theory highlighted by the researcher is the difficulty organizations face in identifying and prioritizing the diverse interests of various stakeholders, particularly when those interests conflict. This complexity can complicate decision-making and strategy formulation, as managers must navigate competing demands and expectations from different stakeholder groups.

Luo et al. (2023) adopted the stakeholder theory to argue that good ESG performance enhances positive interactions between firms and their stakeholders. This, in turn, strengthens mutual understanding and trust, which are essential for obtaining trade credit financing. Their study empirically tested this relationship by exploring causal mechanisms such as information asymmetry, operating efficiency, and firm risk, demonstrating how ESG performance can mitigate these issues and promote trade credit financing.

In the context of ESG and access to external credit, the stakeholder theory suggests that companies prioritising ESG practices are more likely to secure credit. For example, by mitigating environmental risks—such as reducing emissions, improving waste management, or adhering to environmental regulations—these companies can lower the probability of fines, lawsuits, or reputational damage, which are critical factors for lenders (Freeman, 1984).

For listed Canadian companies, which operate in a heavily regulated environment, adherence to environmental standards is particularly significant. As the Canadian government pushes toward stricter climate regulations and carbon pricing, manufacturers that proactively manage their environmental impact signal to lenders that they are less likely to face regulatory sanctions

or financial losses, reducing their risk profile and increasing their chances of obtaining credit (Freeman & Phillips, 2002).

Stakeholder theory, while initially seen as radical, has become increasingly conservative and more managerial over time (Greenwood & Mir, 2018). Critics argue that the theory's definition of stakeholders is ambiguous, potentially leading to ethical issues and redundancy in stakeholder protection (Lee Hung-hee, 2023). The imposition of multiple fiduciary duties and stakeholder participation on boards have also been questioned (Lee Hung-hee, 2023). Some argue that long-term shareholder value can protect stakeholder interests as effectively as the stakeholder theory (Lee Hung-hee, 2023). There are efforts to converge shareholder and stakeholder theories, focusing on wealth creation and stakeholder consideration in decision-making (Kucukyalcin, 2018). Interestingly, Milton Friedman's position on corporate social responsibility is often misrepresented, as he endorsed ethical constraints and the stakeholder theory after its development (Elrick & Thies, 2018). Despite these criticisms, some scholars believe that the stakeholder theory can be improved through a critical lens rather than dismissed entirely (Greenwood & Mir, 2018).

2.2.2 Signaling Theory

Signaling Theory, which was introduced by Spence (1973), emphasises how companies convey information to the market through their actions. According to this theory, firms send signals to investors, lenders, and other stakeholders about their quality, prospects, and risk levels through observable actions, including ESG initiatives. The signaling theory describes how organizations convey information through visible actions in situations where there exist an imbalance of information (Connelly et al., 2011). In strategic management, firms use market actions as signals to convey competencies and influence stakeholder evaluations, impacting their reputation (Basdeo et al., 2006). The theory's primary predictive mechanism is "separating

equilibrium," where signal expectations are confirmed through experience (Bergh et al., 2014). Signaling occurs in various contexts, including organizational advertisements, recruiting, and annual reports (Karasek III & Bryant, 2012). For signals to be effective, they must be costly and negatively correlated with productive ability (Karasek & Bryant, 2012). While signaling theory has gained prominence in management literature, its central tenets have blurred, necessitating a concise synthesis and review of its key concepts (Connelly et al., 2011).

Studies suggest strong ESG performance positively impacts firms' access to credit and overall financial performance. Companies with high ESG ratings experience improved access to trade credit financing (Huang et al., 2023; Luo et al., 2023) and better terms in the corporate bond market (Hoepner et al., 2023). This relationship is attributed to ESG performance reducing information asymmetry, improving operational efficiency, and mitigating ESG risks (Huang et al., 2023; Luo et al., 2023). ESG performance also reduces financial constraints and enhances external financing opportunities, including long-term and short-term debt (D. Zhang & Lucey, 2022).

Furthermore, firms strategically increase their ESG disclosure levels when facing high refinancing risk and issuing bonds, resulting in lower bond spreads (Hoepner et al., 2023). These findings support the signaling theory, suggesting that strong ESG practices send positive signals to the market about a company's long-term financial sustainability, thereby improving access to credit and overall firm performance. In this study, signalling theory provides a valuable framework for understanding how companies communicate their financial health and risk management to external creditors. This theory is particularly relevant in situations of information asymmetry, where lenders and investors may not have full visibility into a company’s internal practices or long-term sustainability.

For major Canadian firms, which often operate in environmentally sensitive or resource-intensive sectors, adopting strong ESG practices can serve as a signal to the market. By publicly committing to sustainable and ethical operations, these firms communicate to potential creditors that they are managing risks effectively. This helps to reduce the uncertainty lenders might have about the company's ability to navigate environmental regulations, social responsibilities, or governance challenges.

Through these signals, companies with robust ESG performance can convey their long-term sustainability and responsible risk management to creditors, even when complete information about their internal operations is unavailable. This, in turn, can lead to more favourable credit terms, lower borrowing costs, and easier access to external financing. Thus, this theory helps to explain the critical link between ESG practices and access to external credit for Canadian manufacturing firms.

Many studies have highlighted several gaps in the signaling theory in business contexts (Bafera & Kleinert, 2023; Moratis, 2018; Shahid et al., 2024; Steigenberger, 2023). Moratis (2018) argues that the International Organization for Standardization (ISO) 26000 standard for social responsibility suffers from signalling problems, potentially compromising stakeholders' ability to interpret the quality of companies' CSR. Bafera and Kleinert (2023) noted that as signaling theory's application in entrepreneurship research expands, understanding its core constructs has become increasingly ambiguous while Shahid et al. (2024) emphasises the growing relevance of signaling theory in international marketing, particularly in reducing information asymmetry between firms and international consumers. However, Steigenberger (2023) points out that false signalling, a widespread phenomenon damaging market efficiency, is not adequately integrated into the signaling theory. This lack of integration hinders both theoretical development and the ability to explain problematic real-world occurrences. These studies

collectively suggest a need for further refinement and critical examination of signaling theory's application in various business domains.

2.2.3 Agency Theory

The agency theory (AT) offers an important perspective for understanding the relationship between financial constraint and ESG by Canadian companies. This theory, introduced by Meckling and Jensen (1976), examines the principal-agent relationship, where the principal (shareholders or owners) delegates decision-making authority to the agent (company managers). AT addresses the potential conflicts of interest between principals and agents, particularly when their goals are misaligned and information asymmetry exists (Shah, 2014). This framework is relevant to understanding how ESG factors influence a company's creditworthiness and access to financing and vice versa. Studies show that superior ESG performance can lead to better access to finance by reducing agency costs through enhanced stakeholder engagement and decreasing informational asymmetry through increased transparency (Cheng et al., 2014b). Other authors have found that strong ESG performance significantly increases a firm's access to trade credit by mitigating information asymmetry, improving operating efficiency, and reducing risk (Luo et al., 2023). Furthermore, ESG scores contain valuable information about a firm's downside risk, particularly for companies with high information asymmetry (Bilyay-Erdogan, 2022; Lööf & Stephan, 2019). Environmental scores have been shown to lower the cost of debt financing for small firms (Jang et al., 2020). These findings highlight the importance of ESG factors in assessing credit quality and access to external financing.

Recent studies demonstrate that strong ESG practices, particularly in governance, can significantly reduce a company's cost of debt and improve access to credit. Alves and Meneses (2024) found that ESG scores have a negative relationship with debt costs, especially benefiting

highly indebted companies. Similarly, Abdul Razak et al. (2023) observed that improvements in ESG performance, particularly in governance, reduce credit risk as measured by credit default swap spreads. Attig et al. (2024) reveal that private lenders impose financial penalties on firms with poor environmental records and greenwashing practices. These studies collectively suggest that strong ESG practices, especially in governance, help mitigate agency conflicts by signalling responsible management to creditors. This, in turn, reduces agency costs and makes companies more attractive to external creditors (Abdul Razak et al., 2023; Alves & Meneses, 2024; Attig et al., 2024; Luo et al., 2023).

Studies indicate that corporate ESG performance can significantly reduce information asymmetry between firms and external stakeholders (Bilyay-Erdogan, 2022; J. W. Kim & Park, 2023; Luo et al., 2023). This relationship is more pronounced in democratic states and stakeholder-oriented countries (Bilyay-Erdogan, 2022). ESG performance enhances trade credit financing by mitigating information asymmetry, improving operational efficiency, and reducing risk (Luo et al., 2023). The effectiveness of ESG disclosure is further strengthened when corroborated by third-party ratings and sustainable equity holdings (Ceccarelli et al., 2023). Additionally, assurance services have a moderating effect on the negative relationship between ESG performance and information asymmetry (Kim & Park, 2023). These findings suggest that ESG reporting and performance are crucial in reducing information gaps, enabling better-informed decision-making by external parties such as creditors and investors.

Despite the prominent adoption of AT in numerous studies, some studies have also highlighted several criticisms of this theory. Lazonick (2017) argues that the agency theory has been used to justify corporate looting, leading to inferior economic performance. Muldoon et al. (2024) demonstrate its inadequacy in interpreting multi-stakeholder relationships in social entrepreneurship contexts. Kunst and Beugelsdijk (2018) challenge the theory's universal

applicability, showing that its effectiveness in improving firm performance through managerial ownership is limited to Anglo-Saxon cultural contexts. These critiques suggest that agency theory may be overly simplistic and culturally bound.

In conclusion, the AT provides a valuable framework for understanding the relationship between ESG practices and access to external credit. By addressing agency conflicts through strong governance, reducing information asymmetry with transparent ESG disclosures, and managing environmental and social risks, Canadian firms can enhance their ESG performance. This alignment of interests among management, shareholders, and creditors not only supports improved ESG outcomes but also underlines the potential for ESG practices to foster financial resilience and long-term sustainability, particularly in times of economic uncertainty, such as the 2008 financial crisis.

2.2.4 Comparison of Theories

Each of these theories offers a unique perspective on how ESG practices influence access to external credit, yet they also share common ground in highlighting the importance of risk reduction and transparency. The stakeholder theory highlights the importance of addressing the needs of various stakeholders, particularly in environmental and social domains, to manage external risks and enhance ESG performance. By reducing environmental and social risks, firms can demonstrate their commitment to sustainability, which may improve their access to external credit. Complementing this, signaling theory suggests that firms can use their ESG practices to send positive signals to the market, influencing lenders' perceptions of their creditworthiness. Together, these theories underscore how ESG practices can serve as a strategic tool for firms to align stakeholder interests, mitigate risks, and improve their financial resilience, especially during periods of economic uncertainty, such as the 2008 financial crisis.

The agency theory, on the other hand, focuses on internal governance issues and transparency, emphasizing how well-managed firms with strong governance frameworks are seen as less risky by lenders. It offers a more internal perspective compared to stakeholder and signaling theories, which look at external relationships and perceptions.

This theoretical review examines how access to external credit influences ESG performance among Canadian firms, particularly in the aftermath of the 2008 financial crisis. The stakeholder theory suggests that firms with greater financial resources can better manage environmental and social responsibilities, aligning with stakeholder expectations. Signaling theory highlights how access to credit may enable firms to invest in ESG initiatives, enhancing their reputation and market position. Agency theory provides insights into how financial constraints impact governance structures, potentially affecting ESG outcomes.

These three theories converge on the idea that ESG practices, particularly strong governance, are essential for managing risks and ensuring the long-term financial stability of firms—a key consideration for creditors. By applying this theoretical framework, this study examines how restricted access to external credit during the 2008 financial crisis influenced Canadian firms' ESG performance.

2.3 Empirical Review

I undertake a comprehensive empirical literature review by understanding some research in ESG and corporate finance, drawing relationships between ESG and access to finance and also delving into issues of ESG ratings. I also explore ESG disclosures and reporting challenges and conclude by looking at Canada’s environment concerning ESG adoption.

2.3.1 Introduction to ESG in Corporate Finance

Recent studies have called on researchers, institutions, and policymakers to direct efforts toward advancing studies in green finance because they help in shaping decisions that ultimately lead to sustainable economic growth. and (Fu et al., 2023; Oliver Yébenes, 2024;)
Recent studies have examined the influence of ESG factors on corporate finance (Luo et al., 2023; Oliver Yébenes, 2024; Rajesh & Rajendran, 2020). ESG practices tend to positively affect corporate profitability and credit ratings, with governance exerting the greatest influence on profitability (Kim & Li, 2021). A study by Mu et al. (2023) found that digital finance positively impacts corporate ESG performance. Specifically, they observe that firms located in regions with developed digital finance exhibit higher ESG performance. This positive relationship remains robust after conducting various tests, including baseline regression models and robustness checks. Additionally, their study identified that digital finance enhances ESG performance primarily by mitigating corporate financial constraints, particularly in non-state-owned, small-sized, and less marketized regions of China. In Australia, companies with higher overall ESG ratings tend to increase leverage, while those with stronger governance ratings maintain lower cash reserves and distribute smaller dividends (Limkriangkrai et al., 2017).

Environmental, Social, and Governance (ESG) criteria have become a focal point in corporate finance, particularly in assessing a company's long-term risk and creditworthiness (Oliver Yébenes, 2024). ESG measures are seen as critical to sustainability, reflecting a company’s impact on the environment, social responsibility, and internal governance (Rajesh & Rajendran, 2020). In financial markets, ESG factors have evolved from being merely ethical considerations to risk factors that materially influence firms' performance, including their ability to access external credit (Luo et al., 2023).

Major Canadian companies operating in the extractive sector, which typically have large carbon footprints and face regulatory and operational challenges, are under increasing scrutiny regarding their ESG practices (Cho et al., 2020). Lenders and investors in these companies have begun to integrate ESG considerations into their decisions, raising the question of whether better ESG performance leads to improved access to external credit (Apergis et al., 2022; Luo et al., 2023; D. Zhang & Lucey, 2022).

2.3.2 ESG and access to credit

A substantial body of empirical work examines the effect of ESG performance on firms' access to credit, though studies specifically focused on Canadian companies are more limited. Nonetheless, broader international and sectoral findings provide relevant insights into this context. ESG performance significantly impacts credit access, as evidenced by several empirical studies. Sun et al. (2023) used Chinese manufacturing firms in their experimental study to conclude that higher ESG performance is driven by firms with fewer financial constraints, firms in economically more developed pilot zones, and state-owned enterprises. The study used the difference-in-differences model by using the introduction of grxeen finance pilot zones in China in 2017 as an external shock to conduct a quasi-natural experiment. The policy, despite potentially worsening financial constraints, still enhances better ESG performance by firms.

From a global perspective, Khan et al. (2024) find that the market's response to ESG performance varies significantly across different regions, revealing a lack of trust or understanding of ESG reporting in certain areas. Specifically, the study identified a negative association between market risk and ESG performance, as well as a negative relationship between ESG performance and the weighted average cost of capital (WACC). Conversely, there was a positive correlation between ESG performance and analysts' target price estimates,

indicating a divergence in analysts' views on the financial implications of ESG performance. This analysis was conducted using a comprehensive global dataset that included 30,225 firm-year observations from 5,038 companies across 73 countries covering various regions such as Europe, the Americas, Asia, Oceania, and Africa. The data was primarily sourced from the Refinitiv database, covering the period from 2016 to 2021. The findings highlighted a significant gap in the auditing practices related to ESG activities, particularly outside the European context, where more consistent market behaviour was observed. This inconsistency suggests that while some regions have made progress in understanding ESG performance, others still face challenges regarding transparency and reliability in ESG disclosures, indicating a need for further research to explore the factors influencing market efficiency related to sustainability initiatives.

The study by Luo et al. (2023) found that corporate ESG performance significantly promotes trade credit financing. This conclusion was reached through empirical tests that explored the causal mechanisms, including information asymmetry, operating efficiency, and firm risk, which were supported by various robustness checks such as instrumental variables and firm-fixed effects models. Their study data was collected from firms in China, specifically analysing a sample of 14,201 observations related to trade credit financing and ESG ratings. However, the study highlights a gap in understanding how corporate ESG performance impacts trade credit financing in different contexts, particularly in countries with varying legal and financial systems. It suggests that further investigation is needed to explore these dynamics beyond the Chinese context.

Okimoto and Takaoka (2024) investigated the impact of ESG performance on corporate credit spreads in Japan, revealing that better ESG performance can help lower a company's credit spread, indicating a reduced perception of risk by investors. The empirical strategy involved constructing firm-level credit spread data from a comprehensive dataset of corporate bond

prices, utilizing a two-stage least squares (2SLS) approach to ensure robustness in the results while controlling for various financial and macroeconomic factors. Data was collected from the Japan Standard Bond Price database, which includes detailed information on corporate bonds issued in Japan, alongside financial indicators and credit ratings sourced from the Thomson Reuters database. However, the study acknowledges certain gaps, notably that it does not fully address potential endogeneity issues and does not explore the long-term effects of ESG performance on credit spreads beyond the observed period of 2007-2018.

2.3.3 ESG Ratings and Creditworthiness

Recent researches demonstrate a significant relationship between ESG performance and corporate financial outcomes (Luo et al., 2023; Oliver Yébenes, 2024; Rajesh & Rajendran, 2020). Various studies conclude that higher ESG ratings are associated with lower borrowing costs and improved creditworthiness (Apergis et al., 2022; R. L. Zhang, 2021). Zhang (2021) found that a one standard deviation increase in ESG score leads to a 6.3 basis point decrease in loan spread, while Apergis et al. (2022) observed lower bond spreads for firms with strong ESG scores. These effects are attributed to reduced credit risk, with Zhang (2021) reporting a 4% lower default probability for high-ESG companies. However, the integration of ESG factors into credit ratings is still in its early stages (Cioli et al., 2023). Dalò et al. (2023) suggest that credit rating agencies do not fully incorporate the risk reduction associated with higher ESG performance into their assessments. These findings underscore the growing importance of ESG considerations in financial markets and highlight the need for improved transparency and standardization in ESG reporting.

ESG ratings have a significant impact on creditworthiness, as evidenced by recent findings by Bonacorsi et al. (2024). The study found that certain ESG factors can serve as reliable

predictors of firms' creditworthiness, which could help banks and regulators mitigate uncertainty regarding borrowers' credit risk. The analysis was conducted using a dataset of 1,251 European companies, with data primarily sourced from publicly available information, including company reports and government agencies, although the main source was company disclosures, which are often incomplete due to a lack of rigorous regulatory standards.

The findings highlighted significant gaps in the data, particularly concerning Social (S) factors, where over 40% of the variables had less than 20% coverage, indicating a need for improved data collection and disclosure practices. Additionally, while Environmental (E) and Governance (G) factors showed better coverage, the overall variability of ESG factors over time was limited, restricting the ability to analyze their impact longitudinally. This lack of comprehensive data on ESG practices presents a challenge for accurately assessing their influence on credit risk.

The findings of Anand et al. (2023) indicate a positive relationship between ESG ratings and sovereign credit ratings, suggesting that sustainability factors play a significant role in assessing credit risk. The research utilized quarterly data from the third quarter of 2009 to the second quarter of 2019, focusing on various countries, although the sample varied due to the availability of ESG data. The data was primarily collected from multiple commercial ESG rating providers and sovereign credit risk metrics, including bond yields and credit default swap (CDS) spreads. However, the study acknowledges several gaps, notably the lack of comprehensive sovereign-level ESG data, which necessitated reliance on company-level data. This limitation affects the robustness of the findings, as the assessment period for some datasets, like Financial Times Stock Exchange (FTSE) ratings, was shorter than desired. Additionally, the study highlights the scarcity of structured ESG data at the country level, particularly for emerging economies, which hampers a more thorough analysis of sustainability risks at the sovereign level.

Michalski and Low (2024) investigated the impact of ESG factors on corporate credit ratings, revealing that ESG features are significant predictors of credit ratings alongside traditional financial metrics. The findings were derived from a comprehensive analysis using various classifiers, including logistic regression and support vector machines, applied to datasets from US and global firms. The data was primarily sourced from S&P ratings, CompStat, and financial ratios, focusing on both standard and ESG samples to assess predictive performance metrics.

Apergis et al. (2022) found that overall ESG scores and individual pillars, are significant determinants in assessing credit risk as indicated by bond yields and spreads. This conclusion was reached through an analysis of ESG, financial, and bond data for S&P 500 companies from 2010 to 2019, sourced from Refinitiv. The research supports earlier findings that ESG is a critical investment consideration for bonds, highlighting the importance of ESG management quality in predicting future defaults and bond performance. However, the study acknowledges gaps such as the differences in ESG relevance across industries, the evolution of these scores over time, and the impact of changing regulations. Additionally, there are limitations in the dataset, including the low availability of bond spreads at issue date, which may affect the generalizability of the results.

In conclusion, the integration of ESG factors into credit analysis is gaining traction, with implications for credit rating predictability and the need for standardized regulations (Anand et al., 2023; Apergis et al., 2022; Bonacorsi et al., 2024; Carnevale & Drago, 2024b; Michalski & Low, 2024).

2.3.4 ESG Disclosure and Reporting Challenges

ESG disclosure has been key to business success in recent times. (Chowdhury et al., 2021) examine differences in corporate social responsibility (CSR) disclosure between foreign firms

listed as American Depositary Receipts (ADRs) in U.S. markets and domestic U.S. firms. The findings indicate that foreign ADR firms tend to disclose more CSR information, particularly in environmental and social aspects, compared to their U.S. counterparts. This enhanced transparency leads to improved market outcomes, such as lower volatility, better liquidity, and higher institutional ownership, suggesting that CSR disclosure serves as a strategic tool for foreign firms to reduce information asymmetry and strengthen investor confidence in global markets.

These findings are relevant to my study, which investigates the impact of restricted credit access on Canadian firms' ESG performance during the 2008 financial crisis. Just as CSR disclosure influences investor perceptions and financial stability, my research explores how financial constraints affect firms' ability to maintain ESG commitments. The role of external credit in sustaining ESG investments aligns with the idea that firms with stronger transparency and governance practices may experience more favorable financial outcomes, reinforcing the broader importance of ESG in corporate resilience.

One of the key challenges in linking ESG performance to access to credit is the inconsistency in ESG disclosures. While many companies are adopting ESG reporting practices, there is a lack of standardization in how ESG factors are measured and reported. This variability can make it difficult for lenders and credit rating agencies to accurately assess the true ESG performance of a company.

Gafni et al. (2024) highlighted that higher ESG ratings are associated with higher quality of financial reporting, as measured by earnings persistence, the ability of earnings to predict future cash flows, and fewer financial restatements. The study analyzed a comprehensive dataset of U.S.-listed companies from 2012 to 2022, using ESG ratings from the MSCI rating agency and

financial data from XBRL filings. This study found that the heightened focus on ESG reporting following the 2019 Business Roundtable statement had a positive impact on the relationship between ESG ratings and financial reporting quality. The study addressed a gap in the literature, as previous research on this topic was limited and focused only on Australian data, while this study provides a more comprehensive analysis across a broader spectrum of U.S. companies over a longer period.

In another recent study by Chen et al. (2024), they found that the authenticity and credibility of ESG reports remain a serious concern due to factors such as unclear regulations, inconsistent reporting standards, incomplete data, and the desire to protect reputation, leading to the practice of 'greenwashing' where companies intentionally release false data to conceal their inadequate ESG performance. The study found that existing research on data authenticity mainly focuses on the architecture and data transmission of Internet of Things (IoT) systems, as well as the content of collected data, but lacks consideration of the importance of event data in analyzing the authenticity of the data. The data for this study was collected from a large clothing company, and the experiment simulated three manufacturing scenarios in a textile factory - the warehouse, dyeing workshop, and sewing workshop- using IoT devices and sensors to automatically gather environmental data. The gap identified in this study is the lack of research on evaluating the authenticity of ESG data by analyzing the events and spatial-temporal elements behind the collected data, which is crucial for understanding real-world happenings and verifying the authenticity of the data.

Martiny et al. (2024) systematically reviewed 153 papers to analyze the determinants of ESG performance, revealing significant discrepancies in the literature primarily due to the lack of standardization in ESG measurement. The findings indicate that the choice of data providers

and methodologies significantly influences the reported impacts of various factors, such as financial performance and board diversity, on ESG outcomes. The research utilized rigorous databases like Scopus and Web of Science to ensure the quality of the literature reviewed, focusing on peer-reviewed articles published up to September 2023.

The study research by Paat et al. (2021) identified the most significant ESG risks associated with potential phosphorite mining in Estonia, focusing on stakeholders' perceptions. The findings revealed that environmental risks were paramount, with concerns about water, waste, air emissions, and biodiversity being particularly highlighted. The data was collected through a non-probability sampling method, utilizing a combination of quota and snowball sampling techniques, which resulted in 134 responses from various stakeholder groups, including policymakers, local businesses, and environmental protection advocates. However, the study's limitations include its non-representative sample, as it did not capture the views of the broader Estonian population, particularly the Russian-speaking community, which is significant in mining. Additionally, the survey only addressed 40 out of 59 identified ESG risks, potentially overlooking other relevant risks that could emerge if mining projects were initiated.

From the foregoing, ESG disclosure and reporting challenges stem from the voluntary nature of disclosure, authenticity verification of data, lack of transparency, and the absence of commonly agreed standards impacting the reliability and trustworthiness of ESG information (Chen et al., 2024; Gafni et al., 2024; Martiny et al., 2024; Paat et al., 2021).

2.4 ESG adoption in Canada and the 2008 Global Financial Crisis

The adoption of Environmental, Social, and Governance (ESG) principles in Canada gained significant momentum after the 2008 Global Financial Crisis, highlighting the need for

sustainable and ethical business practices. This pivotal shift underscored the importance of incorporating ESG factors into investment and corporate decision-making processes to foster long-term resilience and accountability

2.4.1 ESG Adoption in Canada.

The adoption and implementation of ESG principles have become increasingly significant in Canada, driven by growing stakeholder expectations, regulatory advancements, and the evolving landscape of corporate responsibility. The 2008 global financial crisis exposed significant vulnerabilities in the global financial system, prompting a reevaluation of corporate governance and risk management practices. In Canada, the crisis highlighted the importance of robust governance structures and sustainable business practices.

Financial institutions have played a critical role in advancing ESG adoption in Canada. Many institutional investors, such as pension funds and asset managers, have integrated ESG criteria into their investment decision-making processes. For instance, the Canada Pension Plan Investment Board (CPPIB) has established ESG-focused frameworks to guide its investment activities, signalling the increasing importance of sustainability metrics in financial markets (Canadian Securities Administrators (CSA), 2021)

2.4.2 Regulatory and Market Drivers

The regulatory environment in Canada has also encouraged ESG adoption. The Canadian Securities Administrators (CSA) have issued guidance on climate-related disclosures and sustainability reporting to ensure transparency and comparability across firms. Additionally, federal and provincial governments (UNPRI, 2023) have introduced policies aimed at reducing

greenhouse gas emissions and promoting corporate sustainability. Programs such as Canada's Net-Zero Emissions Accountability Act underscore the government's commitment to achieving sustainability goals.

Furthermore, the global alignment with frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD) and the United Nations' Sustainable Development Goals (SDGs) has encouraged Canadian firms to adopt internationally recognised ESG standards. These frameworks not only enhance firms' reputations but also align them with the expectations of global investors and stakeholders.

2.4.3 Post-Crisis Developments

The global financial crisis of 2008 exposed significant weaknesses in the financial system, disruption of economic activity, and high uncertainty that led to substantial value erosion in key developed countries across the globe. The crisis led to unprecedented interventions by governments across the globe (Erkens et al., 2012). The crisis has largely been attributed to weak regulatory regimes amidst increasing competition (Coffee Jr, 2009; D. Erkens et al., 2009). Nevertheless, the nature of financing policies and companies' risk management profiles determine how companies are impacted by external crises such as the 2008 global financial crisis (Brunnermeier, 2009). The highly competitive nature of accessing financial resources requires firms to put in the right regulations and policies to remain attractive destinations for loanable funds.

Following the financial crisis, ESG adoption gained renewed momentum in Canada. Investors and policymakers recognized the importance of sustainability in mitigating systemic risks and promoting long-term value creation. Many Canadian firms began integrating ESG considerations into their risk management frameworks, recognizing that sustainability is not

only a moral imperative but also a strategic advantage; making Canada a model example of how strong corporate regulations can mitigate the impact of crises on firms (Pringle, 2018). The Canadian financial sector remained resilient during and after the crisis period largely because of the robust regulatory environment and the highly conservative and concentrated banking practices of Canadian banking institutions (Bordo et al., 2015), which linked the robust corporate profitability and capital accumulation of the banks before the crisis to support the general stability of the industry and the economy at large (McCormack, 2019).

ESG considerations since 2008 have been playing a growing role in fostering resilience, trust, and long-term stability in industries, particularly those that faced challenges during the crisis in Canada. Investors began framing the climate crisis as a market failure, emphasizing the need for more sustainable investment practices. The renewed focus on ESG has been particularly evident in sectors such as energy, mining, and finance, where firms have faced heightened scrutiny over environmental and social impacts. Companies in these sectors have responded by enhancing disclosure practices, engaging stakeholders, and adopting innovative technologies to reduce environmental footprints.

Nevertheless, some sectors within the economy continue to face significant challenges in their effort to enhance ESG practices. The energy sector, particularly oil and gas, faced significant challenges due to plummeting global demand and falling commodity prices. The decline in oil prices led to reduced revenues and investments in the industry. The crisis led to a fall in oil prices, which affected the economy negatively (Dayanandan & Donker, 2011). In the construction and engineering sectors, there was a general slowdown of business activities due to the tightened credit and private investments during the crisis. Statistics Canada provides that the construction sector accounted for about 12.7% of the total output losses during the 2008

financial crisis. Companies in these sectors may, therefore, not be willing to prioritise long-term strategies (including ESG investments) over short-term operational success.

2.4.4 Challenges in ESG Implementation in Canada

Despite the growing adoption of ESG principles, Canadian firms face several challenges in implementing these practices effectively. One of the primary obstacles is the lack of standardized ESG metrics and reporting frameworks, which makes it difficult to assess and compare performance across industries to enhance investors' ability to measure ESG risks inherent in companies. Small and medium-sized enterprises (SMEs) often struggle to allocate resources for ESG initiatives due to limited financial capacity. Additionally, balancing short-term financial performance with long-term sustainability goals remains a persistent challenge for many firms.

Nevertheless, the challenges discussed above also present some opportunities for innovation and collaboration among businesses and regulatory bodies. For instance, the development of standardised ESG reporting frameworks, such as the Sustainability Accounting Standards Board (SASB) and the Task Force on Climate-related Financial Disclosures (TCFD), provides a roadmap for firms to improve their ESG disclosures.

2.4.5 Contribution to Literature

This paper examines how financial constraints influenced the relationship between ESG performance and access to external finance during the 2008 global financial crisis. My study builds on Campello et al. (2010), who found that financially constrained firms tend to cancel or delay investments during crises. In line with this, the findings here suggest that constrained

firms were less able to maintain ESG investments during the crisis, particularly in the environmental dimension. Similarly, while Luo et al. (2023) argue that ESG reduces information asymmetry and improves access to trade credit, this study expands the scope to include broader forms of external finance and reveals how these effects were shaped by the financial crisis context.

The theoretical framework of the paper draws on stakeholder, signaling, and agency theories. The results reflect the stakeholder theory view that ESG activities strengthen relationships and help firms maintain legitimacy during uncertain periods. They also support signaling theory, showing that firms with strong ESG profiles were more likely to send positive signals to lenders and investors, especially if they were not constrained by lack of capital. From the perspective of agency theory, ESG appears to reduce conflicts between managers and external stakeholders, but the study also shows that financial constraints can limit a firm's ability to follow through on these commitments. By breaking ESG into its three components- Environmental, Social, and Governance. The paper concludes that constrained firms may prioritise certain aspects (like Governance and Social) while pulling back from others (such as Environmental), offering a more detailed understanding of how firms navigate ESG decisions under financial pressure.

Chapter Three: Data And Methodology

3.1 Introduction

This research aims to examine the impact of financial constraints on ESG performance by using the 2008 global crisis as an exogenous shock to test whether sampled firms in Canada would prioritise short-term survival over long-term financial stability during economic recessions. The study is, therefore, grounded in two competing perspectives: the Resource Constraint View and the Strategic Value View. The Resource Constraint View suggests that financially constrained firms prioritise short-term survival over long-term initiatives, such as ESG, during times of crises. According to Campbell et al. (2012), when firms face limited access to external financing, they often cut back on discretionary spending to preserve liquidity and ensure operational stability.

In contrast, the Strategic Value View argues that strategic investments can serve as a resilience strategy even for financially constrained firms during crises. Lins et al. (2017) provide evidence that CSR initiatives enhance corporate reputation, build stakeholder trust, and improve long-term financial stability, making them a valuable strategic tool in times of economic uncertainty. From this perspective, firms with financial constraints may continue or even increase ESG spending to signal stability and attract long-term investors despite immediate financial pressures.

I aim to determine which of the two perspectives is more prevalent when firms are financially constrained. Additionally, it is important to assess whether either perspective applies consistently across the three individual ESG (Environmental, Social, and Governance) pillars. The period of the 2008 Great Recession offers a compelling context for addressing these questions. Canada's stable yet impacted financial system, growing ESG regulatory

environment, and diverse corporate sector make it an ideal setting for evaluating the interaction between credit constraints and ESG performance during the 2008 financial crisis

Examining trends alone to determine the effect of credit constraints on ESG performance during the 2008 financial crisis presents two key identification challenges. First, factors unrelated to the crisis may have influenced firms' ESG performance. For instance, broader macroeconomic trends in ESG adoption, government policies, or unobserved factors could have contributed to a steady increase in ESG engagement. Additionally, shifts in corporate attitudes toward ESG—driven by competitive pressures or industry norms—may have coincided with the crisis, confounding the observed effects."

Secondly, the financial crisis may have influenced ESG performance across both highly financially constrained and less constrained firms due to pre-existing conditions. For instance, firms that were already struggling financially before the crisis were more likely to be classified as highly constrained, potentially confounding the effect of credit access on ESG performance with underlying financial weaknesses. However, this concern is mitigated by using the exogenous Kaplan-Zingales (KZ) Index as a measure of financial constraint. This helps us to reduce endogeneity concerns.

These scenarios are the unobserved events that may have culminated in the surge in ESG performance during the crisis. It is in this spirit that I go beyond the trend analysis and use the Difference-in-Differences (DiD) approach to estimate my regressions. To assess how financial constraints influenced firms' ESG performance during the crisis, I classify firms into a treated group (highly financially constrained firms or those with greater external financing needs) and a control group (less constrained firms or those with lower external financing needs). This

Difference-in-Differences (DiD) approach isolates the differential effect of financial constraints by comparing changes in ESG performance between the two groups. It allows us to test whether constrained firms deprioritised ESG investment (supporting the Resource Constraint View) or strategically maintained certain pillars, such as Social and Governance, despite financial pressures (aligning with the Strategic Value View).

By focusing on the relative ESG performance of constrained firms, the DiD provides causal insights into how financial pressures shaped ESG decisions during and after the crisis
This chapter, therefore, discusses the source of data, summary statistics and the implementation strategy of the DiD approach as well as the techniques to solve some identification issues.

3.2 Sources of Data

The study employs the use of secondary data, primarily from the London Stock Exchange Group's Refinitiv Eikon (formerly Thomson Reuters Eikon) database. Supplementary financial data were obtained from Compustat to enhance the ESG dataset. The final sample is an unbalanced panel of 114 publicly listed Canadian firms spanning from 2004 to 2014, selected based on the availability of ESG data in Refinitiv. The sample covers firms across 11 major industries including Financials, Energy, Materials, Industrials, Information Technology, Consumer Discretionary, Communication Services, Utilities, Real Estate, Health Care, and Consumer Staples. Financials and Energy sectors comprise the largest share of the sample.

Firm size was proxied by total assets, and substantial heterogeneity in firm size was observed across sectors. For instance, average total assets in the Financials sector were significantly larger than those in the Consumer Discretionary or Information Technology sectors. This variation reflects the diverse capital intensities and economic roles of firms across sectors (see

Table 4 in the appendix for the average size of economic sectors between 2004 to 2014 in our sample).

3.3 Variable Description and Measurement

This section gives a comprehensive overview of the data used for the study. I describe how the variables are measured and the interpretation of these variables.

3.3.1 ESG Variables

The London Stock Exchange Group's (LSEG) Refinitiv ESG Data is classified under three pillars and covers over 12,000 companies across more than 630+ different ESG metrics within 80+ countries. Of these 400 company-level ESG metrics, LSEG selects 178 of the most relevant data points. These points are then grouped into 10 categories (resource use, emissions, innovation, management, shareholders, CSR strategy, workforce, human rights, community, and product responsibility) weighted proportionately according to the three pillar scores (environmental, social, and governance).

ESG scores range from 0 to 100 based on the above 10 categories of data points that Refinitiv assigns. The higher the score, the better the firm's performance. This score measures firms' ESG performance based on data in publicly reported information and considerations regarding comparability, data availability, and industry relevance. Each category is weighted. Categories with multiple issues will have a greater weight than lighter categories. For example, "Management" contains multiple issues (composition, diversity, independence, committees, compensation, etc.) and therefore is weighted 19%, whereas "Human Rights" is weighted 4.5%.

LSEG's Environment Pillar Score is the weighted average relative rating of a company based on the reported environmental information and the resulting three environmental category scores (resource use, emissions, and innovation). The Social Pillar Score is a company's weighted average relative rating based on the reported social information and the resulting four social category scores (workforce, human rights, community, and product responsibility) while the Governance Pillar Score is the weighted average relative rating of a company based on the reported governance information and the resulting three governance category scores (management, shareholders, and CSR strategy). It is important to note that the raw data is normalized to ensure comparability across companies, industries and regions. Materiality is also of prime concern to LSEG. This is the reason why carbon emissions may carry more weight for an oil and gas company than for a financial services firm.

The Combined Score is an overall company score based on the reported information in the environmental, social and corporate governance pillars (ESG Score) with an ESG controversies overlay. I took the logarithm of ESG variables to normalise the data and to interpret the coefficients in percentages because no units are assigned to the ESG data.

3.3.2 The KZ Index

The literature has, over the last twenty years, relied on three measures of financial constraints. These measures are the Kaplan-Zingales Index (KZ), Whited and Wu Index (WW), and the Hadlock-Pierce Index (SA). The research uses the KZ Index. The KZ index, developed by Steven Kaplan and Luigi Zingales in 1997, is a relative measure of a firm's dependence on external financing. It is calculated using a formula that incorporates several financial ratios.

$$KZ = -1.002 \times Cashflows + 0.283 \times Tobin's\ Q + 3.139 \times Debt - 39.368 \times Dividend - 1.315 \times Cash$$

Where;

- Cash Flow (Negative weight): A higher cash flow reduces the KZ Index, signalling less financial constraint because the firm generates sufficient internal funds. It is computed as Cash flow divided by total assets = $(\text{Cash Flows})/(\text{Total Assets})$.
- Tobin's Q (Positive weight): A higher Q indicates better growth opportunities, which can increase the KZ Index as firms with higher growth potential may face more constraints in securing external funding. This challenge in accessing external funds for growth opportunity firms is because these firms operate in emerging and innovative industries where prospects are uncertain and there is a high risk of information asymmetry. Tobin's Q is calculated as the market value of the firm divided by the replacement cost of assets = $(\text{Market value})/(\text{Total Assets})$.
- Debt (Positive weight): Higher debt levels increase the KZ Index, signalling greater financial constraints due to the burden of servicing debt obligations. It is computed as total debt divided by total assets= $(\text{Total Debt})/(\text{Total Assets})$.
- Dividends (Negative weight): Paying dividends reduces the KZ Index, as firms that pay dividends are perceived as financially healthier and less constrained. This is computed as dividend payments divided by total assets= $\text{Dividend}/(\text{Total Assets})$.
- Cash (Negative weight): Higher cash reserves reduce the KZ Index, reflecting a lower likelihood of financial constraints since firms can use cash reserves to finance investments. This is measured as cash holdings divided by total assets = $\text{Cash}/(\text{Total Assets})$

A higher KZ index score indicates that a firm is more financially constrained, meaning it has greater difficulty accessing credit. Firms with higher scores have limited access to external financing and are more reliant on internal funds. These firms might experience challenges in

funding growth opportunities, particularly during economic downturns or financial crises. A lower KZ index score suggests that the firm is less financially constrained, making it easier for these firms to access funding. Such firms have better access to external capital markets, higher cash reserves, or greater financial flexibility. They are less sensitive to fluctuations in cash flow and can more easily finance investments. Based on the studies of Campello et al. (2010) and Okimoto & Takaoka (2024), I test for a negative effect of financial constraints on the ESG performance of Canadian firms.

Attempts have been made to suggest that measures of financial constraints are endogenous and do not account for external events that account for firms' unavailability of financial resources (Farre-Mensa & Ljungqvist, 2016; Hoberg & Maksimovic, 2015). Interestingly, both papers do not dispute that all the components of the KZ index and other internal policies are essential elements of a firm's ability to access financial resources, hence a good measure of constraint.

The KZ index is a practical and empirically validated measure of financial constraint that captures multiple dimensions of firm financing behaviour. Unlike the Whited-Wu index, it does not rely on data-intensive variables like investment or sales growth, which was not readily available. Compared to the SA index, the KZ index avoids heavy dependence on firm size and age, reducing endogeneity concerns. The KZ Index's broader scope and accessibility make it well-suited for studies with limited data and a focus on credit sensitivity. This explains my choice of KZ index over the other two measures of finanical constraint.

3.3.3 Other Control Variable

Factors such as firm size, profitability, industry trends, and macroeconomic conditions may influence ESG performance independently of the treatment. If these factors are not accounted

for, the estimated effect of credit constraints on ESG may be biased due to confounding influences. Including relevant control variables can reduce the bias of DiD estimates, particularly when the treatment and control groups differ in ways that affect ESG. For example, highly financially constrained firms (the treated group) may also be generally less profitable than less constrained firms (the control group), even before the crisis. If profitability affects a firm's ability to invest in ESG initiatives, then any observed decline in ESG performance post-crisis might not be driven solely by financial constraints but by pre-existing profitability differences between the two groups.

By controlling for firm-specific and economic characteristics, I ensure that changes in ESG performance are more likely to be attributed to the impact of financial constraints rather than unrelated external factors, as discussed in the introduction to this chapter. Below are justifications for the inclusion of these control variables.

Return on Assets: Return on Assets (ROA) is a crucial control variable in assessing the relationship between financial constraints and ESG performance. As a measure of firm profitability, ROA helps account for differences in financial capacity, which can influence ESG investments. Firms with higher ROA typically have more resources to allocate toward ESG initiatives. This aligns with studies showing a positive relationship between financial performance and sustainability (Eccles et al., 2014; Friede et al., 2015; Orlitzky et al., 2003). In contrast, firms with lower ROA may struggle to maintain ESG commitments due to financial pressures, particularly during economic downturns(Campbell et al., 2012). The Resource Constraint View suggests that constrained firms prioritise short-term survival over ESG, while the Strategic Value View argues that some firms may sustain ESG investments to enhance stakeholder trust and long-term resilience (Lins et al., 2017).

Empirical studies suggest an overall positive relationship between ROA and ESG, meaning firms with strong profitability are more likely to engage in ESG activities (Eccles et al., 2014; Fatemi et al., 2018). Higher profitability reduces financial risk, allowing firms to sustain ESG commitments even during crises. Conversely, firms that have weaker finances with low ROA may cut discretionary ESG spending to preserve liquidity. I, therefore, hypothesise a positive relationship between ROA and ESG score.

Firm Size: Larger firms usually have marketable collateral, credit history and diversified sources of raising revenue. Larger firms might invest more in ESG due to better access to capital markets, higher public visibility, and pressure from stakeholders. Similarly, during an economic recession like the 2008 global financial crisis, larger firms are more resilient, which influences their ability to secure external credit easily. I also control for firm size because larger firms have more resources and capacity to be able to invest in ESG practices and meet regulatory requirements than smaller-sized firms.

A company's total assets (size) and age became relevant after the 2008 global financial crisis. Due to the tightness of credit availability and uncertainty within the international financial market, smaller and younger firms tend to face more challenges accessing external credit, as they are usually perceived as riskier by fund providers than firms with huge assets. In their study of financial constraints on firm productivity among small and medium-sized firms in Canada, Bakke and Whited (2010) as well as Hennessy et al. (2007) conclude that a firm's size is a robust indicator of credit constraint. I control for firm size using the natural logarithm of the total assets of the companies. Based on the previous studies (Drempetic et al., 2020; Gregory, 2024), we hypothesize a positive relationship between firm size and ESG scores.

Leverage :Highly leveraged firms may face financial constraints that limit their ability to invest in ESG initiatives, while moderate levels of debt can enforce discipline and improve

governance practices. Firms with better ESG performance tend to have lower borrowing costs and greater access to capital, indicating that lenders value sustainable and responsible business practices (Apergis et al., 2022; Luo et al., 2023; Okimoto & Takaoka, 2024). Goss and Roberts (2011) provides evidence that firms that perform poorly in ESG have higher loan spreads. In reinforcing the prior studies in Japan, Okimoto and Takaoka (2024) find that companies with better ESG performance enjoy lower credit spreads. I measure leverage as the ratio of a company's debt to equity.

Leverage may moderate the relationship between ESG performance and firm outcomes like the cost of capital. For example, El Ghoul et al. (2011) find that companies with strong ESG performance benefit from lower costs of capital, and this effect may be more pronounced for firms with higher leverage. This would ensure that a firm keeps a good public image to attract future investments. Based on prior studies, I expect a negative relationship between leverage and ESG scores.

CEO Duality: CEO duality, where the CEO also serves as the chair of the board, can have a significant impact on ESG performance. This makes the CEO very powerful and may result in weaker oversight as far as ESG is concerned. In Garcia et al. (2017), the authors find that firms with CEO duality have lower levels of CSR disclosures. ESG risks may be underreported by the CEO to protect his/her image and job. Such entrenched CEOs may prioritize short-term financial gains over long-term business sustainability, hence not investing in ESG activities.

Despite the above, CEO duality in strong institutional environments may facilitate ESG integration as long-term strategies face fewer disruptions (Ortiz-de-Mandojana et al., 2016). Based on prior research and the Canadian environment, I expect a CEO who is also a board chair to be more concerned about sustainability issues; hence, I expect a positive relationship between CEO duality and ESG performance.

Board Gender Diversity: According to the Government of Canada (2024b), Goal 5 of the Sustainable Development Goals (SDGs) aims at empowering girls and women in achieving gender equality. This has led many corporations to make gender diversity key in filling managerial positions and in board compositions. I measure board Gender Diversity as the percentage of female directors out of the total number of directors on the board. Thirumagal et al. (2023) finds no evidence that the presence of women on boards enhances the ESG performance of those companies. Al-Shaer et al. (2024) also finds evidence that female leadership on boards and corporate management do not necessarily lead to ESG performance. While female presence on boards does not lead to better ESG performance when companies' financial performance is poor, younger female presence on boards enhances ESG performance of companies. Nevertheless, (Doan & Nhan, n.d., p.1) concludes that "higher gender diversity on the board improves ESG performance". Based on prior studies I hypothesise a negative relationship between board gender diversity and ESG score performance.

Audit Committee: The presence of audit committees on the board ensures that firms disclose reliable ESG data that ensures the proper analysis of sustainability risks. The presence of audit committees will ensure compliance with ESG standards. This allows companies to with active boards to act as an internal watchdog over the businesses and ensure the mitigation of risks (Liao et al., 2018). They help reduce the risk of legal penalties, investor scrutiny, and reputational damage. Independent audit committees help prevent greenwashing and ensure the conduct of business practices in an ethical manner (García-Meca & Pucheta-Martínez, 2018). Based on the previous studies above, I hypothesise a positive relationship between ESG and audit committees.

Board Size: Board size is the total number of board members at the end of the fiscal year. According to recent studies (Chang et al., 2017; Jizi et al., 2014; Rao & Tilt, 2016), larger boards have a positive influence on ESG performance because they help in the provision of better oversight due to the diverse expertise and experience of their memberships. Conversely, Jizi et al. (2014) provides evidence that larger boards may suffer from inefficiencies, including slower decision-making and weaker consensus on ESG/CSR strategies. The authors found that there exists an optimal level of number of board members beyond which the size of the board may hinder the ESG performance of corporations. I, therefore, hypothesise a positive relationship between board size and the ESG performance of Canadian firms.

3.4 Descriptive Statistics

I present below in Table 1 the descriptive statistics. This table details the total number of observations for each variable, the mean, standard deviation, minimum, and maximum observations for both the dependent and independent variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	997	38.532	18.897	2.58	89.98
Social Score	997	39.774	21.247	.83	93.5
Environmental Score	812	38.185	26.828	.19	93.65
Governance Score	997	51.441	22.552	1.79	98.43
KZ Index	1087	1.152	1.466	-9.735	4.864
Return on Assets	1116	.038	.085	-.778	.439
Size	1118	22.57	1.777	16.864	27.591
Leverage	1117	.565	.219	0	1.025
CEO Duality	982	.962	.191	0	1
Board Gender Diversity	996	12.106	10.545	0	54.55
Audit Committee	996	.992	.089	0	1
Board Size	996	11.03	3.376	2	23

Table 1: Descriptive Statistics

The descriptive statistics reveal varying numbers of observations across the different ESG components. This is primarily due to incomplete ESG disclosures: not all firms report consistently on all three ESG pillars. For example, while most firms provide governance-related data, environmental and social metrics are often less consistently disclosed, particularly

in earlier years of the sample period. This results in an unbalanced panel, where the availability of each ESG component varies across firms and time.

The average overall ESG score between 2004 and 2014 is 38.53. This indicates that the average ESG score among Canadian firms is below 50%. This suggests that Canadian firms have below-average ESG performance compared to global benchmarks. The low average score indicates that there may be gaps in sustainability practices, social responsibility, or governance structures, hence significant room for improvement.

Among the three ESG pillars, the Governance Pillar has the highest average score at 51.44, while the environmental pillar has the lowest at 38.10. The Social Pillar falls in between, with an average score of 39.77.". These scores are not surprising since most giant Canadian firms are known to operate in resource-intensive sectors and may drag the average ESG score down because of environmental concerns.

The below-average Environmental Score by Canadian firms (as compared to the average ESG standards of Canadian companies) suggests that areas like resource wastage, greenhouse emissions, and general environmental impact need serious attention. The resource-intensive nature of the Canadian environment, with sectors like mining and oil & gas, usually has a significant impact on the environmental performance. Companies might need to invest more in sustainable practices and the adoption of new technologies. With the lagging adaptation of sustainability practices as expected by Canada's 2050 net-zero agenda and carbon tax laws, more investments need to be put in place for Canadian firms to achieve that target.

Although slightly higher than the environmental score, the Social Pillar score indicates moderate performance. This moderate performance is similar to the findings by Ioannou and Serafeim (2017) which conclude that the moderate performance of firms in the social factors is because the country has strong labour laws, diversity policies and human rights standards. The challenges with Indigenous rights, workplace diversity, and gender remuneration gaps, as well as the increased scrutiny faced by extractive industries for community impact and ethical labour practices, are key issues affecting the Social Pillar score in Canada.

The higher average Governance Score indicates that Canadian firms have stronger governance practices. Good governance is essential for risk management and long-term sustainability. The governance and regulation of Canadian firms are among the enviable feats globally, hence, a better governance performance. Canadian firms tend to prioritise corporate governance due to strict regulatory frameworks that are usually enforced by the Canadian Securities Administrators (CSA) and the Toronto Stock Exchange (TSX) (Haque & Ntim, 2018). The surge in reforms like board independence, effective audit committees on boards, and disclosure of executive compensations may have had a strong impact on the higher governance score Cormier et al., 2011).

The average of the KZ index is 1.15, while the minimum and maximum are -9.73 and 4.86, respectively. The sampled firms face moderate financial constraints and do not have easy access to external financing, which could impact their ESG investments and responses to the economic shock. The minimum KZ index also suggests that some firms may experience minimal constraints in accessing external funds. These firms usually have strong liquidity, low debt, and better access to capital markets.

In terms of the size of the companies, the average asset value of sampled firms is about 6.34 billion Canadian Dollars (which represents the log-transformed total asset of 22.57). This suggests that the dataset includes large firms**,** as total assets are in the billion-dollar range. The maximum and minimum total assets are approximately 1.05 trillion Canadian Dollars and 21.1 million Canadian Dollars. It is interesting to observe that there are major banks and bigger firms in the extractive industry influencing these results.

The leverage results also indicate that, on average, 56.5% of the firm's assets are financed by debt, while the remainder is equity financed. Some firms are wholly equity-owned (with a minimum leverage of 0), and the highest leverage in the data is 1.025, indicating more debt or financial distress. In terms of board issues, the mean board gender diversity is 12.106%, indicating that, on average, boards have a low representation of women. The standard deviation (10.545) and the range (0% to 54.55%) suggest significant variability across firms. About 96.2% of CEOs also serve as board chairs, while almost all firms in the data had audit board committees.

3.5 Evolution of ESG and Financial Constraints: A Trend Analysis

I briefly discuss below the trend in the combined ESG score as well as the individual pillars. I also look at the trend of the financial constraint measure between 2004 and 2014 and conclude by drawing comparisons.

3.5.1 ESG Trend Analysis

Canadian firms have progressively embraced ESG principles over the past two decades. Figure 2 illustrates the average ESG score for the 114 firms in my sample. The graph depicts an increasing adoption of ESG over the study period. The sustained increase in the ESG score

could be attributed to several factors, including enhanced awareness of climate change, rising demand for corporate accountability, profitability, and pressure from investors prioritising sustainable business practices.

Environmental considerations, such as reducing carbon footprints, transitioning to renewable energy, and achieving net-zero emissions, have taken centre stage in corporate strategies (Government of Canada, 2021). Social dimensions, including diversity, equity, and inclusion (DEI), labour practices, and community engagement, have also gained prominence. Governance reforms, such as improving board accountability, transparency, and ethical business practices, have further reinforced ESG adoption and performance over the period.

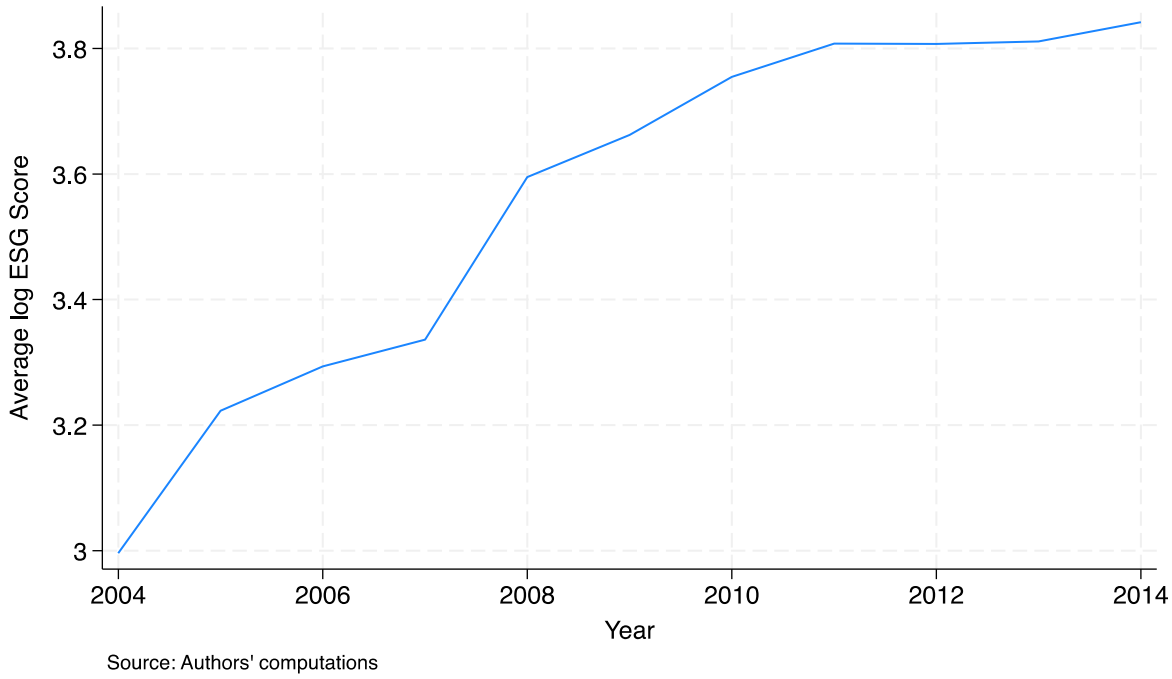

Figure 2: Average ESG Score in Canada

Data Source: LSEG Refinitv database

Figure 3 highlights that during and after the financial crisis, Canadian firms exhibited different behaviours across the ESG pillars. Governance Score dominates the other pillars across the

entire period. The performance in Governance score saw a sharp increase during the crisis, emphasising the need for strong governance practices to ensure investor confidence and regulatory compliance. The superior performance in governance is not surprising as Canada is known for its strong governance regime, and this is similar to the conclusions by Flammer and Ioannou (2021). In that study, the authors concluded that firms that maintained or increased their investments in governance and other strategic areas performed better in research and innovation as well as CSR.

The Environmental Score performance experienced a gradual rise after the financial crisis. This suggests that financially constrained firms likely prioritised cost-cutting and survival over environmental initiatives, aligning with the Resource Constraint View. Therefore, investments in environmental sustainability projects may have been deferred or reduced due to the cost-intensive nature of such projects. Regulatory pressures and investment demands may have caused the steady rebound of environmental performance during the post-crisis period.

The Social performance consistently improved over the period, reflecting a growing recognition of the importance of social responsibility in building stakeholder trust and brand reputation. Employee well-being and diversity may have played critical roles in the surge of Social Score performance over the period.

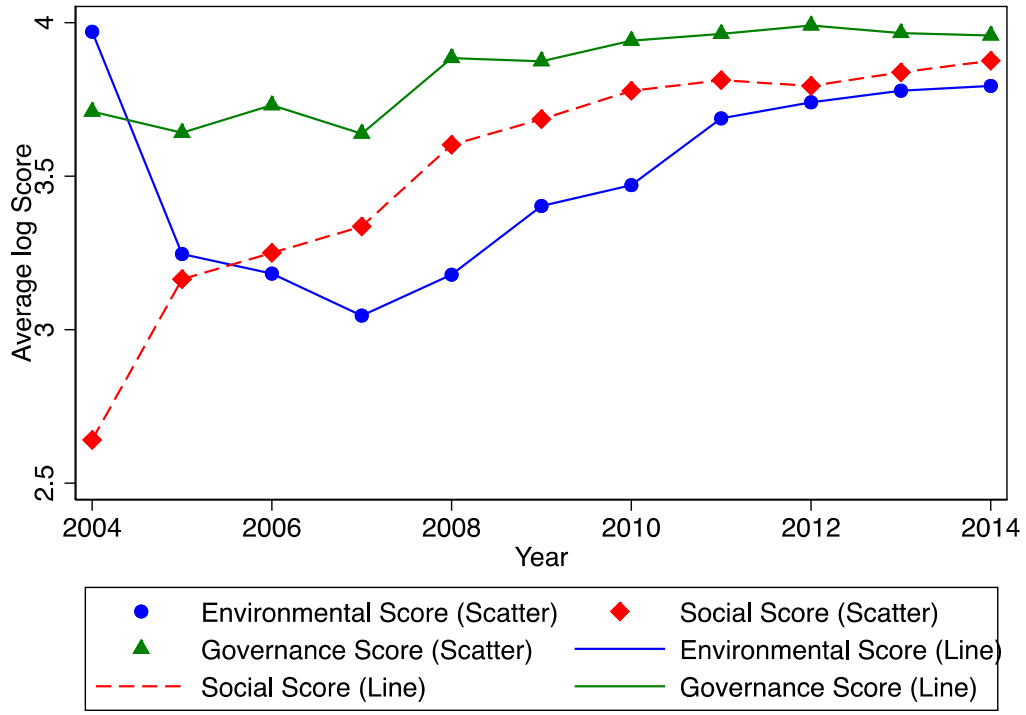

Figure 3: Average ESG Pillar Scores

Data Source: LSEG Refinitv database

The trends in the three ESG pillars collectively illustrate how Canadian firms balanced short-term survival pressures with long-term strategic investments during the 2008 financial crisis. While the Environmental score was more susceptible to financial constraints, the Social and Governance scores demonstrate the strategic value of maintaining stakeholder trust and robust governance structures.

3.5.2 Financial constraint and the KZ index

Many factors may have contributed to the increase in ESG performance over the period. But I aim to isolate the effect of financial constraints on ESG performance using the KZ index.

The Kaplan-Zingales (KZ) Index is used to classify firms based on their degree of financial constraint or external dependency, allowing for an assessment of how ESG performance evolved before and after the crisis across more constrained and less constrained firms.

The KZ Index can be used to explore how financial constraints affected firms' access to external credit. For instance, firms with strong Governance scores and low financial constraints (low KZ scores) may have had better access to credit, even during the crisis, due to their perceived stability and lower risk. This approach provides the necessary framework to ascertain whether ESG investments were primarily reduced due to resource limitations or strategically maintained or increased as a means of long-term value creation.

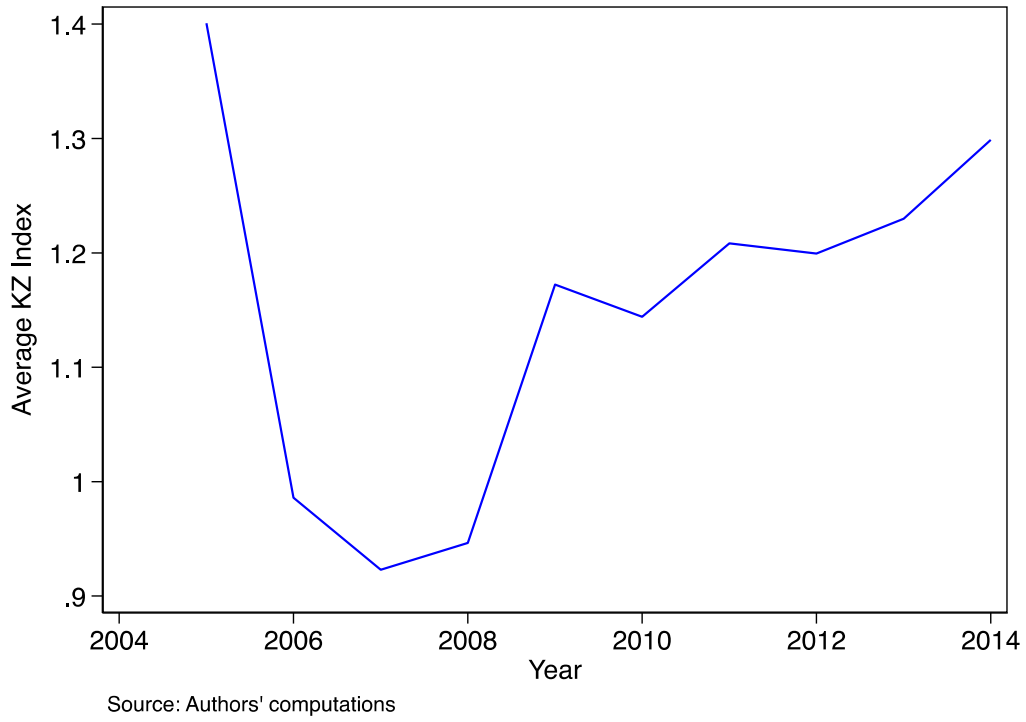

Figure 4: Average KZ Index Over Time

Data Source: LSEG Refinitv database and Compustat

From Figure 4 above, there is evidence that the pre-2008 financial crisis period had more credit availability. This is because of the sustained fall in the KZ index before the crisis. This aligns with the pre-crisis credit booms and its role in the financial crises, including the period leading

up to the 2008 global crisis (Schularick & Taylor, 2012). The lowest point was around 2007-2008, which suggests that firms had the least financial constraint just before the economic downturn.

3.5.3 Comparison between the ESG and financial constraints over the years.

Figures 2 and 4 provide crucial understandings of the relationship between financial constraints and ESG performance by Canadian firms before, during, and after the 2008 global financial crisis.

In the pre-crisis period, which was from 2004 to 2007, the financial constraint index showed a sharp decline, indicating that firms faced fewer financial constraints and had easier access to external credit. During this same period, the average ESG score increased, suggesting that firms had sufficient financial flexibility to invest in sustainability initiatives.

During the crisis (2008-2009), there was a spike in the financial constraint index. This reflects an unsurprising significant tightening of financial constraints as firms faced reduced access to external funding. Despite this, the ESG score continued to increase, which could suggest that firms either sustained ESG investments despite financial pressure (supporting the Strategic Value View of ESG) or that ESG commitments were already in place and took time to adjust.

The post-crisis period of 2010-2014 shows the KZ index still increasing, indicating higher financial constraints than the pre-crisis period. However, ESG during the same period continued to rise, but at a slower pace, suggesting that some firms may have adjusted their ESG investments despite the ongoing constraints. This is the period that could reflect heterogeneity in ESG responses; either firms reduced ESG spending or strategically maintained it to secure future benefits. If ESG investment trends diverge significantly between the treated and the

control group after the crisis, this provides strong causal evidence that financial constraints influenced ESG decisions and performances.

Trends alone cannot establish causal relationships because they fail to control for confounding factors that may influence ESG performance, such as macroeconomic shifts or industry-specific changes. Without a clear distinction between treated and control groups, it's impossible to attribute changes in ESG performance solely to financial constraints. The Difference-in-Differences (DiD) approach allows for a more reliable causal inference by comparing the relative changes in ESG performance between firms with varying levels of financial constraint, controlling for external factors and pre-crisis conditions.

3.6 Empirical Strategy

The study analyses the results using the Difference-in-Differences (DiD) estimating technique. The DiD method is a powerful econometric tool to assess the impact of the 2008 financial crisis (or treatment) by comparing outcomes over time between a treatment group and a control group (Sun et al., 2023). The choice of the DiD approach enables me to assess whether observed differences in ESG performance are attributable to credit access or if they might have occurred due to other factors unrelated to the financial crisis. This econometric method helps to isolate the effect of credit constraint practices on ESG variables by controlling for time-invariant differences between firms and common trends affecting all firms. In my strategy of comparing the change in ESG scores for highly constrained firms before and after the crisis to the change for less constrained firms, the DiD isolates the causal impact of credit access on the ESG scores of Canadian firms during that period of economic downturn, controlling for time-invariant firm characteristics and common economic trends

3.6.1 Identification Strategy

Following prior studies (Hadlock & Pierce, 2010; Kaplan & Zingales, 1997; Lu & Cheng, 2023; Martins, 2022; Sun et al., 2023), my identification strategy assumes that the 2008 financial crisis was an exogenous shock that affected all firms but had a differential impact based on their financial constraints relative to their ESG practices.

Ivashina and Scharfstein (2010) show that the crisis led to a significant tightening of global credit markets, disproportionately impacting firms with weaker access to external financing. This global shock, therefore, serves as a quasi-natural experiment, allowing me to assess how pre-existing financial constraints influenced ESG performance post-crisis. By employing a DiD approach, I test whether highly constrained firms deprioritised ESG activities due to resource limitations (Campbell et al., 2012) or strategically maintained ESG investments to enhance resilience and stakeholder trust (Lins et al., 2017) while also examining the differential effects across groups, to determine whether the impact of financial constraints on ESG varied between firms with different levels of access to credit.

The firms are divided into two groups: the treatment group and the control group. The treatment group consists of firms with a Kaplan-Zingales (KZ) index above the median, and firms with KZ index below the median are placed in the Control Group. The year 2008 is used as a benchmark year because this is the year in which the crisis occurred.

3.6.2 Model Specification

Based on the above strategy, I used the model below to estimate the effect of financial constraints on the ESG performance of firms based on the prior discussions.

$$Y_{it} = \beta_0 + \beta_1(PostCrisis_t \times FC_i) + \beta_2 ROA_{it} + \beta_3 BankSize_{it} + \beta_4 Leverage_{it} +$$

$$\beta_5 CEOD_{it} + \beta_6 BGD_{it} + \beta_7 AuditCommittee_{it} + \beta_8 BoardSize_{it} + \eta_i + \lambda_t + \varepsilon_{it}$$

Where;

Y_{it} is the outcome variable, which is ESG performance (Combined ESG). Additionally, I estimate Y_{it} using the individual Environmental, Social, and Governance scores of firm i in year t. $PostCrisis_t$ as an indicator variable for the post-treatment period, is 1 for observation after the 2008 financial crisis and 0 otherwise. FC_i is the indicator variable for the treatment groups. This is measured as 1 if a Canadian firm is highly financially constrained (KZ index greater than the median) and 0 if the firm is less financially constrained (KZ index greater than the median). The coefficient β_3 is the main coefficient of interest as it captures the causal effect of the 2008 global financial crisis on the relationship between ESG and firms' access to external credit by financially constrained firms in Canada.

ROA is the return on assets, a measure of profitability, and is net income scaled over the total assets of the companies. BankSize measures the size of firms using the log of total assets. Leverage measures the firm's financial stability or risk. It is a ratio of debt to total assets of the company. CEOD is Chief Executive Officer (CEO) duality of companies. This is a dummy variable which is measured as 1 if the CEO is a board chair and 0 if the CEO of the firm is not the board chair. BGD measures board gender diversity. This measures the percentage of female representation on corporate boards. AuditCommittee is also a dummy variable that has 1 for companies that have audit committees on the board and 0 if there is no board audit committee. BoardSize indicates the number of board members and η_i and λ_t account for unobserved heterogeneity across firms and time trends. This helps me estimate robust results. While η_i is firm-fixed effects to control for time-invariant firm characteristics, λ_t is year-fixed effects to control for time-specific shocks. $\varepsilon_{i,t}$ is the error term.

3.6.3 The parallel trend assumption and robustness of the DiD framework

The parallel trends assumption is crucial for ensuring that the DiD approach provides valid estimates of the causal effect of financial constraints on ESG performance. This assumption posits that, in the absence of the 2008 financial crisis, the ESG scores of more financially constrained (treatment group) and less constrained firms (control group) would have followed a similar trajectory over time. Any divergence in ESG performance after the crisis can then be attributed to the financial constraint effect. Given that the crisis acted as an exogenous shock, the DiD approach helps to isolate its differential impact on firms with varying degrees of financial constraints.

To test the validity of this assumption, I employ multiple strategies. First, a pre-trend analysis visually inspects ESG score movements from 2004 to 2008 to confirm whether both groups followed similar trends before the crisis. If the treatment group exhibited a significantly different trajectory before 2008, the assumption would not hold. Secondly, I use an event study approach, estimating year-by-year DiD coefficients from 2005 to 2014 to check for any pre-crisis deviations. The parallel trends assumption is supported if pre-2008 effects are insignificant while post-2008 effects are significant. Additionally, I conducted placebo tests by applying the DiD framework to a pre-crisis period to rule out random trends or unobserved factors (see Appendix).

To further mitigate biases and strengthen causal inferences, I incorporate firm fixed effects to control for time-invariant firm characteristics such as industry norms and governance practices. Time-fixed effects are included to account for macroeconomic shocks affecting all firms, such as fluctuations in interest rates and inflation. In addition to the above, I include other control variables in the regression to help improve the estimates.

The Conditional Independence Assumption (CIA**)** assumption plays a crucial role in ensuring that my DiD approach provides valid causal inferences. This assumption implies that once I control for observed covariates (e.g., profitability, firm size, leverage), financial constraint and the ESG outcome should be independent of each other, except for the causal effect of the treatment (financial constraints). The CIA, therefore, ensures that any observed difference in ESG performance between the treated group and the control group can be attributed to financial constraints and not to unobserved factors that may affect both access to credit and ESG performance.

Chapter Four: Results, Findings And Discussions

4.1 Introduction

This chapter discusses the findings and results obtained from using the estimated econometric model in the previous chapter to analyse the data. The discussion looks at thee event study, placebo test, descriptive statistics, and a detailed panel results analysis with much emphasis on the role of the 2008 financial crisis with respect to the relationship between ESG and access to external finance by firms.

4.2 Event Study and Placebo Test

I conducted an event study to provide visual evidence of how ESG scores evolved in response to the 2008 financial crisis. The idea of the event study is to provide sufficient evidence to buttress the evidence of the causal effect of the financial crisis and credit constraints on the ESG scores of firms. This is very central to my study as I am interested in the causal relationship between financial constraints and ESG performance. I now discuss the event study graphs below.

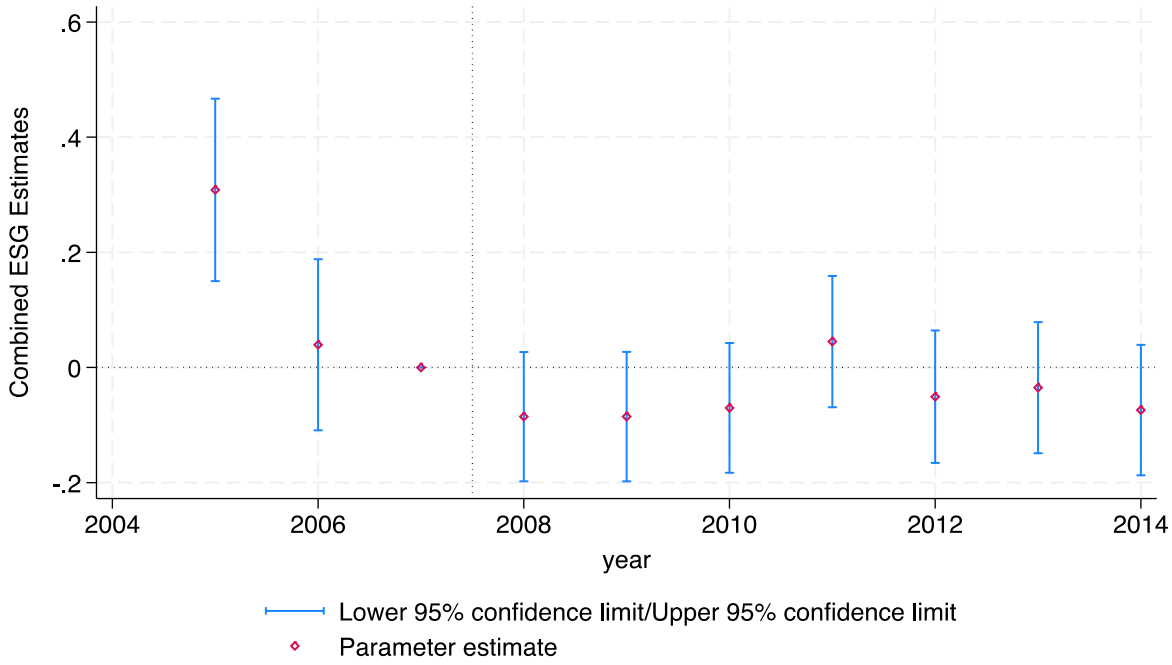

Figure 5: Event Study for Combined ESG

Notes: The event study for the combined ESG score graph is generated using the following equation.

$$log(ESG_{it}) = \gamma_t + \alpha_i + \sum_{s=2005}^{2006} \phi_s \,.\, 1_{t=s} \,.\, T_i + \sum_{s=2008}^{2014} \phi_s \,.\, 1_{t=s} \,.\, T_i + \beta_1 ROA_{it} + \beta_2 BankSize_{it} + \beta_3 Leverage_{it} + \beta_4 CEOD_{it} + \beta_5 BGD_{it} + \beta_6 AuditCommittee_{it} + \beta_7 BoardSize_{it} + \varepsilon_{it}$$

where $T_i = \begin{cases} 1 \; if \; firm \; i \; is \; in \; treatment \; group \\ 0 \; if \; firm \; i \; is \; in \; control \; group \end{cases}$ and where $1_{t=S} = \begin{cases} 1 \; if \; s = t \\ 0, otherwisee \end{cases}$

Figure 5 presents the parameter estimates for ϕ_s, illustrating the average changes in ESG performance between 2004 and 2014, along with their corresponding 95% confidence intervals. This is a relative change between the treatment group and the control group with mid-2007 as my reference point. The width of the confidence intervals reflects the degree of uncertainty and variability in the estimates: wider intervals indicate greater uncertainty, while narrower intervals suggest more precise estimates. During the pre-crisis period, the confidence intervals are relatively wide, indicating higher uncertainty in the estimates. There exist pre-trends in the overall ESG score and statistically significant estimates. This makes the interpretation of the combined ESG coefficient problematic.

The graph reveals a notable decline in ESG parameter estimates in 2007, coinciding with the beginning of the global financial crisis. This dip suggests that Canadian firms faced significant challenges in maintaining their ESG performance during the crisis. The narrowing of confidence intervals in the post-crisis years (2009–2014) indicates greater precision in the estimates, likely reflecting a stabilisation of ESG performance as firms adapted to the post-crisis environment. The decline in ESG performance during 2008 can likely be attributed to reduced access to external credit, which constrained firms' ability to invest in sustainability initiatives.

Nevertheless, there were no significant pre-trends for the environmental pillar, as shown in Figure 6 below. Before the global crisis, there were high confidence intervals, and parameter estimates show variabilities, indicating that the parallel trend assumption holds for this specific dimension of ESG. This means that, before the 2008 financial crisis, the treated and control groups were evolving similarly in terms of their environmental performance, which is a key assumption for the DiD methodology. This is critical because it suggests that the observed post-crisis divergence in environmental scores can reasonably be attributed to the crisis rather than pre-existing differences between the groups. This validates the estimation and interpretation placed on the environmental pillar estimate.

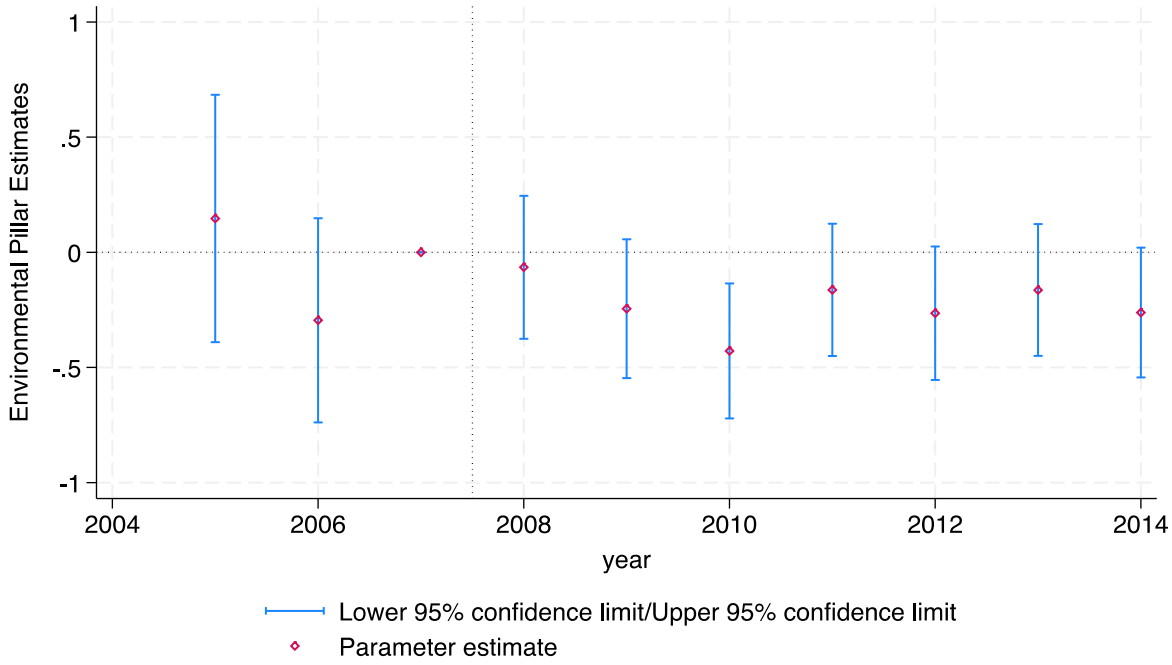

Figure 6: Event Study for Environmental Pillar Score

Notes: The event study for the environmental pillar graph is generated using the following equation

$$log(ES_{it}) = \gamma_t + \alpha_i + \sum_{s=2005}^{2006} \phi_s \,.\, 1_{t=s} \,.\, T_i + \sum_{s=2008}^{2014} \phi_s \,.\, 1_{t=s} \,.\, T_i + \beta_1 ROA_{it} + \beta_2 BankSize_{it} + \beta_3 Leverage_{it} + \beta_4 CEOD_{it} + \beta_5 BGD_{it} + \beta_6 AuditCommittee_{it} + \beta_7 BoardSize_{it} + \varepsilon_{it}$$

where $T_i = \begin{cases} 1 \; if \; firm \; i \; is \; in \; treatment \; group \\ 0 \; if \; firm \; i \; is \; in \; control \; group \end{cases}$ and where $1_{t=s} = \begin{cases} 1 \; if \; s = t \\ 0, otherwisee \end{cases}$

The social pillar event study, as shown in Figure 7, does not deviate from the overall ESG trend. Compared to the earlier ESG and environmental pillar estimates graphs, the social pillar estimates graph shows a more pronounced decline in performance post-crisis, highlighting the challenges faced by firms in maintaining social initiatives during financial turmoil. I also do not place much premium on coefficient estimates for the social pillar score regression because of the pre-trends and significant estimates.

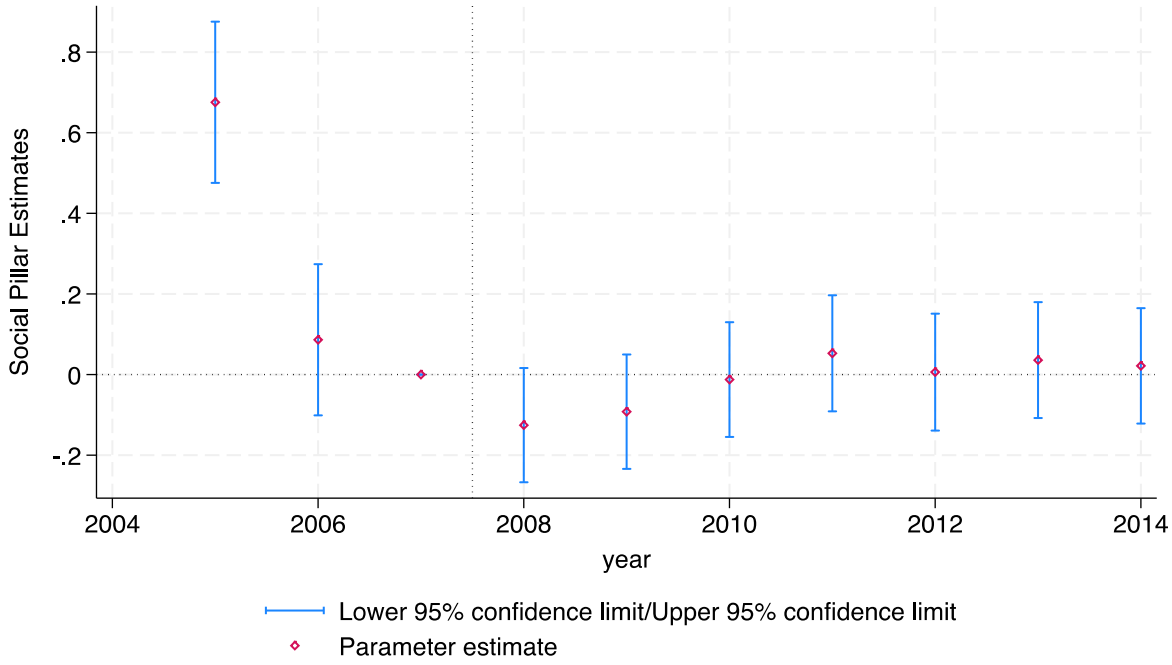

Figure 7: Event Study for Social Pillar Score

Notes: The event study for the social pillar graph is generated using the following equation.

$$log(SS_{it}) = \gamma_t + \alpha_i + \sum_{s=2005}^{2006} \phi_s \,.\, 1_{t=s} \,.\, T_i + \sum_{s=2008}^{2014} \phi_s \,.\, 1_{t=s} \,.\, T_i + \beta_1 ROA_{it} + \beta_2 BankSize_{it} + \beta_3 Leverage_{it} + \beta_4 CEOD_{it} + \beta_5 BGD_{it} + \beta_6 AuditCommittee_{it} + \beta_7 BoardSize_{it} + \varepsilon_{it}$$

where $T_i = \begin{cases} 1 \; if \; firm \; i \; is \; in \; treatment \; group \\ 0 \; if \; firm \; i \; is \; in \; control \; group \end{cases}$ and where $1_{t=s} = \begin{cases} 1 \; if \; s = t \\ 0, otherwisee \end{cases}$

Finally, the governance pillar event study graph (as shown in Figure 8) indicates the relatively unstable governance performance by Canadians before the event year. The firms had a notable dip in 2008, with a narrowing confidence interval after the crisis. There was, however, a rapid recovery post-crisis. Similar to the environmental pillar score, there exists no clear pre-trend in the governance score, but the estimates are not statistically significant, meaning the treatment (2008 financial crisis) does not appear to have had a significant impact on the governance pillar.

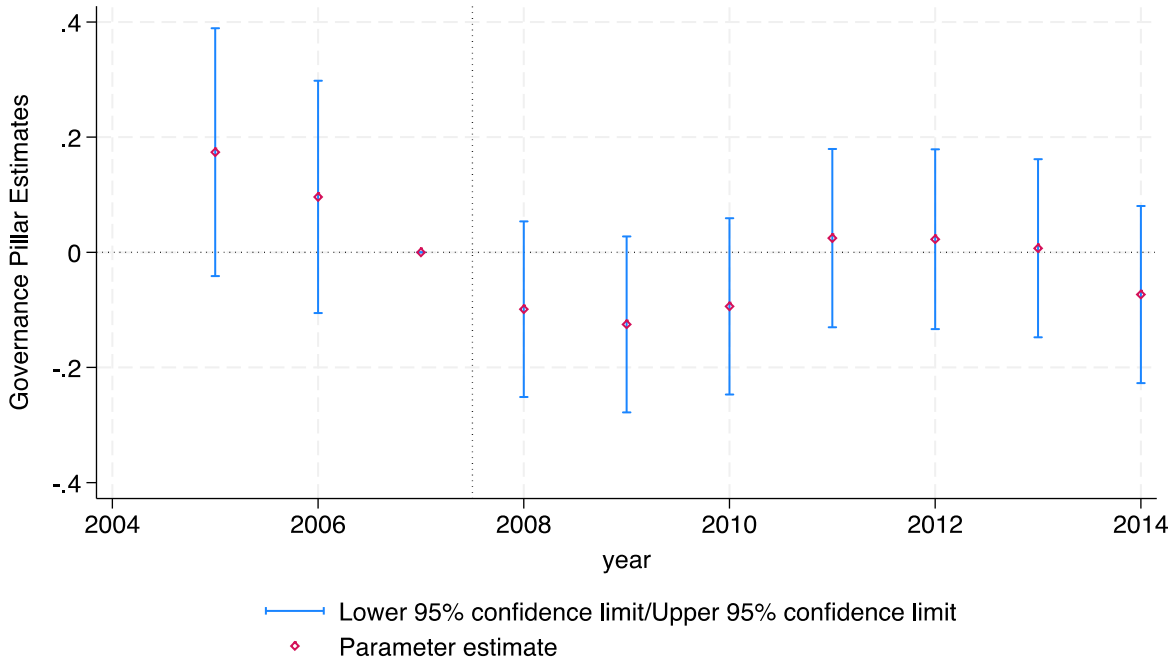

Figure 8: Event Study for Governance Pillar Score

Notes: The event study for the governance pillar graph is generated using the following equation.

$$log(GS_{it}) = \gamma_t + \alpha_i + \sum_{s=2005}^{2006} \phi_s \,.\, 1_{t=s} \,.\, T_i + \sum_{s=2008}^{2014} \phi_s \,.\, 1_{t=s} \,.\, T_i + \beta_1 ROA_{it} + \beta_2 BankSize_{it} + \beta_3 Leverage_{it} + \beta_4 CEOD_{it} + \beta_5 BGD_{it} + \beta_6 AuditCommittee_{it} + \beta_7 BoardSize_{it} + \varepsilon_{it}$$

where $T_i = \begin{cases} 1 \; if \; firm \; i \; is \; in \; treatment \; group \\ 0 \; if \; firm \; i \; is \; in \; control \; group \end{cases}$ and where $1_{t=s} = \begin{cases} 1 \; if \; s = t \\ 0, otherwisee \end{cases}$

The test for the combined ESG, Environmental Pillar, Social Pillar, and Governance Pillar estimates discussed above effectively validates the DiD estimates for the environmental pillar. I could not validate the estimates for combined ESG and social scores because of the existence of statistically significant pre-trends. The significant dips in estimates around 2008 across all pillars underscore the adverse impact of the financial crisis on ESG performance. However, the gradual recovery and stabilisation in estimates post-crisis highlight the resilience and reinvestment in ESG initiatives by Canadian firms as financial conditions improved. These findings emphasise the critical role of financial stability in supporting sustainable business

practices and justify my usage of the DiD estimation technique and the interpretation placed on the environmental estimates.

Further to the event study, I conducted a placebo Difference-in-Differences (DiD) test using 2007 as a false treatment year and excluded all observations from 2008 onward to ensure that the actual effects of the 2008 financial crisis do not contaminate the analysis. This allows me to test whether any spurious treatment effects are present before the true intervention.

VARIABLES	(1) CombinedESG	(2) Environment	(3) Social	(4) Governance
Placebo_treatment	-0.074	-0.339*	-0.115	-0.131
	(0.089)	(0.196)	(0.131)	(0.121)
ROA	0.159	0.418	0.310	-0.437
	(0.747)	(1.651)	(1.099)	(1.019)
Size	-0.027	0.360	-0.091	-0.063
	(0.158)	(0.350)	(0.233)	(0.216)
Leverage	0.002	-0.181	0.107	0.069
	(0.358)	(0.792)	(0.527)	(0.489)
CEO duality	0.124	0.775**	-0.062	0.058
	(0.158)	(0.349)	(0.232)	(0.215)
Board gender diversity	0.003	0.025	0.006	-0.008
	(0.008)	(0.017)	(0.011)	(0.010)
Audit board committee	0.131	0.504	-0.001	0.124
	(0.349)	(0.771)	(0.513)	(0.476)
Board size	-0.032	-0.060	0.018	-0.049
	(0.028)	(0.063)	(0.042)	(0.039)
Constant	4.269	-5.928	5.321	5.807
	(3.695)	(8.172)	(5.440)	(5.043)
Observations	168	168	168	168
R-squared	0.810	0.769	0.767	0.765

Table 2: Placebo test

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

Dependent variables are in logarithms.

The results (in Table 2) show that the placebo treatment variable is statistically insignificant for Combined ESG, Social and Governance scores, with only a weakly significant effect on the Environmental score at the 10% level. These findings suggest that no strong pre-existing trends

were driving the main results, supporting the validity of the parallel trends assumption and strengthening the credibility of the main DiD estimates.

Both the event study and placebo test support the credibility of our identification strategy, showing no strong pre-trends before the 2008 crisis. However, given that the event study casts doubt on the validity of the Combined ESG, Social, and Governance results, we focus our interpretation primarily on the Environmental dimension.

4.3 Regression Results and Discussions

In this section, I present the results of my DiD estimation. I then proceed to discuss our results and draw parallels and deviations from previous studies.

4.3.1 Discussion of Regression Results

Based on the DiD regression output below, I proceed to discuss the results and findings in line with my research objectives discussed in earlier chapters.

VARIABLES	(1) Combined ESG	(2) Environment	(3) Social	(4) Governance
FC*PostCrisis	-0.076**	-0.207**	-0.071*	-0.073*
	(0.032)	(0.083)	(0.041)	(0.043)
Return on Assets	0.233*	0.224	0.360**	0.116
	(0.141)	(0.398)	(0.181)	(0.190)
Size	0.100***	0.228***	0.062*	0.071**
	(0.027)	(0.077)	(0.034)	(0.036)
Leverage	-0.271**	-0.142	-0.035	-0.227
	(0.109)	(0.301)	(0.139)	(0.146)
Ceo Duality	0.011	0.373**	-0.023	-0.125
	(0.062)	(0.165)	(0.080)	(0.084)
Board Gender Diversity	-0.000	0.004	0.000	0.001
	(0.002)	(0.006)	(0.003)	(0.003)
Audit Board Committee	0.388***	0.240	0.151	0.475***
	(0.112)	(0.300)	(0.143)	(0.150)
Board size	-0.011	0.015	-0.002	-0.031***
	(0.007)	(0.018)	(0.009)	(0.010)
Constant	1.143*	-2.665	2.004***	2.321***
	(0.601)	(1.757)	(0.772)	(0.811)
Observations	963	781	963	963
R-squared	0.805	0.731	0.789	0.674

Table 3: DiD Regression results

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

Dependent variables are in logarithm.

4.3.2 Impact of Restricted Credit Access on ESG Performance

The significant coefficient of the combined ESG score confirms that the financial crisis led to disruptions in the financial markets, making credit availability difficult. The high significant

negative impact on combined ESG and environmental scores indicates that credit constraints exacerbated by the crisis hindered firms' ability to invest in ESG initiatives. Highly financially constrained firms struggled to maintain or improve their ESG performance due to limited access to credit.

The crisis was an exogenous shock because it was unexpected and beyond the control of individual firms. This disruption affected firms' normal financial planning and operations. My findings confirm that of Franken and Aisen (2009); who concluded that the crisis led to a significant reduction in credit supply, which led to disruptions in firms' operations and investment decisions. These investment decisions include ESG, which is expected to enhance the company's future operations. Similarly, Franklin et al. (2020) also concluded that the global crisis of 2008 led to credit contractions, which substantially reduced wages, labour productivity, and capital per worker within firms, ultimately leading to the likelihood of firm failure. These two studies (Franken & Aisen, 2009; Franklin et al., 2020) underscore my findings of the exogenous impact of the 2008 financial crisis that altered the way businesses were operating.

The coefficient of the interaction term (FC*PostCrisis), which is my variable of interest, is -0.076, which is statistically significant at the 5% level. The results imply that firms that were highly financially constrained experienced an approximately 7.6% lower ESG score as compared to their less-constrained counterparts due to restricted access to external credit post-2008. This suggests that firms experiencing more restricted access to credit had a significant negative impact on their combined ESG scores during the post-crisis period. Firms that are highly constrained experienced a significant decline in their overall ESG performance post-crisis compared to the less financially constrained firms.

The findings per my first research objective violate the Strategic Value View (Eccles et al., 2014; Flammer, 2015; Lins et al., 2017) in favour of the Resource Constraint View (J. T. Campbell et al., 2012; Kaplan & Zingales, 1997; Shleifer & Vishny, 1997) more strongly. The two sub-components of the Resource Constraint View that align with my outcome are financial survival priority and reduction in ESG expenditure.

Firstly, firms with higher financial constraints prioritised immediate survival needs, leading to reduced investments in long-term ESG initiatives. Firms with limited liquidity and cash flow tend to cut back on "non-core" expenditures during economic downturns, including sustainability initiatives.

Secondly, the negative impact on ESG performance suggests that financially constrained firms cut back on expenditures related to ESG practices to conserve cash flow and focus on core operational needs. During the 2008 financial crisis, many financially constrained firms reduced their ESG activities to maintain short-term solvency.

The findings of Campbell et al. (2012) concluded that firms, especially those under financial constraints, may not prioritise long-term initiatives like ESG during periods of economic stress, focusing instead on immediate survival. Similarly Shleifer and Vishny (1997), in their survey of corporate governance issues highlights how financial constraints can lead firms to focus on short-term goals, often at the expense of long-term investments like ESG. My findings, therefore, reinforce the view that financially constrained firms prioritised financial survival over long-term ESG commitments, as they had fewer resources to allocate toward non-essential, long-term projects during financial distress.

4.3.3 Differential Effects on Environmental, Social, and Governance (ESG) Pillars

The coefficient for FC*PostCrisis in the Environmental score (estimation 2), Social Score (estimation 3) and Governance Score (estimation 4) are -0.207, -0.071 and -0.073, respectively. While the coefficient of the FC*PostCrisis in estimation 2 (Environmental score) is statistically significant at the 5% level, that of Social and Governance scores were marginally significant at 10%.

The results (in estimates 2, 3, and 4) support the notion of heterogeneous impacts, with environmental performance being more negatively affected by credit constraints than social and governance performance. Highly constrained firms reduced their ESG performance by 20.7% during the post-crisis period. The results indicate that these firms may not have prioritised environmental initiatives due to their high upfront costs and long-term nature during financial uncertainty. This may also suggest that ESG expenditures, particularly those related to environmental sustainability, are highly sensitive to external finance.

Additionally, Canada's regulatory regime might have placed less emphasis on environmental performance as compared to other regions, leading firms to allocate fewer resources to environmental initiatives during financial uncertainties. Most of the bigger firms in my sample operate in the extractive (natural resource) and manufacturing sectors, and these firms might have been more severely impacted by the financial crisis, leading to greater constraints on environmental investments.

Nevertheless, we find weaker statistically significant results for the impact of credit constraint on Social and Governance scores. The results depict a 7.1% and 7.3% decline in Social and Governance performances for highly financially constrained firms relative to less financially

constrained firms during the post-crisis period. The 7.1% decline in social performance indicates that constrained firms causally reduced engagement in social responsibility initiatives**,** such as employee benefits and community programs. However, the effect is smaller than on the environmental pillar, possibly because social initiatives are harder to cut in the short term.

The 7.3% decline in governance scores suggests that financial constraints causally weakened governance practices**,** possibly by reducing transparency, compliance, or board independence measures. My findings, therefore, imply that restricted credit access due to the 2008 crisis causally forced firms to prioritise immediate financial survival over long-term ESG commitments as supported by the resource-constraint view, particularly in environmental areas that require large capital expenditures with may be longer-term unpredictable benefits.

4.3.4 Control Variables and other Governance factors

I control for other variables to isolate and predict more precisely the effect of access to finance on ESG performance. I emphasise the results of the control variables in the first regression that has combined ESG (estimation 1).

The Return on Asset (ROA) was marginally significant. This outcome indicates that profitable firms are more positioned to engage in ESG initiatives, especially in social responsibility initiatives, as a unit increase in ROA is associated with a 23.3% increase in combined ESG performance, significant at the 10% level. Among the individual pillars, the much higher (36.0%) and significant results for the Social pillar indicate that more profitable Canadian firms are more likely to invest in employee welfare, social programs and corporate social responsibility initiatives.

The results show positive and statistically significant for firm size as measured by the total assets of the firms, though weaker for the Social Pillar. These results indicate that larger firms

have better access to credit and are more resilient during financial crises. This is consistent with the idea that larger firms are perceived as less risky by lenders due to their established reputations, diversified portfolios, and greater resources (Berger et al., 2017; Diamond, 1984). The strong positive relationship for the Environmental and Governance pillars suggests that larger firms may prioritise these aspects to enhance their credibility and access to credit. Larger firms may causally engage in more ESG initiatives due to greater regulatory and reputational incentives.

The results for leverage are very intriguing as they suggest that more debts lead to lower ESG performances, though I did not find significant results for the individual pillars. This could mean that firms with higher leverage may face financial constraints that limit their ability to invest in sustainable practices or are faced with regular debt-servicing obligations, which gives them little room to invest in ESG activities. However, the lack of significant coefficients for the individual Environmental, Social, and Governance pillars indicates that leverage does not have a clear impact on these specific aspects of ESG performance in this study.

I do not find evidence for scenarios where the CEO also serves as the board chair, influencing the overall ESG performance. Nevertheless, CEO duality is positively significant for the Environmental Pillar and negative but statistically insignificant for the Social and Governance Pillars. This suggests that CEO duality may enhance a firm's ability to implement environmental initiatives due to centralised decision-making. The positive relationship with Environmental scores may reflect the ability of CEOs with dual roles to drive environmental initiatives more effectively (Endrikat et al., 2014). However, the negative relationship with Governance aligns with agency theory, which argues that CEO duality weakens board oversight and increases agency costs, thereby reducing access to credit (Elmagrhi et al., 2017), but this is unclear based on my results.

I also find that board gender diversity is not statistically significant in any of the models. This contrasts with some studies that suggest that diverse boards help to improve firm performance and access to credit by enhancing decision-making and reducing risk (Allemand et al., 2024; Banahan & Hasson, 2018; Gavana et al., 2024). The lack of significance in this analysis may indicate that gender diversity alone is not a decisive factor in ESG initiatives for Canadian firms during the financial crisis. I, therefore, conclude that board gender diversity, while important, does not have an immediate causal effect on ESG performance in this study.

The presence of an audit board committee has a significant and positive impact on firms' ESG performance, particularly in governance. The coefficient for governance performance (0.475, significant at the 1% level) indicates that firms with an audit board committee experience a 47.5% increase in governance performance. This aligns with the committee's primary role in overseeing financial reporting, ensuring compliance, and strengthening internal controls. Similarly, the committee's presence is associated with a 38.8% increase in combined ESG performance (significant at the 1% level). This highlights the audit committee's broader contribution to sustainability and accountability. However, the effects on environmental and social performance, while positive, are not statistically significant, suggesting that the committee's influence is more pronounced in governance-related areas.

These findings are consistent with recent literature (Ma et al., 2024; Pozzoli et al., 2022), which emphasises the critical role of audit committees in enhancing ESG performance through improved transparency and accountability.

Finally, board size was not significant, except for the Governance pillar, where board size has a negative and significant relationship with ESG. Larger boards may suffer from inefficiencies,

coordination problems, and slower decision-making, which can negatively impact firm ESG performance (Guest, 2009). My results, therefore, corroborate that of Jizi et al. (2014) that concluded that larger boards suffer from slower decision-making and weaker consensus on ESG strategies. The strong negative coefficient for Governance suggests that Larger boards can causally weaken governance effectiveness, highlighting the need for optimal board structures.

Chapter Five: Summary, Conclusion and Recommendations

5.1 Introduction

In this chapter, I present a summary of my study, draw conclusions, and make the necessary policy recommendations for implementation and recommendations to guide future research. In concluding this final chapter, I also highlight the limitations of the study.

5.2 Summary

This research investigates the impact of the 2008 global financial crisis on the ESG performance of Canadian firms, with a special focus on how access to external credit influenced their ability to sustain ESG initiatives during the crisis. The study is premised on two competing theoretical perspectives: the Resource Constraint View, which argues that financially constrained firms prioritise short-term survival over long-term ESG investments during crises, and the Strategic Value View, which suggests that firms may continue to invest in ESG as a strategic asset, even in challenging economic conditions.

Using a Difference-in-Differences (DiD) estimation technique, the study analyses data from Canadian firms to assess changes in combined ESG performance before and after the crisis. I also analysed the three individual ESG pillars- Environmental, Social, and Governance. Key control variables, such as firm size, profitability (ROA), leverage, and board characteristics like gender diversity, size, the presence of an audit committee, and CEO duality, are included to isolate the impact of credit constraints on ESG performance.

The results from this study reveal that the financial crisis had a significant negative impact on ESG performance, particularly in the Environmental pillar, which experienced the largest

decline. The combined ESG score also decreased, with smaller declines in the Social and Governance pillars. These findings support the Resource Constraint View, as firms facing credit constraints during the crisis reduced their ESG investments to conserve resources for current operational purposes and business survival. In terms of the control variables, Larger and more profitable firms were more resilient, maintaining better ESG commitments, while highly leveraged firms showed a decline in governance-related efforts. Board governance-related factors, such as the presence of an audit board committee, were also positively associated with Governance performance, highlighting the importance of strong governance structures.

I conclude this study by observing that while the "Great Recession" of 2008 generally impacted ESG performance, firms with greater resources and robust governance mechanisms were more resilient. I also provide evidence to conclude that financial constraints during crises can weaken firms' ESG commitments, especially environmental commitments; hence, firms face a trade-off between financial stability and sustainability commitments during economic downturns.

5.3 Recommendations

These findings have important implications for policymakers, firms, and financial institutions. I suggest the need for targeted interventions to support ESG investments during economic downturns and the integration of ESG considerations into broader risk management strategies. These suggestions are broadly discussed below.

Firstly, governments should introduce targeted financial incentives, such as tax breaks or low-interest loans, to encourage firms to maintain ESG investments during economic downturns. These initiatives can help firms mitigate the trade-off between financial constraints and

sustainability goals and ultimately reduce the impact of credit constraints on ESG performance, particularly in the Environmental pillar, which was most affected during the 2008 crisis.

I also suggest that larger firms, which demonstrated a greater ability to sustain ESG performance during the crisis, should be encouraged to set industry standards. Policymakers and industry associations could recognise and reward such firms, inspiring smaller companies to follow their lead.

Firms should prioritise the establishment of independent and well-structured governance mechanisms, such as audit board committees, which have been shown to positively influence ESG performance. Strengthening corporate governance can ensure that ESG initiatives remain integral to business strategies even in challenging financial periods. Individual companies should also explore leadership models that empower executives to drive sustainability strategies. Leadership development programs focused on ESG can enhance decision-making and foster a corporate culture that prioritises sustainability.

I also encourage corporations to embark on long-term ESG integration strategies. Companies should integrate ESG considerations into their core strategic planning rather than treating them as discretionary expenditures. By embedding ESG into long-term business objectives, firms can create sustainable value and reduce the likelihood of not prioritising ESG initiatives during economic downturns.

Finally, financial institutions should develop ESG-focused financing options, such as green bonds or sustainability-linked loans, to provide firms, especially Small and Medium

Enterprises (SMEs), with access to capital for ESG initiatives during economic downturns. This would serve as an incentive for the rapid investments in sustainability initiatives during and after economic downturns.

5.4 Thesis Contribution

This study contributes to the literature on corporate sustainability and financial constraints by providing empirical evidence on how access to external credit influences ESG performance during economic downturns. By leveraging the 2008 global financial crisis as an exogenous shock, the study establishes a causal link between financial constraints and firms' ESG commitments, reinforcing the Resource Constraint View. Unlike previous studies (Chowdhury et al., 2021; Eccles et al., 2014; Friede et al., 2015) that primarily focus on the long-term benefits of ESG investments, this research highlights the short-term trade-offs firms face when liquidity becomes a concern. The findings demonstrate that firms that are more financially constrained significantly reduce their ESG efforts, particularly in the environmental dimension, shedding light on the vulnerability of sustainability initiatives during periods of financial stress.

Secondly, this study makes a methodological contribution by employing a Difference-in-Differences (DiD) approach to isolate the causal effect of financial constraints on ESG performance. While prior studies on ESG investments often rely on cross-sectional or panel regressions without accounting for exogenous shocks, this research leverages the 2008 global financial crisis as a natural experiment. With the usage of the DiD approach, the study effectively controls for time-invariant firm characteristics and broader economic trends, strengthening the causal interpretation of the findings.

From a policy and managerial perspective, this research provides actionable perspectives for regulators, investors, and corporate leaders. My findings underscore the need for financial mechanisms that incentivise firms to sustain ESG investments even during crises, such as ESG-linked financing and government-backed sustainability initiatives. Additionally, the study reinforces the importance of strong corporate governance structures, particularly the presence of audit committees, in maintaining ESG performance, even in financially constrained environments. By demonstrating that financial constraints disproportionately impact environmental sustainability efforts, this research informs the ongoing debate on whether ESG investments should be viewed as discretionary or essential for long-term corporate resilience. Collectively, these findings contribute to the growing body of literature on sustainable finance by offering empirical evidence on the financial determinants of ESG behaviour during economic downturns.

5.5 Limitations and direction for future research

First, the research focuses exclusively on Canadian firms, which may limit the generalizability of the findings to other countries with different regulatory environments, market structures, or cultural attitudes toward ESG. For example, firms in countries with stronger ESG regulations or more robust stakeholder pressure might exhibit different patterns of behaviour during financial crises. Future studies could expand the geographic scope to include firms from multiple countries, particularly those with varying levels of ESG regulation and enforcement.

Second, the study relies on secondary data for ESG performance, which may not fully capture the qualitative aspects of ESG initiatives or the nuances of firm-level decision-making. ESG ratings can vary across providers, and the metrics used may not always reflect the true extent of a firm's sustainability efforts. My usage of LSEG Refinitiv data may not reflect some

qualitative views of managers of the firms. For future research, investigators could incorporate qualitative methods, such as interviews or case studies, to complement the quantitative analysis. This would provide a deeper understanding of how firms make decisions about ESG investments during crises and the internal and external factors that shape these decisions. For example, interviews with business executives could reveal whether firms view ESG as a strategic priority or a discretionary expense during periods of financial stress.

Another limitation is the focus on the 2008 financial crisis as a single event. While this crisis provides a useful setting for examining the relationship between credit constraints and ESG performance, it is unclear whether the findings would hold in the context of other economic shocks, such as the COVID-19 pandemic or sector-specific downturns. I suggest that future research could examine the impact of other economic shocks, such as the COVID-19 pandemic or climate-related disasters and tariffs, on ESG performance. These events offer unique contexts to test the robustness of the findings and explore whether the Resource Constraint View or the Strategic Value View holds under different types of crises.

Finally, the methodological limitation of this study is that some of the ESG variables, particularly in the Social and Governance dimensions, exhibit pre-trends. This violation of the parallel trends assumption raises concerns about the validity of the Difference-in-Differences (DiD) approach for these dimensions. While the Environmental score appears to follow parallel trends before the crisis, the pre-existing trends in Social and Governance scores suggest that the treated and control groups may have been on divergent paths even before the financial shock. As a result, the causal interpretation of the effects of financial constraints on Social and Governance performance may be compromised, and the observed post-crisis differences could be partially driven by pre-existing differences rather than the crisis itself.

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Appendix

I present some useful graphs from my results in this section. In Figure 9 below, there is a general rise in the average ESG scores for both highly constrained firms and less constrained firms over the study period. The Treated Group, being more financially constrained, showed a steady rise in ESG scores post-2006. The less financially constrained firms exhibited more variability in ESG scores, showing improvement overall but with notable fluctuations.

Overall, ESG scores for both groups increased, with the Treated Group showing a steadier upward trend post-2007, while the Control Group had more variability. Though there was a positive rise, my DiD results indicated that financially constrained firms did not prioritise ESG activities as much as they could, resulting in a negative impact of financial constraint on ESG performance. This is not surprising, as the less financially constrained firms narrowed the ESG performance gaps more in the post-crisis period than in the pre-crisis period.

These findings suggest that financially constrained firms may have faced challenges in accessing external credit despite improvements in ESG performance, particularly during financial crises like the 2008 global financial crisis.

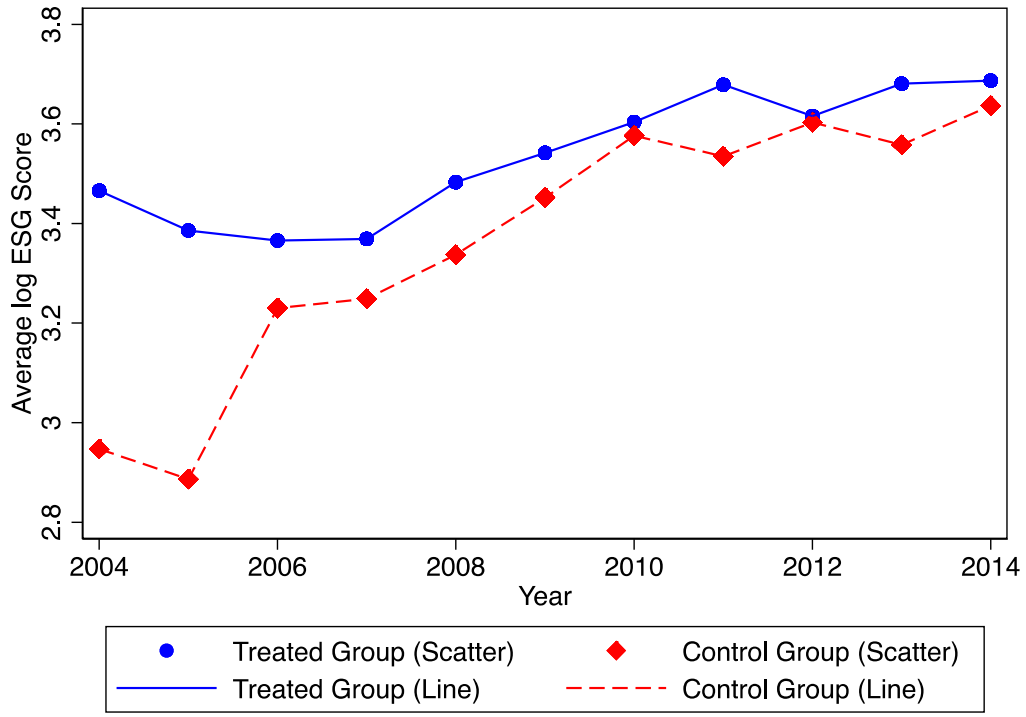

Figure 9: Average ESG Score: Treated vs Control Group

The environmental pillar graph in Figure 10 shows that there was a significant decline in the pre-crisis period for both groups. While both groups showed improvement in their environmental scores post-2007, financially constrained firms demonstrated a more consistent upward trend but faced challenges due to limited access to credit. This underscores the

difficulties these firms encounter in prioritising environmental activities, particularly during the financial crises of 2008.

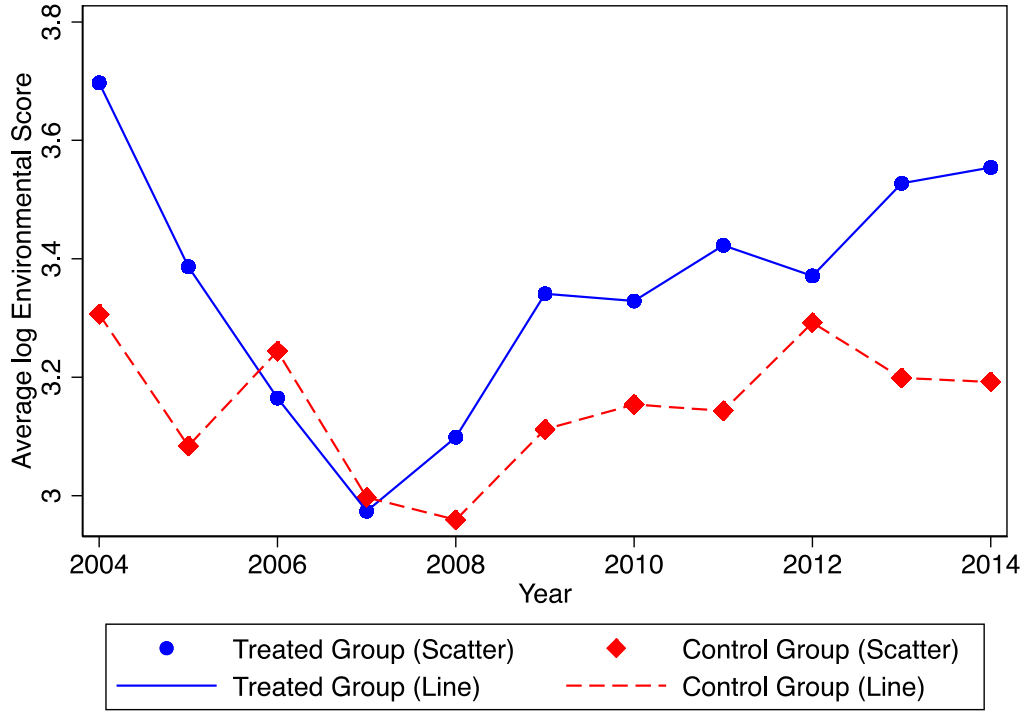

Figure 10: Average Environmental Pillar Score: Treated vs Control Groups

Concerning the Social Pillar Score (as shown in Figure 11), highly constrained firms continuously dominated the less constrained firms over the entire period. Nevertheless, the control group performed very well in 2010 and 2012, almost at par with the treatment group.

The treated group's consistent dominance suggests that even financially constrained firms prioritised social activities over the period. The control group's significant improvements in 2010 and 2012 indicate a focused effort, possibly due to specific interventions or changes in external conditions. These findings highlight that while financially constrained firms managed to maintain higher social scores, less constrained firms had the capacity for rapid improvements during certain periods after the global financial crisis.

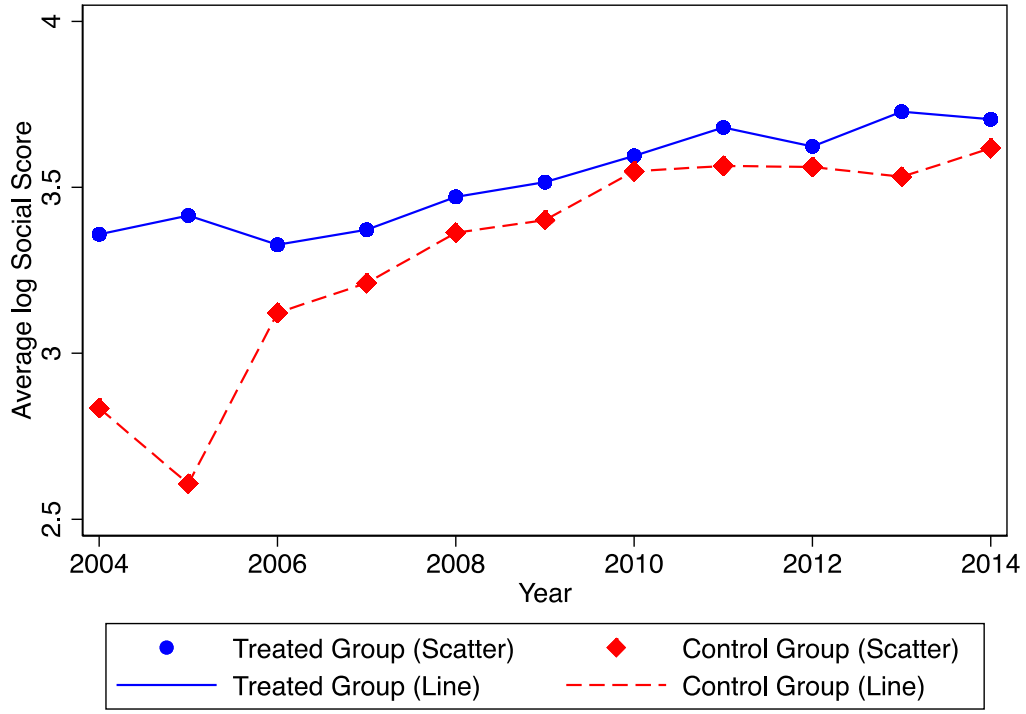

Figure 11: Average Social Pillar Score: Treated vs Control Groups

Figure 12 depicts a different departure from the other previous graphs. The graph shows that the less financially constrained firms were performing relatively better in ESG scores before the crisis. This performance continued until late 2011 when the highly constrained firms regained superior performance over the less constrained firms. This is not surprising as my results indicated that there was less motivation for financially constrained firms to invest in ESG activities after the crisis because of the need to sustain current operations and survival over some strategic long-term investments.

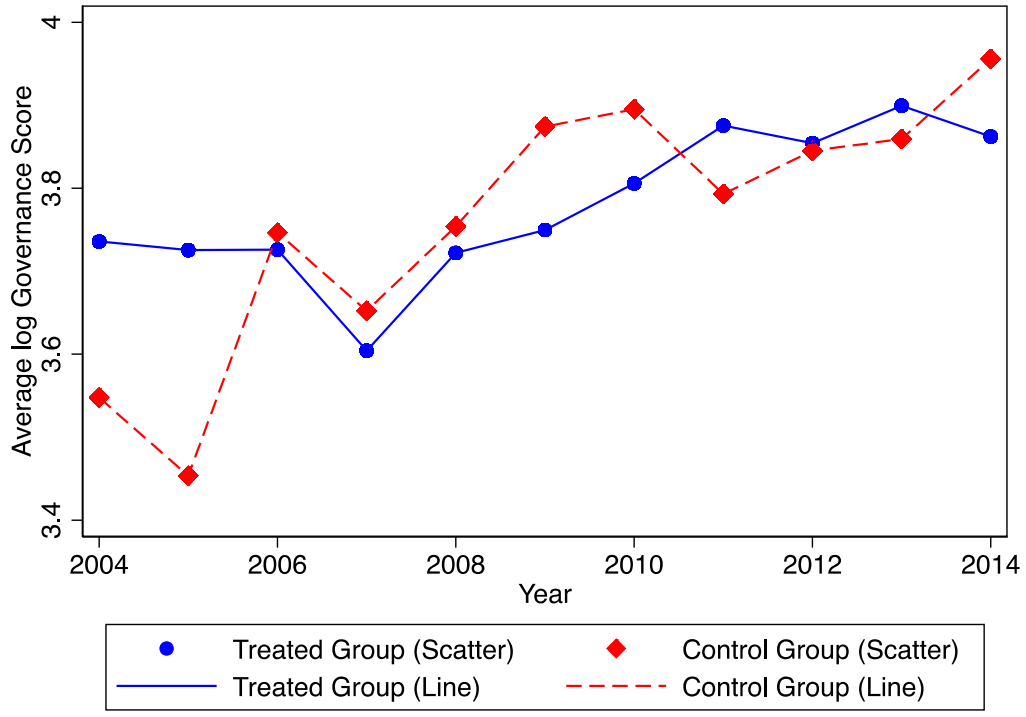

Figure 12: Average Governance Pillar Score: Treated vs Control Groups

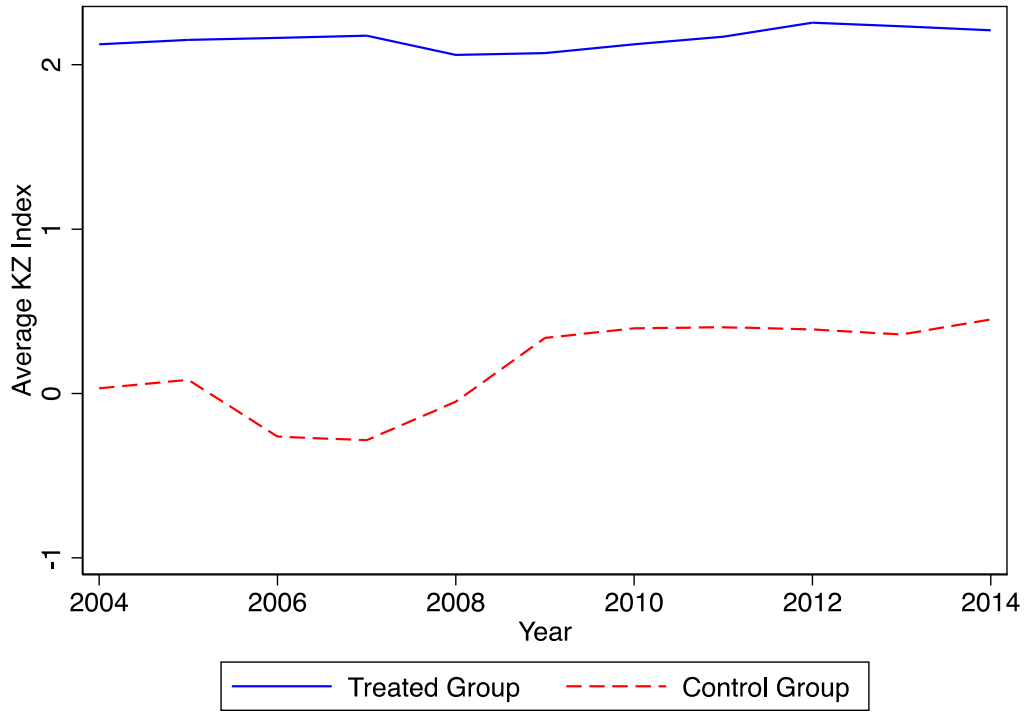

Figure 13: Average KZ Index: Treated vs Control Groups

The graph in Figure 13 demonstrates a clear divergence in financial constraints between treated and control firms following the 2008 crisis, underscoring the shock's differential impact. The divergence implies that the effect of the financial constraints on ESG performance might not be uniform across firms.

Sector Name	Unique Firms	Average Total Assets (in millions of C$)
Communication Services	4	38,533.50
Consumer Discretionary	11	9,442.73
Consumer Staples	6	12,518.77
Energy	12	38,402.68
Financials	18	95,303.92
Health Care	9	6,728.53
Industrials	16	7,023.87
Information Technology	13	7,424.95
Materials	13	8,967.31
Real Estate	7	21,254.68
Utilities	5	24,277.86

Table 4: Average Total Assets for Economic Sectors (2004-2014)

Post-estimation robustness checks

Table 5 confirms that most firms contribute around 9 years of non-missing ESG data between 2004 and 2014. This supports the robustness of our within-firm estimation strategy. However, the Environmental score shows more variability, with at least one firm having no data.

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG combined years	114	8.947	1.601	7	11
Environmental score years	114	8.684	1.929	0	11
Social score years	114	8.947	1.601	7	11
Governance score years	114	8.947	1.601	7	11

Table 5: Summary of Non-Missing ESG Observations Per Firm

To verify the robustness of the DiD estimates, I restricted the sample to firms with complete Environmental data between 2005 and 2014. The results, presented in Table 6, remain consistent with the baseline estimates (see Table 3), particularly for the Environmental pillar

(column 2), where the negative and statistically significant effect of financial constraints after the crisis persists. Combined ESG and Social scores also exhibit significant declines, while Governance remains statistically unaffected.

VARIABLES	(1) CombinedESG	(2) Environment	(3) Social	(4) Governance
FC*PostCrisis	-0.074**	-0.239***	-0.082**	-0.046
	(0.031)	(0.081)	(0.039)	(0.042)
ROA	0.240*	0.248	0.335*	0.138
	(0.141)	(0.396)	(0.180)	(0.191)
Size	0.123***	0.238***	0.067*	0.093**
	(0.027)	(0.077)	(0.035)	(0.037)
Leverage	-0.263**	-0.111	-0.115	-0.213
	(0.114)	(0.300)	(0.145)	(0.154)
CEO duality	-0.003	0.383**	-0.033	-0.188**
	(0.063)	(0.165)	(0.081)	(0.086)
Board gender diversity	0.002	0.005	0.000	0.003
	(0.002)	(0.006)	(0.003)	(0.003)
Audit board committee	0.388***	0.249	0.145	0.486***
	(0.110)	(0.300)	(0.140)	(0.149)
Board size	-0.008	0.014	0.000	-0.030***
	(0.007)	(0.018)	(0.009)	(0.010)
Constant	0.608	-2.922*	1.965**	1.842**
	(0.628)	(1.761)	(0.804)	(0.853)
Observations	911	781	911	911
R-squared	0.789	0.732	0.771	0.657

Table 6: DiD regression with no missing data for environmental score

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