

CAPITAL MARKETS REVIEW

Volume 31, No. 2, 2023

Negative Social Media Sentiments and Capital Structure 1-22
Samuel Jebaraj Benjamin, Zhuoan Feng & Pallab Kumar Biswas

COVID-19 Dynamics and Financing of Cash Flow Shortages: 23-53
Evidence from Firm-Level Survey
Yusuf Adeneye, Fathyah Hashim, Yusuf Babatunde Rahman & Normaizatul
Akma Saidi

CSR Performance and Profitability of the Banking Industry in 55-68
Southeast Asia Nations (ASEAN)
Berto Usman, Ridwan Nurazi, Intan Zoraya & Nurna Aziza

Financial Performance as a Determinant of The Cost of Capital: 69-87
An Empirical Study on Listed Companies in India
Naseem Ahamed & Nitya Nand Tripathi

The Performance of ESG ETFs in the U.S. 89-101
Gerasimos G. Rompotis

Published by:



Sponsored by:



E-ISSN: 2805-430X

MALAYSIAN FINANCE ASSOCIATION

Founded in 1998

EXECUTIVE COMMITTEE 2021/2023

<i>President</i>	Mansor Ibrahim, <i>INCEIF</i>
<i>Vice President</i>	Chee-Wooi Hooy, <i>Universiti Sains Malaysia</i>
<i>Honorary Secretary</i>	Wai-Ching Poon, <i>Universiti Teknologi PETRONAS</i>
<i>Honorary Assistant Secretary</i>	Jason Kian-Tek Lee, <i>Sunway University</i>
<i>Honorary Treasurer</i>	Wahida Ahmad, <i>Universiti Teknologi MARA</i>
<i>Committee Member</i>	Ahmad Hakimi Tajuddin, <i>Taylor's University</i>
<i>Committee Member</i>	Gary John Rangel, <i>Universiti Sains Malaysia</i>
<i>Committee Member</i>	Maran Marimuthu, <i>Universiti Teknologi PETRONAS</i>
<i>Committee Member</i>	Mohd Edil Abd Sukor, <i>Universiti Malaya</i>
<i>Committee Member</i>	Siong-Hook Law, <i>Universiti Putra Malaysia</i>
<i>Committee Member</i>	Woei-Chyuan Wong, <i>Universiti Utara Malaysia</i>

PRESIDENTS

<i>1998/1999</i>	Muhamad Muda, <i>Universiti Kebangsaan Malaysia</i>
<i>1999/2000 – 2003/2004</i>	Mansor Md. Isa, <i>University of Malaya</i>
<i>2004/2005 – 2010/2011</i>	Fauzias Mat Nor, <i>Universiti Kebangsaan Malaysia</i>
<i>2011/2012 – 2016/2017</i>	Obiyathulla Ismath Bacha, <i>INCEIF</i>
<i>2017/2018 – 2019/2021</i>	Catherine Soke-Fun Ho, <i>Universiti Teknologi MARA</i>
<i>2021/2023 – Present</i>	Mansor Ibrahim, <i>INCEIF</i>

ABOUT MFA

The Malaysian Finance Association (MFA) was officially established in September 1998 and is currently registered under the Faculty of Business Management, Universiti Teknologi MARA (UiTM). It was formed through the initiative of a group of finance academicians from various public higher learning institutions in Kuala Lumpur who feels the need to consolidate effort in promoting awareness and interest in the field of finance.

Objectives: The objectives of MFA are to stimulate public interest in finance related studies, to encourage the research and discussion of finance related issues with special reference to Malaysia, to issue Malaysian finance Journals and other publications with the prior approval of the relevant authorities, to promote and organize conferences, forums, dialogues and activities between private and public sectors on current finance issues of national and international concerns; and to undertake such management, economic, and other activities as the Association deems appropriate for the furtherance, promotion and execution of its aforesaid objectives.

Membership: Membership is open to academicians, professionals and students in the area of Finance, Banking, Economics, Insurance, Real Estate, Accounting and other finance related area. There are three types of membership: Ordinary Membership, Associate Membership and Life Membership.

Ordinary Membership (RM100 per year): The Ordinary Membership is open to all academicians and working person in the field of Accounting, Banking, Business Administration, Economics, Finance, Financial Engineering, Actuarial Science, Data Science, Insurance and other finance related area. Ordinary member is eligible to attend and vote at all general meetings of the Association.

Associate Membership (RM100 per year): The Associate Membership is open to foreign professionals / scholars / postgraduates in the field of Finance, Banking, Economics, Insurance, Real Estate, Accounting and other finance related area. The associate members are entitle to all general meetings, but are not eligible to hold an office and to vote.

Life Membership (RM600): The Life Membership is open to Malaysian academicians, an extension of ordinary membership and entitles to all the rights and privileges of ordinary members.

Capital Markets Review

Vol. 31, No. 2, 2023

Chief Editor

Chee-Wooi Hooy

Universiti Sains Malaysia

Associate Editors

Chai-Aun Ooi

Universiti Utara Malaysia

Changyong Zhang

Curtin University

Fakarudin Kamarudin

Universiti Putra Malaysia

Irwan Adi Ekaputra

Universitas Indonesia

Mohd Edil Abd Sukor

University of Malaya

Ruzita Abdul Rahim

Universiti Kebangsaan Malaysia

Suresh Kumar Oad Rajput

Sukkur IBA University

Tuck-Cheong Tang

University of Malaya

Tze-Haw Chan

Universiti Sains Malaysia

Wai-Ching Poon

University Petronas Malaysia

Weng-Chang Lee

Xiamen University

Woei-Chyuan Wong

Universiti Utara Malaysia

Editorial Advisers

A. Mansur M. Masih

University of Kuala Lumpur

Ali M. Kutun

Southern Illinois University, USA

Allaudeen Hameed

National University of Singapore, Singapore

Bany Ariffin Bin Amin Noordin

Universiti Putra Malaysia

Catherine Soke-Fun Ho

Universiti Teknologi MARA

Chee-Keong Choong

Universiti Tunku Abdul Rahman

Evan Lau

Universiti Malaysia Sarawak

Fauzias Mat Nor

Universiti Sains Islam Malaysia

Ferdinand A. Gul

Deakin University, Australia

Hooi Hooi Lean

Universiti Sains Malaysia

Kian-Ping Lim

University of Malaya

Kim-Leng Goh

University of Malaya

Kym Brown

Monash University, Australia

M. Shahid Ebrahim

Durham University, UK

Mansor Ibrahim

INCEIF

Mansor Md Isa

University of Malaya

Nur Adiana Hiau Abdullah

Universiti Utara Malaysia

Obiyathulla Ismath Bacha

INCEIF

Razali Haron

International Islamic University of Malaysia

Robert Faff

University of Bond, Australia

Ruhani Ali

Universiti Sains Malaysia

S. Ghon Rhee

University of Hawaii, USA

Siong-Hook Law

Universiti Putra Malaysia

Terence Tai-Leung Chong

Chinese University of Hong Kong, Hong Kong

Wing-Keung Wong

Asia University, Taiwan

Editorial Assistant

Shu-Fen Chuah

Universiti Sains Malaysia

Capital Markets Review

Vol. 31, No. 2, 2023

Published by:

Malaysian Finance Association (MFA)

MFA is currently registered under below address:

Faculty of Business and Management,

Universiti Teknologi MARA,

40450 Shah Alam, Selangor, Malaysia.

Tel: 603-5544 4792

Fax: 603-5544 4693

Email: cmr@mfa.com.my

Sponsored by:

Bursa Malaysia (previously known as Kuala Lumpur Stock Exchange)

The Latest Information

For the latest information about our association, membership, journal, conference and activities, please visit our website at <http://www.mfa.com.my/>

Advertising in the Journal

For advertising information, please contact the editorial assistant at cmr@mfa.com.my

Abstracting and Indexing

CMR is listed and indexed in ABDC Journal Quality List, Research Papers in Economics (RePEc), and MyJurnal by Citation and Infometrics Centre (formerly known as Malaysia Citation Centre (MCC)).

Copyright and Disclaimer

© 2023 The Malaysian Finance Association. All rights reserved. No part of this publication may be reproduced or transmitted or published in any form or by any means whatsoever, without permission.

The Capital Markets Review is published twice a year (March and September) by the Malaysian Finance Association. Views expressed by contributors are entirely their own and do not in any way reflect those of the Malaysian Finance Association. Whilst every reasonable care is taken to ensure the accuracy of matter printed, no responsibility can be accepted thereof.

E-ISSN: 2805-430X

Capital Markets Review

Vol. 31, No. 2, 2023

Publication Ethics Policy

Capital Markets Review (CMR) is a peer reviewed journal which adheres to the Committee on Publication Ethics (COPE) standards on publication ethics to prevent any publication malpractice. It is expected that all parties involved in the act of publishing article(s) in CMR, including authors, reviewers and editors, are fully committed to the following ethics statements documented based on the Ethical Code of COPE.

- i. Author's Obligations
 - Author(s) should ensure that their work has not been published previously except in the form of an abstract or as part of a published lecture or academic thesis.
 - Author(s) should ensure that their work is not under consideration for publication elsewhere before they submit their work to this journal.
 - The article(s) submission and publication in this journal must be known and approved by all Authors.
 - The work must be original and entirely owned by Author(s). Author(s) should ensure that there is no falsification, fabrication of data or plagiarism including duplicate publication of the Author's own work without proper citation.
- ii. Reviewer's Obligations
 - Every manuscript that is sent to the appointed reviewers should be kept as a confidential document and reviewers should not reveal or communicate the work to others unless authorized by the editor.
 - Reviewers are required to judge the credibility and feasibility of the manuscript.
 - It is the duty of appointed reviewers to offer unbiased, detailed and constructive comments with supporting arguments.
 - Reviewers should ensure that there is no conflict of interests between the reviewers and the authors, author's research work or author's research funding. If any, reviewers should communicate with editors.
 - Reviewers should complete their review within the stipulated time. If reviewers require more time or unable to complete their review within the stipulated time, they should communicate with editors.
- iii. Editor's Obligations
 - Editors are liable to uphold the integrity of the publication review process.
 - Editors should keep all information related to the manuscript received as confidential, including the identity of the author(s) and reviewer(s).
 - Editors should ensure that each manuscript received by the journal is evaluated for its intellectual content regardless of gender, race, ethnic, religion or citizenship of author(s).
 - It is the duty of editors to make the final decision whether to accept the manuscript to be published in the journal.
 - The responsibilities of editors are guided by the policies set by the editorial board and shall be constrained by its legal requirements.

The editorial board has complete authority to accept or reject a manuscript. If libel, copyright infringement, plagiarism or any unethical publishing behaviour is found, the editorial board has complete authority to amend or withdraw the manuscript if necessary. The published manuscripts would not represent the stand or opinion of the Editorial Board of Malaysian Finance Association. Any cases of serious ethical misconduct will be dealt with using the guidelines issued by COPE.

Capital Markets Review

Vol. 31, No. 2, 2023

CONTENTS

Negative Social Media Sentiments and Capital Structure

SAMUEL JEBARAJ BENJAMIN, ZHUOAN FENG and PALLAB KUMAR BISWAS 1-22

COVID-19 Dynamics and Financing of Cash Flow Shortages: Evidence from Firm-Level Survey

YUSUF ADENEYE, FATHYAH HASHIM, YUSUF BABATUNDE RAHMAN and

NORMAIZATUL AKMA SAIDI 23-53

CSR Performance and Profitability of the Banking Industry in Southeast Asia Nations (ASEAN)

BERTO USMAN, RIDWAN NURAZI, INTAN ZORAYA and NURNA AZIZA 55-68

Financial Performance as a Determinant of The Cost of Capital: An Empirical Study on Listed Companies in India

NASEEM AHAMED and NITYA NAND TRIPATHI..... 69-87

The Performance of ESG ETFs in the U.S.

GERASIMOS G. ROMPOTIS 89-101

Negative Social Media Sentiments and Capital Structure

Samuel Jebaraj Benjamin^{1*}, Zhuoan Feng¹ & Pallab Kumar Biswas²

¹*School of Accounting, Finance and Economics, University of Waikato, New Zealand.*

²*Department of Accountancy & Finance, University of Otago, New Zealand.*

Abstract: Research Question: Does negative social media sentiments have implications for a firm's capital structure? **Motivation:** Little is known about how social media sentiments affect capital structure, although previous studies have provided information on the detrimental consequences of negative SMS on firm performance, value, financial hardship, and revenue. However, choosing a capital structure is regarded as one of the crucial choices for every organisation. **Idea:** This study investigates the role of negative social media sentiments (SMS) in shaping the capital structure of firms; namely leverage, cost of debts, and the term to maturity. **Data:** We sample the United States (US) Fortune 500 firms between 2010 – 2017. The data for this study is collected from the Infegy Atlas social media database (a US company that gathers data from social media conversations), Thomson Reuters' Asset4 and Compustat. **Method/Tools:** The pooled ordinary least squares (OLS) regression with robust standard errors technique and the Propensity score matching (PSM) analysis are deployed. **Findings:** We first study how negative social media sentiments effects capital structure by examining the level of leverage, cost of debts, and the term to maturity of firms. Our results suggest that firms that receive a significant amount of negative SMS will have a higher leverage, cost of debt and term to maturity. We further offer evidence that shows how Corporate Social Responsibility performance and firm size influence the negative SMS-capital structure nexus. **Contributions:** This the first study to examine the impact of negative SMS on capital structure. Our findings from this research add to the emerging debate on the role of SMS in affecting firm financial outcomes and performances. Our findings provide novel perspectives that carry notable implications for corporate strategies concerning capital structure and enhance the comprehension of stakeholders, including investors and creditors, regarding the factors influencing a firm's capital structure.

Keywords: Negative social media sentiments, capital structure, leverage, cost of debts, term to maturity, Fortune 500.

JEL Classification: O33, G39, M14

* Corresponding author: Samuel Jebaraj Benjamin. Tel.: +64-78379578.

Email: samuel.benjamin@waikato.ac.nz

Received 19 Apr 2023; Final revised 19 Jul 2023; Accepted 15 Sep 2023; Available online 30 Sep 2023.

To link to this article: https://www.mfa.com.my/cmr/v31_i2_a3/

© Malaysian Finance Association, 2023. This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Social media encompasses internet-based applications and enables individuals to create, communicate, and exchange information or opinions on electronic platforms and networks.¹ In contrast to conventional media (e.g., newspapers, TV, and radio), social media is widely reachable and allows anybody to share information and views (Lee *et al.*, 2015). The attractiveness of social media has increased dramatically in recent years. Out of the worldwide population of 7.83 billion in 2021, about 4.2 billion people use social media (Digital 2021: Global Overview Report: <https://datareportal.com/reports/digital-2021-global-overview-report>).² Given the immense acceptance and popularity of social media, sentiments expressed in social media can reach broad audiences and have considerable influence on stakeholder perspectives of firms as well as on firms' operating and financing decisions (Schmidt *et al.*, 2020).

As the use of social media has become increasingly prevalent in people's daily lives, a stream of research has begun to investigate whether and how social media sentiments (SMS) effect a firm's financial outcomes such as its value and performance. These studies have demonstrated the usefulness of social media sentiments in affecting firm value, performance, financial distress, and revenue (Benjamin *et al.*, 2022; Dunham *et al.*, 2021; Nguyen *et al.*, 2020; Bartov *et al.*, 2018; Sonnier *et al.*, 2011; Luo, 2007; Chevalier and Mayzlin, 2006). Both academic research and the trade press suggest that it is more important to investigate negative SMS than positive SMS. Negative SMS is more important in influencing financial markets (Agrawal *et al.*, 2018), impairing corporate reputations (Luo *et al.*, 2013) and causing more financial damage (Luo, 2009; Chevalier and Mayzlin, 2006) than the corresponding benefits of positive SMS. Hence, firms may prioritise attention towards understanding the implications of negative SMS and adjust their strategies and decisions accordingly. Interestingly, while prior studies provide information on the unfavourable effects of negative SMS on firm performance, value, financial distress and revenue, little is known about the effect of social media sentiments on capital structure. Yet capital structure determination is considered one of the key decisions for any corporations (Akhtar, 2005).

This study investigates how negative SMS affects the capital structure of firms. Following prior studies (e.g., Garcia and Herrero, 2021), we examine the following capital structure attributes: leverage, cost of debt, and debt maturity. We argue that the implications of negative SMS on capital structure are threefold. First, investors and creditors are becoming increasingly aware of the value of SMS and recognise the connection between social media communication and the effect on companies' business performance (Dunham *et al.*, 2021; Luo, 2009). Therefore, negative SMS may influence shareholders unfavourably and reduce their support, limiting firms from accessing external financial resources and decreasing a firm's proportion of external equity in the capital structure. As a result, these firms need to seek alternative external financial resources, such as debts, and this could lead to higher leverage. Second, creditors may consider the increased risk to firms emanating from negative SMS when determining the cost of debt capital. As a result, firms with more negative SMS may have a higher cost of debt. Third, we consider how negative SMS affects debt maturity. On the one hand, negative SMS can impair financial performance and reduce cash flows (Luo, 2009). On the other hand, short-term debt is subject to more frequent renewals and refinancing (Li and Zhang, 2019). Hence, firms with more negative SMS, which are predisposed to performance and cash flow risk, may be less likely to use short-term debt, given that creditors may regularly incorporate the unfavorableness of negative SMS into their lending decisions. Thus, firms with more negative SMS may have a higher debt maturity.

¹ Mainstream social media platforms include Facebook, Twitter, Instagram, Pinterest, Reddit, Weibo, and TikTok.

² This equates to 53.6% of the global population being active social media users.

Next, we bear comparison with studies on the implications of Corporate social responsibility (CSR) performance and capital structure and instinctively investigate their links with negative SMS.³ CSR has emerged as a dominant topic and top priority for businesses in current times (Zolotoy *et al.*, 2019; Lu *et al.*, 2014). Over the last decade, CSR initiatives are increasingly being considered as an important consideration for investors and creditors (Benlemlih *et al.*, 2018). Prior literature presents mixed evidence on the implications of CSR on leverage, cost of debt, and debt maturity (García and Herrero, 2021; Lemma *et al.*, 2021; La Rosa *et al.*, 2018; Attig *et al.*, 2013; Wang *et al.*, 2008). Our research delves further by exploring whether CSR performance influences the association between negative SMS with leverage, cost of debt, and debt maturity. We surmise that CSR could either attenuate or amplify investor and creditor concerns over negative SMS and this could have an impact on the capital structure choices of firms. Empirically, this continues to be an interesting, and yet unanswered question. Lastly, we examine whether firm size will influence the association between negative SMS and capital structure. Firm size is empirically documented to have an important bearing on capital structure decisions (González and González, 2012; Kurshev and Strebulaev, 2015). Large firms generally have more opportunities to access external equity capital, more bargaining power to negotiate lower interest rates, and prefer short-term debt (Dennis and Sharpe, 2005; Titman and Wessels, 1988). These strands of evidence would imply that investor and creditor concerns over negative SMS could be lower for larger firms. Hence, the influence of negative SMS on leverage, cost of debt, and debt maturity may be influenced by firm size. However, empirically, this remains unexplored.

Based on a group of Fortune 500 corporations between the period 2010 - 2017, we examine how negative SMS influence capital structure by examining the level of leverage, cost of debt, and debt maturity. Our results show that negative SMS is significantly associated with higher leverage, cost of debt and debt maturity. Nevertheless, our findings are mixed when we explore the influence of CSR performance and firm size on the relationship between negative SMS and capital structure. Our findings indicate that the relationship between negative SMS and leverage is significant only in firms with high CSR performance. We also show that the significant and positive relationship between negative SMS and cost of debt stays consistent in firms with low and high CSR performance but the association between negative SMS and debt maturity becomes insignificant for both sub-sample groups. When we divide our sample into firms with small and large size, we discover that the association between negative SMS and leverage is significant only in small firms. However, the effects of negative SMS on cost of debt and debt maturity are consistently significant across the sub-samples tests. Our results are strengthened by a battery of robust estimations.

Our study contributes to the literature in several ways. First, the results from this research add to the emerging debate on the role of SMS in affecting firm financial outcomes and performances (Nguyen *et al.*, 2020; Schmidt *et al.*, 2020; Bartov *et al.*, 2018). In this study, we investigate another important firm attribute: capital structure. Our findings, which show that negative SMS can significantly increase leverage and the cost of debt, complement the findings from prior literature on SMS and capital structure (Benjamin *et al.*, 2022; García and Herrero 2021; Nguyen *et al.*, 2020; Dunham *et al.*, 2021; McAlister *et al.*, 2012). Prior research in this area has largely emphasized on the adverse effects of negative SMS (Luo *et al.*, 2013; Luo, 2007, 2009) and our study broadens this strand of literature by examining how negative SMS affects the capital structure decisions of firms. Second, we also extend the literature on CSR by investigating how the role of negative SMS, which shapes firm capital structure, varies with firms' CSR performance levels. Our findings highlight the significance of CSR in influencing firm capital structure, and also add a further dimension to the existing

³ In this research, we employ the terms 'CSR' interchangeably with environmental, and social and governance (ESG) performance similar to Lu *et al.* (2014), Fatemi *et al.* (2018) and Choi *et al.* (2018).

literature on CSR and capital structure (Lemma *et al.*, 2021; Benlemlih *et al.*, 2018; La Rosa *et al.*, 2018; Attig *et al.*, 2013; Wang *et al.*, 2008). Finally, our research connects the importance of firm size to capital structure with negative SMS. We provide important insights by demonstrating how the effects of negative SMS on capital structure is differs between smaller-sized and larger-sized firms. In sum, Our findings suggest that negative SMS, and the influence of CSR and firm size, play important roles in determining firm capital structure. Therefore, our findings can also inform investors and creditors in making important financial decisions.

The rest of the paper is organized into four sections. The following section provides the review of related literature and the development of our hypotheses. Next we discuss our methodology and data. This is followed by the presentation of our results and our conclusion, noting also the limitations of our study and the future research opportunities it presents.

2. Literature Review and Hypotheses Development

2.1 Capital Structure

An appropriate capital structure is a critical decision for any business organization. Some of the main theories that have been put forward in the extant literature on capital structure are trade-off theory (Modigliani and Miller, 1963), pecking order theory (Myers & Majluf, 1984; Myers, 1984), and agency theory (Jensen, 1986). Although most studies have primarily concentrated on a single capital structure attribute, namely leverage, cost of debt, or debt maturity, Garcia and Herrero (2021) argue that these attributes or proxies are related and should be examined alongside each other. Hence, future studies are encouraged to consider all three proxies to provide a more complete picture of a firm's capital structure. The consideration of social media sentiments in the realm of capital structure studies is relatively new and in its infancy. In this regard, although there is no prevailing theory that directly addresses this new line of research, the choice of capital structure attributes (leverage, cost of debt, and debt maturity structure) may be influenced by social media sentiments. Because social media sentiments can equip market participants, such as investors and creditors with clues about a firm's prospects, potential future performance, risks, and its stakeholder and customer support, SMS may serve as an important indicator of capital structure. This study specifically examines whether negative social media sentiments influence the capital structure of firms.

2.2 Social Media Sentiments

Since the last decade, a stream of research has investigated how social media platforms affect firm financial outcomes and strategies. Recently, social media analytics have enabled researchers to collect data from social media applications, and to analyze, decode, and comprehend users' perspectives of firms. Prior literature reveals that approximately 20% of all social media content is regarding corporations (Jansen *et al.*, 2009). Social media often contains regular discussions regarding the actions of corporations, such as changes in strategies, restructuring, handling of public policies, and reactions to current events (IBM, 2017). Compared with conventional media such as radio and television, social media is increasingly emerging as the favored platform for public and customers to share their thoughts and views and source for information (Bartov *et al.*, 2018). Accordingly, researchers have paid increasing attention to the observability and measurement of SMS to study the effects of these sentiments on firms' financial performance and decisions such as capital structure.

The 'Wisdom of Crowds' concept is relevant in understanding how SMS may influence the capital structure of firms (Surowiecki, 2004).⁴ Social media platforms are resources for

⁴ The 'Wisdom of Crowds' notion implies that information accumulated from a big sample of non-experts provides better predictive capability than information from any individual expert. For example, Surowiecki (2004) presents

stakeholders such as shareholders, creditors, and social media analysts to access the wisdom of crowds. They believe that the accumulation of information generated by social media users frequently forecasts outcomes more accurately than predictions by experts (Bartov *et al.*, 2018). Views and comments expressed in social media have been increasingly regarded as an important pool of contemporary information for shareholders and creditors to predict firm financial outcomes (Chen and Xie, 2008; Gu *et al.*, 2012). For example, previous literature document that comments and opinions voiced on social media effect a corporation's financial performance such as sales, cash flows, the price of products or services, stock returns, and volatilities (McAlister *et al.*, 2012; Luo, 2009; Dhar and Chang, 2009). Shareholders and creditors realize how the wisdom of crowds may contribute to interpreting the association between SMS and firm financial performance. As financial market participants endeavour to benefit from the wisdom of crowds, sentiments expressed in social media provides a vital source of information for investors and creditors that may shape a firm's capital structure.

2.3 Negative Social Media Sentiments and Capital Structure

Negative social media sentiment is a demonstration of criticisms or representations of displeasure by the public or customers of social media about a corporation, in which experiences of being displeased with the company are shared (Luo, 2007). As discussed previously, investigation of negative SMS is particularly important as it appears to have greater implications for corporations than positive SMS (Agrawal *et al.*, 2018; Luo *et al.*, 2007, 2013). Negative SMS is typically recognized from words or phrases such as “angry” and statements like “I hate it” (Nguyen *et al.*, 2020) and it has an adverse and contagion effect on the wider stakeholder group (Haidt, 2001). Prior studies have demonstrated the unfavourable effects of negative SMS on stock returns and financial markets (Nguyen *et al.*, 2020; Yu *et al.*, 2013; Luo *et al.*, 2013, 2009). Negative customer reviews online have also been found to be forceful in reducing sales (Chevalier and Mayzlin, 2006). Likewise, some studies find that negative sentiments impair firms' future equity returns (Chen *et al.*, 2014; Luo, 2007). That said, there are also a handful of studies which find that negative SMS does not exhibit significant effects on a firm's financial distress (Dunham *et al.*, 2021) and stock returns (Chen *et al.*, 2012).

We surmise that the consequences of negative SMS on the capital structure of firms are threefold. First, shareholders are growing ever more aware of the value of SMS and recognize its influence on firms' business performance (Luo, 2009). Therefore, shareholders use SMS as proxies for unobserved revenue, cash flows, and firm value (McAlister *et al.*, 2012; Luo, 2009). The intuition is that when firms receive a considerable amount of negative SMS, shareholders may consider such firms as less attractive investments. Along this line, we argue that negative SMS will hinder the efforts of firms to access external equity financing and decrease a firm's proportion of external equity in the capital structure. As a result, firms eliciting a great deal of negative SMS may need to seek alternative external financial resources, such as debts, leading to a higher level of leverage.

Next, we expect that firms with more negative SMS will incur higher cost of debts. As argued earlier, negative SMS can unfavourably impact a corporation's business performance such as revenue, cash flows, price of products or services, equity returns and volatilities (McAlister *et al.*, 2012; Luo, 2009; Dhar and Chang, 2009). In particular, negative SMS can be a signal that firms may be facing greater financial risks. When determining the cost of debt capital, creditors will assess risks comprehensively and consider negative SMS as an indication that the borrower carries greater risk (Chen *et al.*, 2012; Luo *et al.*, 2013). As a

scenarios and examples to describe the ‘Wisdom of Crowds’ idea. A typical illustration of this idea is the discovery by Sir Francis Galton in the 20th century that the average estimate of a group at a country fair more precisely projected the weight of an ox, as opposed to the projections made by cattle experts (Van Dolder and Van den Assem, 2018).

result, we can expect that firms with more negative SMS would incur a higher cost of debt. Furthermore, if negative SMS also leads to higher leverage in general, such a scenario would likewise influence creditors' decisions on the cost of debt. Indeed, prior literature suggests that a higher level of leverage poses greater risks, such as risks of failure or bankruptcy (García and Herrero, 2021).

Finally, we examine the impact of negative SMS on debt maturity. Debt maturity decision may be defined as the choice that has to be made between short-term and long-term debt (La Rocca *et al.*, 2020) and is typically measured as the proportion of long-term debt to the total debt of a firm. Prior studies suggest that safer firms, which have less risk and more stable cash flows, are likely to choose short-term debt over long-term debt to signal their high quality to the market (Diamond, 1991; Flannery, 1986).⁵ However, debts with short maturities are subject to more frequent renewal and refinancing (Li and Zhang, 2019). Short-term creditors can review a firm's performance and decisions more frequently (Demirguc-Kunt and Maksimovic, 1999) given that they are subject to more regular renewals. Since negative SMS is a signal of poor corporate reputation (Luo *et al.*, 2013) and can reduce cash flows, short-term debt becomes a less attractive source of financing for firms with negative SMS as it exposes these firms to higher liquidity and credit risk (Luo, 2009; Diamond, 1991). All else being the same, firms that receive large amounts of negative SMS will be less inclined to use short-term debts as their source of finance given that creditors could regularly give consideration to negative SMS in their lending decisions. As a result, firms attracting significant negative SMS are more likely to use long term debt. Given that direct prior evidence on these associations are not available, we propose the following hypotheses in the null format below:

H1a: There is no association between negative SMS and leverage.

H1b: There is no association between negative SMS and cost of debt.

H1c: There is no association between negative SMS and term to maturity.

2.4 The Influence of CSR on the SMS-Capital Structure Relation

In this section, we examine the influence of CSR on the relationship between SMS and capital structure. In relation to leverage, some prior studies argue that investors regard CSR as a valuable pursuit for businesses and an appeal of greater customer and stakeholder support, profitability, and shareholder wealth (Benjamin *et al.*, 2022; Radhouane *et al.*, 2018; Castaldo *et al.*, 2009; Bendixen and Abratt 2007; Porter and Kramer, 2006; McWilliams and Siegel, 2001; Sen and Bhattacharya, 2001; Berman *et al.*, 1999). Following this line of evidence would imply that the concerns of investors over negative SMS, as explained earlier, could be eased in firms with better CSR and, hence, encourage investors to invest in these firms. This may enable firms to seek higher equity financing and, as a result, the positive relationship between negative SMS and leverage might be statistically insignificant in firms with high CSR performance but significant in firms with low CSR performance. However, some studies argue that investors may consider CSR a costly pursuit that reduces shareholder value (Benjamin *et al.*, 2022; Kruger, 2015; Navarro, 1988). In this case, concerns over negative SMS may be intensified with better CSR, further limiting investor support and further elevating the need for firms to decrease their proportion of equity in the capital structure. As a result, the positive relationship between negative SMS and leverage might be statistically insignificant in firms with low CSR performance but significant in firms with high CSR performance.

⁵ The terms 'high-quality' and 'low-quality' firms denote low credit risk firms and high credit risk firms respectively (Diamond, 1991).

There is mixed evidence around how CSR influences the cost of debt. Some studies find that better CSR reduces information asymmetry and increases demand for debt issues, thereby facilitating firm access to lower-cost external financing and lowering costs of debt (La Rosa *et al.*, 2018; Fishman and Hagerty, 1989; Verrechia, 1983). While firms with high CSR ratings have been reported to experience higher customer support, profitability, growth, and sales (Radhouane *et al.*, 2018; Lins *et al.*, 2017), poor CSR records may present significant risks in future clean-ups or compliance costs that threaten the ability of firms to meet their repayments to creditors (Bhuiyan and Nguyen, 2020; Schneider, 2011). Superior CSR is argued to be able to reduce firm operational risk exposure, lower cash flow volatility, risk, and consequently, the cost of debt (Erragragui *et al.*, 2018). Given this line of evidence, creditors' assessment of added risk from negative SMS, when determining the cost of debt, may be mitigated in firms with better CSR. Hence, the positive relationship between negative SMS and cost of debt might be statistically insignificant in firms with high CSR performance but significant in firms with low CSR performance. However, some studies do not find superior CSR to benefit firms in the form of a lower cost of debt (Wang *et al.*, 2008; Armitage and Marston, 2008). The assessment of negative SMS as a signal of a firm's additional riskiness by creditors may not necessarily be eased by the firm's strong CSR performance. As a result, the positive relationship between negative SMS and leverage might be statistically significant, both in firms with high and low CSR performance.

Finally, we explore possible explanations of the role of CSR performance on the relationship between SMS and debt maturity. The influence CSR wields on debt maturity continues to be an area that is under researched and one which has produced mixed findings. Some studies find that firms with better CSR exhibit higher stability and lesser risk and, hence, are more likely to use short-term debt (Benlemlih *et al.*, 2018; Attig *et al.*, 2013; Goss and Roberts, 2011). Additionally, as high-quality firms are more likely to assume more short-term debt to indicate their high quality to the market and to make the most of their high credit rating (Diamond, 1991), firms with better CSR, which are typically perceived as less risky, may be more likely to be associated with the use of short-term debt (Benlemlih *et al.*, 2018). This line of argument would suggest that the added risk from negative SMS to firms may, as explained earlier, be eased in firms with better CSR. As a result, the positive relationship between negative SMS and debt maturity might be statistically insignificant in firms with high CSR performance but significant in firms with low CSR performance. That said, some studies argue that firms which are highly committed to the disclosure of CSR have improved transparency and, hence, have a reduced need to issue short-term debts to signal their quality (Lemma *et al.*, 2021) and could prefer long term debts that is subject to less regular renewals. In this case, the positive relationship between negative SMS and debt maturity might be statistically insignificant in firms with low CSR performance but significant in firms with high CSR performance.

In sum, it is unclear how CSR performance influences the association between negative SMS and capital structure since there is no prior evidence on these associations. Hence, the following hypotheses are proposed in the null format below:

H2a: The effect of negative SMS on leverage does not differ between firms with low and high CSR performance.

H2b: The effect of negative SMS on cost of debt does not differ between firms with low and high CSR performance.

H2c: The effect of negative SMS on debt maturity does not differ between firms with low and high CSR performance.

2.5 The Influence of Firm Size on the SMS-Capital Structure Relation

Our sample for this study encompasses large-sized Fortune 500 firms on the basis of their total assets are. However, even within this group, the largest firms on average, are more than fifty times the size of the smallest firms (<https://fortune.com/fortune500/>). Prior literature widely documents that firm size has an important influence on capital structure (González and González, 2012; Kurshev and Strebulaev, 2015). The intersection of prior literature on firm size and capital structure with our previous arguments for the baseline hypotheses in Section 2.3 above, suggest that the relationship between negative social media sentiments and capital structure could be influenced by firm size. First, the literature reveals that larger firms are more diversified and have easier access to the equity markets (Titman and Wessels, 1988). Therefore, large firms are more likely to have lower leverage levels since they have more opportunities to access the equity capital. Second, large firms usually have more bargaining power to negotiate lower interest rates (Dennis and Sharpe, 2005). In addition, lenders are more likely to offer lower interest rates to large firms, because lenders consider large firms as low-risk borrowers (Ferri and Jones, 1979). As a result, large firms can borrow at more favourable interest rates. Finally, large firms usually have high credit ratings and prefer short-term debt because their exposure to the risk of not obtaining refinancing when their debt matures is relatively low (Dennis and Sharpe, 2005). Hence, concerns of investors and creditors over negative SMS may, as explained earlier, be eased in larger firms, and possibly enable firms to have lower leverage, cost of debt, and debt maturity. As a result, the positive relationship between negative SMS with leverage, cost of debt, and debt maturity might be statistically insignificant in larger-sized firms but significant in firms with smaller-sized. However, since there is no prior evidence on these direct associations, the following hypotheses are proposed in the null format below:

- H3a: The effect of negative SMS on leverage does not differ between smaller-sized and larger-sized firms.*
- H3b: The effect of negative SMS on cost of debt does not differ between smaller-sized and larger-sized firms.*
- H3c: The effect of negative SMS on debt maturity does not differ between smaller-sized and larger-sized firms.*

3. Data and Sample Selections

3.1 Sample

The sample for this study consisted of Fortune 500 firms over an 8-year period from 2010 to 2017. We exclude companies from the financial industry because they exhibit different characteristics as compared to firms from other industries. The final firm-year observations amounted to 2,331 after further excluding any observations with missing data. Our sample is compiled from three sources: the Infegy Atlas social media database, the Thomson Reuters' Asset4 database, and the Compustat database. Infegy Atlas is a U.S.-based company that utilizes data gathering techniques to scour billions of conversations from various social media sites, news, online reviews, blogs, and forums. Examples of social media sites include Facebook, Twitter, Instagram, Snapchat, Tumblr, TikTok, and Weibo. Infegy uses algorithms to identify data patterns in order search, classify, cluster, and relate social media conversations and subsequently perform sentiment analysis using natural language processing techniques. The use of Infegy database in research is gaining popularity and examples of recent studies that use Infegy include Benjamin *et al.* (2022) and Nguyen *et al.* (2020). CSR is sourced from DataStream's Asset4 database. All the financial data, such as the dependent variables and control variables, are retrieved from the Compustat database. The definition of all the variables is shown in Table 1.

3.2 Variables Measurement

The outcome variables in this study are the capital structure of the firm (leverage, cost of debt, and debt maturity). Leverage (*LEV*) is measured as the total book value of debt (long-term and short-term debt) divided by total assets, cost of debt (*COD*) is computed as the ratio of financial expenses to total debt, and term to maturity (*MAT*) is calculated as the fraction of long-term debt to total debt, consistent with Garcia and Herrero, (2021).

Infegy utilizes Artificial Intelligence in gathering the social media sentiments data. Similarly, the Natural Language Understanding (NLU) technique, alongside the lexicon analysis are employed in extracting and classifying the social media data into positive and negative sentiments. Infegy derives social media sentiments through the following procedures: (a) extraction of social media data with Python software; (b) cleansing of data to eliminate non-operational words such as spaces, website links, etc., to recognize the source or essence of the words; (c) recognising social media sentiments into positive and negative sentiments via lexicon analysis; and (d) further recognizing and decoding more complicated word patterns into positive and negative sentiments employing natural language processing techniques.⁶ For instance, words or phrases such as “furious” and “I hate it” are classified as negative SMS (Nguyen *et al.*, 2020). The variable of interest from social media for this study is negative SMS. Negative SMS (*NEGATIVE*) is calculated as the ratio of the number of negative SMS to total number of negative and positive SMS expressed in social media about a firm.

In line with prior literature, we control for a number of variables commonly used in research on capital structure and social media sentiments (Garcia and Herrero, 2021; Benjamin *et al.*, 2022; Nguyen *et al.*, 2020; Schmidt *et al.*, 2020). These variables are ESG scores (*CSR*), firm size, measured as the natural logarithm of total assets (*SIZE*), net income before interest, tax, depreciation and amortization divided to total assets (*ROA*), growth opportunities calculated as the market-to-book ratio (*M2B*), capital intensity computed as the ratio of a firm’s capital expenditure to total assets (*CAPIN*), liquidity calculated as working capital divided by total assets (*LIQ*), variability of *ROA* computed as the standard deviation of *ROA* for the past 5 years (*SD_{ROA}*) and asset tangibility computed as plant, and equipment to total assets (*TAN*).

The *CSR* data – composite environmental, social and governance performance (ESG) scores (*ENV*) -- are retrieved from the Thomson Reuters’ Asset4 database. Asset4’s ESG scores are customary and suitable proxies for a firm’s *CSR* performance (Choi *et al.*, 2018; Luo *et al.*, 2015). Thomson Reuters’ Asset4 yearly formulates its *ESG* scores that are equally weighted by gathering information from multiple sources (e.g., annual reports, websites, *CSR* reports, news) (Benjamin and Biswas, 2022). The aggregate *ESG* score is comprised of 90 indicators from the environmental dimension, 63 indicators from the social dimension (*ENV*) and 54 indicators from the governance dimension. The score for *ESG* ranges from zero for the lowest ratings to 100 for the maximum ratings.

⁶ For instance, consider the following two words/phrases that mention the word “like”: “I like Campbell Soup” and “That tastes like Campbell Soup”. The first phrase reflects an sentiment, whereas the second phrase latter does not. Infegy uses data mining techniques where the terms are clustered and association rules are applied to ascertain the patterns.

Table 1: Variable definitions

Variable	Definition
<u>Dependent variables</u>	
<i>LEV</i>	<i>Leverage</i> : total book value of debt (long-term and short-term debt) divided by total assets
<i>COD</i>	<i>Cost of debt</i> : ratio of financial expenses to total debt
<i>MAT</i>	<i>Term to maturity</i> : fraction of long-term debt to total debt
<u>Main variable</u>	
<i>NEGATIVE</i>	<i>Negative SMS</i> : calculated as the ratio of the number of negative SMS to total number of negative and positive SMS expressed in social media.
<u>Control variables</u>	
<i>SIZE</i>	<i>Firm size</i> : natural logarithm of total assets
<i>LIQ</i>	<i>Liquidity</i> : working capital divided by total assets
<i>ROA</i>	<i>Profitability</i> : EBITDA divided by total assets
<i>CAPIN</i>	<i>Capital intensity</i> : ratio of a firm's capital expenditure to total assets
<i>M2B</i>	<i>Growth opportunities</i> : market-to-book ratio
<i>SD_{ROA}</i>	<i>Variability of ROA</i> : standard deviation of ROA for the past 5 years prior to the current period)
<i>CSR</i>	Composite Environmental, Social and Governance scores of Thomson Reuters' Asset4 based on 178 key indicators and more than 750 data points.
<i>TAN</i>	<i>Tangible assets</i> : net property, plant, and equipment divided by total assets

3.3 Modelling Capital Structure and Negative SMS

We examine the impact of negative SMS of firms on capital structure using the following empirical models:

$$\begin{aligned}
 LEV_{i,t} = & \alpha + \beta_1 NEGATIVE_{i,t-1} + \beta_2 CSR_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LIQ_{i,t-1} \\
 & + \beta_5 ROA_{i,t-1} + \beta_6 CAPIN_{i,t} + \beta_7 M2B_{i,t-1} + \beta_8 SDROA_{i,t-1} \\
 & + \beta_9 TAN_{i,t-1} + INDUSTRY_i + YEAR_t + \varepsilon_{i,t}
 \end{aligned} \quad (1)$$

$$\begin{aligned}
 COD_{i,t} = & \alpha + \beta_1 NEGATIVE_{i,t-1} + \beta_2 CSR_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LIQ_{i,t-1} \\
 & + \beta_5 ROA_{i,t-1} + \beta_6 CAPIN_{i,t} + \beta_7 M2B_{i,t-1} + \beta_8 SDROA_{i,t-1} \\
 & + \beta_9 TAN_{i,t-1} + INDUSTRY_i + YEAR_t + \varepsilon_{i,t}
 \end{aligned} \quad (2)$$

$$\begin{aligned}
 MAT_{i,t} = & \alpha + \beta_1 NEGATIVE_{i,t-1} + \beta_2 CSR_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LIQ_{i,t-1} \\
 & + \beta_5 ROA_{i,t-1} + \beta_6 CAPIN_{i,t} + \beta_7 M2B_{i,t-1} + \beta_8 SDROA_{i,t-1} \\
 & + \beta_9 TAN_{i,t-1} + INDUSTRY_i + YEAR_t + \varepsilon_{i,t}
 \end{aligned} \quad (3)$$

where *LEV*, *COD* and *MAT* represent leverage, debt maturity, and cost of debt, respectively, for firm *i* at year *t*. Eqs. (1), (2) and (3) are estimated based on the pooled ordinary least squares (OLS) regression with robust standard errors technique. The outcomes variables and firm-specific financial control variables are winsorized at the 1st and 99th percentiles. All our regressions also contain indicator variables for industry effects based on the two-digit Global Industry Classification Standard (GICS) codes and year effects.

In order to assess the influence of *CSR* performance on the effect of negative SMS on capital structure, we divide the sample into two sub-groups and rerun Eq. (1), (2) and (3). Specifically, firms with ESG scores below the median are classified as 'Low CSR' group and firms with ESG scores above the median are classified as 'High CSR' group. Similarly, in order to examine the influence of firm size on the effect of negative SMS of firms on capital structure, we divide the sample into two sub-groups and rerun Eq. (1), (2) and (3). Specifically, firms with the values of *SIZE* below the median are classified as 'Small Size' group and firms with the values of *SIZE* above the median are classified as 'Large Size' group.

Table 2: Descriptive statistics

Variable	N	Mean	SD	p25	Median	p75	Min	Max
<i>LEV</i>	2331	0.289	0.177	0.164	0.262	0.391	0.000	0.847
<i>MAT</i>	2279	0.882	0.164	0.841	0.940	0.989	0.014	1.000
<i>COD</i>	2255	0.052	0.046	0.033	0.046	0.059	0.008	0.484
<i>NEGATIVE</i>	2331	0.284	0.113	0.206	0.274	0.350	0.000	1.000
<i>CSR</i>	2331	48.595	17.784	35.300	48.330	61.840	5.650	92.530
<i>SIZE</i>	2331	9.581	1.133	8.775	9.486	10.348	5.956	13.004
<i>LIQ</i>	2331	0.146	0.146	0.038	0.125	0.241	-0.134	0.592
<i>ROA</i>	2331	0.065	0.061	0.033	0.062	0.096	-0.212	0.227
<i>CAPIN</i>	2331	0.046	0.040	0.020	0.035	0.058	0.003	0.233
<i>M2B</i>	2331	4.273	6.778	1.833	3.002	5.022	-19.903	35.727
<i>SD_{ROA}</i>	2331	0.032	0.034	0.012	0.021	0.037	0.001	0.211
<i>TAN</i>	2331	0.269	0.214	0.095	0.201	0.392	0.014	0.857

Notes: p25 and p75 = 25th and 75th percentile of the variables, respectively. SD and N denotes standard deviation and number of observations, respectively. Definitions of all variables are presented in Table 1.

4. Empirical Results

4.1 Descriptive Statistics and Correlation Analysis

The descriptive statistics is presented in Table 2. The mean (median) value of *LEV* is 0.289 (0.262). The average *COD* of the sample firms is 0.052 and ranges between 0.008 and 0.484. Term to maturity (*MAT*) constitutes 88.2% of the total debt. *NEGATIVE* has a mean of 0.284 and median of 0.274. Other control variables such as *CSR* and *SIZE* have means of 48.595, and 9.581 respectively. Next, the results of the correlation matrix between all the variables are presented in Table 3. Results indicate that multicollinearity is not likely to be a main concern, as none of the independent variables have correlations higher than 0.8. Next, we present the results of the tests of our multivariate analyses.

4.2 Multivariate Analysis

Table 4 presents the results regarding the influence of negative social media sentiments on leverage (Column 1), cost of debt (Column 2), and term to maturity (Column 3). These results show a significant and positive relationship (*LEV*; coefficient = 0.063, $p < 0.10$), (*COD*; coefficient = 0.029, $p < 0.01$) and (*MAT*; coefficient = 0.064, $p < 0.5$) and support the conjecture that: a firm's capital structure is adversely affected by negative social media sentiments. Specifically, a one standard deviation increase in *NEGATIVE* is associated with a 0.025 ($=0.063 \times 0.113 / 0.289$) increase in the *LEV* at the mean. Similarly, a one standard deviation increase in *NEGATIVE* is associated with a 0.063 ($=0.029 \times 0.113 / 0.052$) and 0.008 ($=0.064 \times 0.113 / 0.882$) increase in *COD* and *MAT* at the means, respectively). Therefore, the null hypothesis *H1a* could be rejected, as our results suggest that negative SMS influences shareholders unfavorably, restricts firms' access to external financial resources, and reduces a firm's proportion of external equity in the capital structure, leading to higher levels of leverage. Likewise, *H1b* could be rejected as the results suggest that negative SMS signals greater financial risks and affects creditors' risk assessment of firms unfavorably, leading to a higher cost of debt. Finally, *H1c* could be rejected as the result indicates that short-term debt becomes less attractive for firms that are more exposed to negative SMS and, hence, are more likely to use long-term debt. In terms of the control variables, the coefficient of *SIZE* is negative and significant across all three measures of capital structure while *TAN* is positive and significant across all three measures of capital structure. *CAPIN* is only negative and significant in Column (1) for *LEV* and in Column (3) for *MAT*. Similarly, *SD_{ROA}* is only positive and significant in Column (3) for *MAT*.

Table 3: Correlations table

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
[1] <i>LEV</i>	1.00											
[2] <i>MAT</i>	0.09***	1.00										
[3] <i>COD</i>	-0.19***	-0.07***	1.00									
[4] <i>NEGATIVE</i>	0.02	0.03	0.00	1.00								
[5] <i>CSR</i>	-0.04*	0.01	-0.11***	-0.00	1.00							
[6] <i>SIZE</i>	-0.01	-0.04*	-0.19***	0.33***	0.22***	1.00						
[7] <i>LIQ</i>	-0.30***	0.01	0.09***	-0.05**	-0.06***	-0.29***	1.00					
[8] <i>ROA</i>	-0.22***	-0.05**	0.01	-0.05***	0.14***	-0.00	0.19***	1.00				
[9] <i>CAPIN</i>	0.06***	0.09***	0.06***	0.06***	-0.05**	0.01	-0.22***	-0.05***	1.00			
[10] <i>M2B</i>	0.03	-0.02	-0.04**	0.02	0.04**	-0.01	-0.03	0.14***	0.01	1.00		
[11] <i>SD_{ROA}</i>	-0.00	0.09***	0.02	0.09***	0.02	0.03	0.08***	-0.18***	0.25***	-0.03	1.00	
[12] <i>TAN</i>	0.18***	0.14***	0.04*	0.08***	0.01	0.12***	-0.36***	-0.11***	0.73***	-0.05**	0.14***	1.00

Notes: *** and ** denote statistical significance at the 10%, 5% and 1% level, respectively. Definitions of all variables are presented in Table 1.

Table 4: Negative social media sentiments and capital structure

Dependent variable	<i>LEV</i> (1)	<i>COD</i> (2)	<i>MAT</i> (3)
<i>NEGATIVE</i>	0.063* (1.93)	0.029*** (3.65)	0.064** (2.14)
<i>CSR</i>	-0.001*** (-2.68)	-0.000 (-1.32)	0.000** (2.17)
<i>SIZE</i>	-0.012*** (-3.52)	-0.008*** (-7.82)	-0.013*** (-3.27)
<i>LIQ</i>	-0.294*** (-10.19)	0.006 (0.80)	0.073** (2.24)
<i>ROA</i>	-0.529*** (-7.22)	0.010 (0.54)	-0.081 (-1.41)
<i>CAPIN</i>	-0.543*** (-3.86)	-0.009 (-0.24)	-0.210** (-2.09)
<i>M2B</i>	0.001 (0.94)	-0.000*** (-2.85)	-0.000 (-0.40)
<i>SD_{ROA}</i>	0.052 (0.46)	0.029 (1.12)	0.344*** (3.73)
<i>TAN</i>	0.213*** (8.06)	0.015*** (3.25)	0.151*** (8.21)
Constant	0.438*** (12.98)	0.125*** (13.90)	0.943*** (22.28)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Adj R ²	0.214	0.077	0.051
F-statistic	32.106	15.054	8.831
N	2,331	2,255	2,279

Notes: This table presents the estimation results of the relationship between social media sentiments (SMS) and capital structure. *t*-statistics are based on robust standard errors and are in parentheses. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Definitions of all variables are presented in Table 1.

Table 5 shows the results for the sub-sample analysis for Hypotheses 2a - 2c. Columns (1) and (2) report the sub-sample analysis for the influence of CSR performance on the relationship between *NEGATIVE* with leverage (*H2a*). The results show that in the case of firms with low CSR performance (Column 1), the relationship between *NEGATIVE* and *LEV* is not significant. However, in firms with high CSR performance, the coefficient of *NEGATIVE* on *LEV* loads positively and significantly at the 5% level. Hence, the null hypothesis *H2a* could be rejected as the results show that the effect of negative SMS on leverage does differ between firms with low and high CSR performance. Overall, these results are supportive of the conjecture that investors view CSR as a costly pursuit (Benjamin *et al.*, 2022), and hence, their concerns over negative SMS are intensified in firms with high CSR performance, further limiting investors' support and elevating the need for firms to decrease their proportion of equity in the capital structure. Financial professionals should recognize the impact of CSR performance on investor perceptions and consider proactive strategies to manage negative SMS, especially for firms with a strong CSR focus, to maintain favorable leverage choices and investor support.

The results of the Low CSR and High CSR sub-sample analyses for Hypothesis 2b are reported in Columns (3) and (4) of Table 5, respectively. It is notable that the associations between *NEGATIVE* and *COD* remain positive and significant at the minimum, with a significance level of 5% in both sub-samples. Therefore, the null hypothesis of *H2b*, could not be rejected as the results show that effect of negative SMS on cost of debt does differ between firms with low and high CSR performance. Overall, these results are consistent with the notion that superior CSR performance does not benefit firms in the form of a lower cost of debt. Hence, the concerns of creditors over negative SMS result in a higher cost of debt, regardless of whether firms have high or low CSR performance. These results underscore the

significance of managing negative perceptions and maintaining a positive reputation among creditors to secure favorable debt financing, irrespective of CSR performance levels.

The results of the *Low CSR* and *High CSR* sub-samples analyses for Hypothesis 2c are reported in Columns (5) and (6) of Table 5, respectively. The results show that in the case of firms in both sub-samples, the relationship between *NEGATIVE* and *MAT* are not significant. Therefore, the null hypothesis of *H2c* which states that the effect of negative SMS on leverage does not differ between smaller-sized and larger-sized firms, could not be rejected. As mentioned earlier, since evidence on this area is still limited, we contend that more studies should be carried out in this area to further understand why effect of negative SMS on term to maturity is insignificant in firms with low and high CSR performance. Financial professionals should consider these nuances when making debt-related decisions and assess how investor perceptions may differ based on firm size and CSR performance.

Table 5: Negative social media sentiments and capital structure – the influence of CSR

Dependent variable	<i>LEV</i>		<i>COD</i>		<i>MAT</i>	
	<i>Low CSR</i> (1)	<i>High CSR</i> (2)	<i>Low CSR</i> (3)	<i>High CSR</i> (4)	<i>Low CSR</i> (5)	<i>High CSR</i> (6)
<i>NEGATIVE</i>	0.030 (0.63)	0.099** (2.29)	0.036*** (2.97)	0.026** (2.50)	0.070 (1.57)	0.062 (1.61)
<i>SIZE</i>	-0.011** (-2.27)	-0.018*** (-3.73)	-0.008*** (-5.88)	-0.008*** (-4.95)	-0.013** (-2.42)	-0.013** (-2.33)
<i>LIQ</i>	-0.327*** (-7.98)	-0.261*** (-6.63)	0.003 (0.28)	0.009 (0.88)	-0.013 (-0.25)	0.146*** (4.10)
<i>ROA</i>	-0.608*** (-6.01)	-0.504*** (-5.00)	0.027 (0.90)	-0.012 (-0.59)	-0.068 (-0.74)	-0.050 (-0.68)
<i>CAPIN</i>	-0.868*** (-4.39)	-0.280 (-1.50)	0.016 (0.33)	-0.022 (-0.39)	-0.353** (-2.48)	-0.086 (-0.58)
<i>M2B</i>	0.001 (0.86)	0.001 (0.66)	-0.000*** (-3.64)	0.000 (0.65)	0.001 (1.38)	-0.001 (-1.20)
<i>SD_{ROA}</i>	-0.009 (-0.06)	0.199 (1.19)	0.039 (0.99)	0.021 (0.59)	0.454*** (3.64)	0.270* (1.79)
<i>TAN</i>	0.331*** (7.78)	0.094*** (3.03)	0.009 (1.36)	0.017*** (3.05)	0.154*** (5.37)	0.145*** (5.76)
Constant	0.304*** (5.56)	0.345*** (6.10)	0.139*** (11.25)	0.142*** (8.86)	0.984*** (17.75)	0.960*** (15.01)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adj R ²	0.247	0.202	0.064	0.086	0.049	0.075
F-statistic	21.768	18.728	8.030	13.842	6.084	6.318
N	1,166	1,165	1,107	1,148	1,126	1,153

Notes: This table presents the estimation results of the relationship between negative social media sentiments (SMS) and capital structure amongst firms with low versus high ESG scores. *t*-statistics are based on robust standard errors and are in parentheses. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Definitions of all variables are presented in Table 1.

In Table 6, we present the results of the sub-sample analysis for Hypotheses 3a - 3c. Columns (1) and (2) report the sub-sample analysis for the influence of firm size on the relationship between *NEGATIVE* with leverage (*H3a*). The results show that in the case of *Small Size* firms (Column 1), the relationship between *NEGATIVE* and *LEV* is positive and significant at the 1% level. However, in *Large Size* firms (Column 2), the coefficient of *NEGATIVE* on *LEV* is not significant. Thus, the null hypothesis *H3a* could be rejected because the results show that effect of negative SMS on leverage does differ between smaller-sized and larger-sized firms. Collectively, these results show that, unlike smaller-sized firms, concerns of investors over negative SMS are eased in larger-sized firms, leading to an insignificant relationship between *NEGATIVE* on *LEV*. The contrasting relationships between negative SMS and leverage observed in smaller-sized and larger-sized firms highlight the

significance of firm size in shaping the impact of negative SMS on capital structure decisions. Financial professionals and managers should take these differences into account when managing investor perceptions and optimizing leverage choices to achieve favorable financial outcomes based on their firm's size and investor concerns related to negative SMS.

The results of the *Small Size* and *Large Size* sub-samples analyses for Hypothesis 3b are reported in Columns (3) and (4) of Table 5, respectively. It is notable that, at the minimum, the associations between *NEGATIVE* and *COD* remain positive and significant with a significance level of 5% in both sub-samples. Hence, the null hypothesis *H3b* could not be rejected as results reveal that the effect of negative SMS on cost of debt does differ between smaller-sized and larger-sized firms. Hence, we find no support for the argument that concerns of creditors over negative SMS is more elevated in smaller-sized firms, as compared to larger-sized firms. These findings challenge the notion that concerns of creditors over negative SMS are more pronounced in smaller-sized firms compared to larger-sized firms, highlighting the need for all firms, regardless of size, to carefully manage negative perceptions to maintain favorable debt costs and creditor support.

Table 6: Negative social media sentiments and capital structure – the influence of firm size

	LEV		COD		MAT	
	<i>Small size</i> (1)	<i>Large size</i> (2)	<i>Small size</i> (3)	<i>Large size</i> (4)	<i>Small size</i> (5)	<i>Large size</i> (6)
<i>NEGATIVE</i>	0.145*** (2.96)	-0.003 (-0.08)	0.035** (2.41)	0.021*** (2.71)	0.090* (1.68)	0.075** (2.26)
<i>CSR</i>	-0.001*** (-2.62)	-0.001*** (-3.31)	-0.000 (-0.48)	-0.000 (-1.34)	0.001 (1.43)	-0.000 (-0.16)
<i>SIZE</i>	0.055*** (5.25)	-0.037*** (-6.75)	-0.016*** (-3.28)	-0.006*** (-7.25)	0.026* (1.91)	-0.039*** (-7.09)
<i>LIQ</i>	-0.418*** (-10.95)	-0.116*** (-2.63)	0.029** (2.40)	-0.020** (-2.58)	0.215*** (4.43)	-0.030 (-0.67)
<i>ROA</i>	-0.616*** (-6.54)	-0.295*** (-2.89)	0.041 (1.16)	-0.023 (-1.52)	-0.098 (-1.00)	0.033 (0.48)
<i>CAPIN</i>	-0.890*** (-3.66)	0.006 (0.03)	0.069 (0.93)	-0.088*** (-4.10)	0.408** (2.05)	-0.327*** (-2.76)
<i>M2B</i>	0.001 (0.46)	0.002 (1.52)	-0.000** (-2.35)	-0.000 (-1.59)	-0.001 (-0.97)	-0.000 (-0.32)
<i>SD_{ROA}</i>	0.355* (1.76)	-0.204* (-1.65)	0.035 (0.54)	0.032* (1.76)	0.631*** (3.33)	0.218** (2.11)
<i>TAN</i>	0.267*** (5.00)	0.192*** (6.32)	0.009 (0.84)	0.019*** (5.25)	0.083* (1.90)	0.144*** (7.31)
Constant	-0.245** (-2.45)	0.621*** (10.67)	0.199*** (4.80)	0.128*** (12.66)	0.525*** (4.09)	1.250*** (22.20)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adj R ²	0.341	0.211	0.063	0.110	0.049	0.115
F-statistic	35.219	16.917	4.223	21.712	3.380	9.487
N	1,079	1,252	1,023	1,232	1,044	1,235

Notes: This table presents the estimation results of the relationship between negative social media sentiments (SMS) and capital structure amongst firms with low versus high firm size. *t*-statistics are based on robust standard errors and are in parentheses. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Definitions of all variables are presented in Table 1.

Columns (5) and (6) of Table 6 present the results of the *Small Size* and *Large Size* sub-samples analyses, respectively of Hypothesis 3c. The results indicate that for firms in both sub-samples, the relationship between *NEGATIVE* and *MAT* is consistently positive and significant, with a minimum significance level of 10%. Hence, the null hypothesis *H3c* could not be rejected as the results show that effect of negative SMS on term to maturity does not differ between smaller-sized and larger-sized firms. Hence, we find no support for the idea that, unlike smaller-sized firms, the higher credit ratings and preference for short term debt

among larger-sized firms leads to insignificant relationship between *NEGATIVE* and *MAT*. The consistent and significant influence of negative SMS on term to maturity (*MAT*) for firms of various sizes has important implications for practitioners. Regardless of a firm's size or credit ratings, it is crucial for financial professionals and decision-makers to recognize the potential impact of negative SMS on the maturity of their debt. This highlights the need for proactive risk management strategies and effective communication strategies to address negative perceptions and maintain a favorable debt structure. Understanding and addressing the influence of negative SMS on *MAT* can help firms enhance their financial stability and reputation among investors and creditors, ultimately contributing to improved financial performance and long-term sustainability.

4.3 Further Robustness Tests

In this part, we perform three robustness tests to assess our main findings. First, we employ the two-stage least squares (2SLS) regression analysis to address possible endogeneity issues. We use one-year lagged value of *NEGATIVE* (excluding the focal firm) as the instrumental variable for the 2SLS. This instrument is named as *LAG_NEGATIVE* in our analysis and identified based on prior studies (Benjamin *et al.*, 2020; Al-Hadi *et al.*, 2017) that had used the one-year lagged value of the main variable of interest as the instrument. Initially, *NEGATIVE* is regressed on the instrumental variable, i.e., *LAG_NEGATIVE* and control variables in the first-stage regression to estimate the fitted value of negative SMS. The fitted value of negative is named *PRED_NEGATIVE*. In the second-stage of the 2SLS, *PRED_NEGATIVE* is employed as the independent variable of interest. In Table 7, the first-stage regressions are presented in Models (1), (3) and (5). It can be seen that *LAG_NEGATIVE*, is positively associated at the 1% levels with *NEGATIVE* for all three models. Several post-estimation tests confirm the validity of our instrument. For example, the Kleibergen-Paap rk LM statistic of 25.88 (untabulated) is significant at the 0.01% level, suggesting that the instrument is relevant. Similarly, the results of the weak identification test suggest that our model does not suffer from weak identification because the Cragg-Donald F statistic is higher than the Stock and Yogo (2005) critical threshold of 16.38. Columns (2), (4) and (6) of Table 7 present the second-stage regressions and the coefficients of *PRED_NEGATIVE* are significant and positive at the 10%, 1%, and 1% levels in explaining *LEV*, *COD* and *MAT*, respectively. Hence, the results of the 2SLS regressions technique are consistent with the earlier reported results and reinforce our findings which reveal positive and significant associations between negative SMS with leverage, cost of debt and debt maturity.

Next, we adopt the propensity score matching (PSM) estimator to address selection bias due to firm-related characteristics and functional misspecifications. We apply PSM to compare capital structure (leverage, debt maturity, and cost of debt) between a group of firms that have a high negative SMS value (treatment group) with a group of firms that have a low negative SMS value (control group). We classify a high (low) negative SMS as firms whose *NEGATIVE* value is above (below) the median of *NEGATIVE*. We choose the nearest neighbour technique with no replacement and with a caliper distance of 0.02 to ensure both groups are comparable, and no significant differences are detected between them.

Table 7: Two-stage least-squares (2SLS) results

	<i>NEGATIVE</i>		<i>LEV</i>		<i>NEGATIVE</i>		<i>COD</i>		<i>NEGATIVE</i>		<i>MAT</i>	
	First stage (1)	Second stage (2)	First stage (3)	Second stage (4)	First stage (5)	Second stage (6)	First stage (5)	Second stage (6)	First stage (5)	Second stage (6)	First stage (5)	Second stage (6)
<i>LAG_NEGATIVE</i>	0.525*** (21.48)		0.526*** (21.20)		0.524*** (21.30)							
<i>PRED_NEGATIVE</i>		0.109* (1.74)		0.041*** (3.34)		0.147*** (2.60)						
<i>CSR</i>	-0.000* (-1.70)	-0.001** (-2.48)	-0.000 (-1.34)	-0.000 (-1.09)	-0.000 (-1.57)	0.000** (2.29)						
<i>SIZE</i>	0.015*** (6.85)	-0.012*** (-3.06)	0.014*** (6.44)	-0.009*** (-7.53)	0.014*** (6.53)	-0.018*** (-4.21)						
<i>LIQ</i>	0.030* (1.87)	-0.286*** (-9.25)	0.033** (1.98)	0.004 (0.56)	0.034** (2.07)	0.079** (2.45)						
<i>ROA</i>	-0.055* (-1.70)	-0.517*** (-6.73)	-0.058* (-1.76)	0.012 (0.65)	-0.056* (-1.71)	-0.046 (-0.79)						
<i>CAPIN</i>	-0.020 (-0.26)	-0.508*** (-3.33)	0.008 (0.10)	-0.001 (-0.04)	0.002 (0.02)	-0.200* (-1.94)						
<i>M2B</i>	0.000 (0.18)	0.001 (0.63)	0.000 (0.28)	-0.000** (-2.54)	0.000 (0.27)	-0.000 (-0.48)						
<i>SD_{ROA}</i>	0.059 (1.02)	0.017 (0.15)	0.043 (0.75)	0.023 (0.82)	0.050 (0.86)	0.324*** (3.43)						
<i>TAN</i>	0.033* (1.89)	0.205*** (6.94)	0.031* (1.76)	0.015*** (3.11)	0.032* (1.81)	0.142*** (7.29)						
Constant	-0.039** (-1.98)	0.499*** (13.76)	-0.035* (-1.73)	0.111*** (13.12)	-0.035* (-1.76)	0.974*** (24.98)						
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes						
Adjusted R ²	0.438	0.193	0.430	0.068	0.431	0.048						
Underidentification test	339.220		327.825***		332.661							
Weak Identification test	461.289		825.630		453.680							
F-statistic	66.635	26.327	61.14	13.181	63.280	8.293						
N	2,065	2,065	2,000	2,000	2,023	2,023						

Notes: This table presents the estimation results of our instrumental variable (2SLS) specification. In Columns (1), (3) and (5) the one-year lagged value of *NEGATIVE* (denoted as *LAG_NEGATIVE*) serve as excluded instrument to generate *PRED_NEGATIVE* that is used in Column (2), (4) and (6). *t*-statistics are in parenthesis. ***, **, * represents significance at the 1%, 5% and 10% level, respectively. Definitions of all variables are presented in Table 1.

Panel A of Table 8 presents the univariate mean comparisons between the treatment and control firms' characteristics using the same control variables included in Eqs. (1), (2) and (3). The *t*-stats reveal that the mean differences of each variable between the treated and control groups are not statistically significant and this show that there are no distinguishable differences between the two groups. Hence, this increases the likelihood that any differences in capital structure between the two groups is due to the differences in *NEGATIVE*. Models (1), (2) and (3) of Panel B in Table 8 report the re-estimation of our baseline regression using the propensity score-matched sample. The results show that the positive and significant associations between *NEGATIVE* with *LEV*, *COD* and *MAT* are at the 5%, 1% and 1% levels respectively. Hence, these PSM results are consistent with the results of our baseline results in Table 4.

Table 8: Propensity score matching (PSM) analysis

Panel A: Comparison of treatment and control firms						
Variable	Obs.	Treated	Obs.	Control	Difference	<i>t</i> -stat
<i>CSR</i>	827	48.443	827	48.558	-0.115	-0.130
<i>SIZE</i>	827	9.443	827	9.493	-0.050	-1.090
<i>LIQ</i>	827	0.147	827	0.144	0.003	0.420
<i>ROA</i>	827	0.063	827	0.065	-0.001	-0.370
<i>CAPIN</i>	827	0.043	827	0.044	-0.001	-0.380
<i>M2B</i>	827	4.399	827	4.238	0.161	0.450
<i>SD_{ROA}</i>	827	0.030	827	0.030	0.000	0.180
<i>TAN</i>	827	0.267	827	0.268	-0.001	-0.120

Panel B: PSM regression

	<i>LEV</i> (1)	<i>COD</i> (2)	<i>MAT</i> (3)
<i>NEGATIVE</i>	0.095** (2.49)	0.030*** (3.35)	0.107*** (2.92)
<i>CSR</i>	-0.001*** (-3.60)	-0.000 (-1.21)	0.000 (1.48)
<i>SIZE</i>	-0.003 (-0.70)	-0.006*** (-4.39)	-0.010* (-1.81)
<i>LIQ</i>	-0.273*** (-7.42)	0.009 (1.08)	0.068 (1.64)
<i>ROA</i>	-0.514*** (-5.93)	-0.021 (-1.14)	-0.111* (-1.66)
<i>CAPIN</i>	-0.363** (-2.03)	-0.026 (-0.72)	-0.242* (-1.96)
<i>M2B</i>	0.000 (0.45)	-0.000** (-1.99)	-0.000 (-0.73)
<i>SD_{ROA}</i>	0.058 (0.41)	0.002 (0.06)	0.222* (1.87)
<i>TAN</i>	0.233*** (7.62)	0.013** (2.46)	0.151*** (7.44)
Constant	0.253*** (4.62)	0.118*** (8.48)	0.914*** (15.08)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Adj R ²	0.213	0.070	0.055
F-statistic	22.824	11.464	6.699
N	1,654	1,612	1,620

Notes: This table presents the baseline results for the impact of negative social media sentiments (SMS) on capital structure, using PSM. *t*-statistics are based on robust standard errors and are in parentheses. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Definitions of all variables are presented in Table 1.

5. Conclusion

In this paper, we examine whether SMS affects firm capital structure. Our findings, based on a sample of Fortune 500 firms in the period between 2010 – 2017, reveal that negative SMS significantly increases leverage, cost of debt and term to maturity. However, when we examine the influence of CSR performance and firm size on the relationship between negative SMS and capital structure, the findings are mixed. Specifically, we find that the positive and significant relationship between negative SMS and leverage remains unchanged only in firms with high CSR performance. The corresponding results for the influence of low and high CSR sub-samples on the positive association between negative SMS with; (1) cost of debt produce significant results for both groups, and (2) term to maturity produce insignificant results for both groups. The sub-sample results small and large firms reveal the effects of negative SMS on leverage is positive and significant in small firms only. The corresponding sub-sample analysis for the effects of negative SMS on cost of debt and term to maturity show positive

and significant association across both sub-samples. The results are strengthened by several robustness tests.

We acknowledge that there are certain limitations in this present study and the potential opportunities for future research it presents. First, since our study is based on archival empirical analysis of large Fortune 500 firms, and hence our results may not necessarily be applicable to smaller and medium-sized firms. Secondly, steady growth in the usage of social media may strengthen the results obtained in this study in future periods. Future studies should examine the linkage between social media sentiments and the capital structure of firms in different time periods and other capital markets to deepen understandings of this topic. Future studies could also extend this research by empirically examining how social media sentiments affect other corporate financial outcomes outside of capital structure, such as firm risk and stock price crash risk.

Our findings will also help researchers and practitioners to understand the impact of negative sentiments on capital structure and how CSR performance and firm size are important influences on this nexus. Our research has potential global implications as corporations are now paying more attention to understanding how social media sentiments impact firm strategies and financial outcomes.

References

- Agrawal, S., Azar, P. D., Lo, A. W., & Singh, T. (2018). Social media: Evidence from stock tweets and Twitter. *The Journal of Portfolio Management*, 44(7), 85-95.
- Akhtar, S. (2005). The determinants of capital structure for Australian multinational and domestic corporations. *Australian Journal of Management*, 30(2), 321-341.
- Al-Hadi, A., Chatterjee, B., Yafian, A., Taylor, G., & Hasan, M. M. (2017). Corporate social responsibility performance, financial distress and firm life cycle: evidence from Australia. *Accounting & Finance*, 59(2), 961-989.
- Armitage, S., & Marston, C. (2008). Corporate disclosure, cost of capital and reputation: Evidence from finance directors. *The British Accounting Review*, 40(4), 314-336.
- Attig, N., El Ghouli, S., Guedhami, O., & Suh, J. (2013). Corporate social responsibility and credit rating. *Journal of Business Ethics*, 117, 679-694.
- Bartov E., Faurel, L., & Mohanram, P. (2018). Can Twitter help predict firm level earnings and stock returns?. *Accounting Review*, 93(3), 25-57.
- Bendixen, M., & Abratt, R. (2007). Corporate identity, ethics and reputation in supplier-buyer relationships. *Journal of Business Ethics*, 76, 69-82.
- Benjamin, S. J, Regasa, D, G, Wellalage, N. H., & Marathamuthu M., S. M. (2020). Waste disclosure and corporate cash holdings. *Applied Economics*, 52(49), 5399-5412.
- Benjamin, S. J., & Biswas, P. K. (2022). Does winning a CSR Award increase firm value? *International Journal of Disclosure and Governance*, 1-17.
- Benjamin, S., J., Biswas, P. K., Marathamuthu M., S. M., & Arunachalam M. (2022). Social media sentiments and firm value. *Applied Economics*, 54(26), 2983-2997.
- Benlemlih, M., Shaukat, A., Qiu, Y., & Trojanowski, G. (2018). Environmental and social disclosures and firm risk. *Journal of Business Ethics*, 152(3), 613-626.
- Berman, S. L., Wicks, A. C., Kotha, S., and Jones, T. M. (1999). Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *Academy of Management Journal*, 42, 488-506.
- Bhuiyan, M. B. U., & Nguyen, T. H. N. (2019). Impact of CSR on cost of debt and cost of capital: Australian evidence. *Social Responsibility Journal*, 16(3), 419-430.

- Castaldo, S., Perrini, F., Misani, N., & Tencati, A. (2009). The missing link between corporate social responsibility and consumer trust: The case of fair-trade products. *Journal of Business Ethics*, 84(1), 1-15.
- Chen, H., De, P., & Hwang, B.-h. (2014). Wisdom of crowds: the value of stock opinions transmitted through social media. *Review of Financial Studies*, 27(5), 1367-1403.
- Chen, Y., & Xie, J. (2008). Online consumer review: Word-of-mouth as a new element of marketing communication mix. *Management Science*, 54(3), 477-491.
- Chen, Y., Liu, Y., & Zhang, J. (2012). When do third-party product reviews affect firm value and what can firms do? The case of media critics and professional movie reviews. *Journal of Marketing*, 76(2), 116-134.
- Chevalier, J. A., & Mayzlin, D. (2006). The effect of word of mouth on sales: Online book reviews. *Journal of Marketing Research*, 43(3), 345-354.
- Choi, J. J., Jo, H., Kim, J., & Kim, M. S. (2018). Business groups and corporate social responsibility. *Journal of Business Ethics*, 153(4), 931-954.
- Dennis, S. A., & Sharpe, I. G. (2005). Firm size dependence in the determinants of bank term loan maturity. *Journal of Business Finance & Accounting*, 32(1-2), 31-64.
- Dhar, V., & Chang, E. A. (2009). Does chatter matter? The impact of user-generated content on music sales. *Journal of Interactive Marketing*, 23(4), 300-307.
- Diamond, D. W. (1991). Debt maturity structure and liquidity risk. *The Quarterly Journal of Economics*, 106, 709-737.
- Dunham, L. M., & Garcia, J. (2021). Measuring the effect of investor sentiment on financial distress. *Managerial Finance*, 47(2), 1834-1852.
- Erragragui, E. (2018). Do creditors price firms' environmental, social and governance risks?. *Research in International Business and Finance*, 45, 197-207.
- Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, 38, 45-64.
- Ferri, M. G., & Jones, W. H. (1979). Determinants of financial structure: A new methodological approach. *The Journal of Finance*, 34(3), 631-644.
- Fishman, M. J., & Hagerty, K. M. (1989). Disclosure decisions by firms and the competition for price efficiency. *The Journal of Finance*, 3, 633-646.
- Flannery, M. J. (1986). Asymmetric information and risky debt maturity choice. *The Journal of Finance*, 41(1), 19-37.
- García, C. J., & Herrero, B. (2021). Female directors, capital structure, and financial distress. *Journal of Business Research*, 136, 592-601.
- González, V. M. & González, F. (2012) Firm size and capital structure: evidence using dynamic panel data. *Applied Economics*, 44(36), 4745-4754.
- Goss, A., & Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, 35, 1794-1810.
- Gu, B., Park, J., & Konana, P. (2012). the impact of external word-of-mouth sources on retailer sales of high-involvement products. *Information Systems Research*, 23(1), 182-196.
- Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, 108, 814-834.
- IBM. 2017. *How CSR social media sentiment affects your brand reputation*. IBM Corporate Citizenship and Corporate Affairs. US Chamber of Commerce Foundation. Retrieved March 15, 2021, from https://www.ibm.com/ibm/responsibility/initiatives/pdfs/CC_CA_whitepaper_HR.pdf
- Jansen, B. J., Zhang, M., Sobel, K., & Chowdury, A. (2009). Twitter power: Tweets as electronic word of mouth. *Journal of the American Society for Information Science and Technology*, 60(11), 2169-2188.

- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323-329.
- Kruger, P. 2015. Corporate goodness and shareholder wealth. *Journal of Financial Economics*, 115, 304-329.
- Kurshev, A., & Strebulaev, I. A. (2015). Firm size and capital structure. *The Quarterly Journal of Finance*, 5(3), 1550008.
- La Rocca, M., Neha, N., & La Rocca, T. (2020). Female management, overconfidence and debt maturity: European evidence. *Journal of Management and Governance*, 24, 713-747.
- La Rosa, F., Liberatore, G., Mazzi, F., & Terzani, S. (2018). The impact of corporate social performance on the cost of debt and access to debt financing for listed European nonfinancial firms. *European Management Journal*, 36(4), 519-529.
- Lee, F., Hutton, A., & Shu, S. (2015). The role of social media in the capital market: Evidence from consumer product recalls. *Journal of Accounting Research*, 53(2), 367-404.
- Lemma, T. T., Lulseged, A., & Tavakolifar, M. (2021). Corporate commitment to climate change action, carbon risk exposure, and a firm's debt financing policy. *Business Strategy and the Environment*, 30(8), 3919-3936.
- Li, Y., & Zhang, X. Y. (2019). Impact of board gender composition on corporate debt maturity structures. *European Financial Management*, 25(5), 1286-1320.
- Lins, K., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *The Journal of Finance*, 72(4), 1785-1824.
- Lu, W. S., Chau, K. W., Wang, H. D., & Pan, W. (2014). A decade's debate on the nexus between corporate social and corporate financial performance: A critical review of empirical studies 2002-2011. *Journal of Cleaner Production*, 79, 195-206.
- Luo, X. (2007). Consumer negative voice and firm-idiosyncratic stock returns. *Journal of Marketing*, 71(3), 75-88.
- Luo, X. (2009). Quantifying the long-term impact of negative word of mouth on cash flows and stock prices. *Marketing Science*, 28(1), 148-165.
- Luo, X., Wang, H., Raithel, S., & Zheng, Q. (2015). Corporate social performance, analyst stock recommendations, and firm future returns. *Strategic Management Journal*, 36(1), 123-136.
- Luo, X., Zhang, J., & Duan, W. (2013). Social media and firm equity value. *Information Systems Research*, 24(1), 146-163.
- McAlister, L., Sonnier, G., & Shively, T. (2012). The relationship between online chatter and firm value. *Marketing Letters*, 23(1), 1-12.
- McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, 26(1), 117-127.
- Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review*, 53, 433-443.
- Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance*, 39(3), 574-592.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187-221.
- Navarro, P. (1988). Why do corporations give to charity?. *Journal of Business*, 61, 65-93.
- Nguyen, H., Calantone, R. & Krishnan, R. (2020). Influence of social media emotional word of mouth on institutional investors' decisions and firm value. *Management Science*, 66(2), 887-910.
- Porter, M. E., & Kramer, M. R. (2006). Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review*, 84, 78-92.
- Radhouane, I., Nekhili, M., Nagati, H., & Pache, G. (2018). The impact of corporate environmental reporting on customer-related performance and market value. *Management Decision*, 56(7), 1630-1659.

- Schmidt, C. G., Wuttke, D. A., Ball, G. P., & Heese, H. S. (2020). Does social media elevate supply chain importance? an empirical examination of supply chain glitches, twitter reactions, and stock market returns. *Journal of Operation Management*, 66(6), 646-669.
- Schneider, T. E. (2011). Is environmental performance a determinant of bond pricing? Evidence from the US pulp and paper and chemical industries. *Contemporary Accounting Research*, 28(5), 1537-1561.
- Sen, S., & Bhattacharya, C. B. (2001). Does doing good always lead to doing better? Consumer reactions to corporate social responsibility. *Journal of Marketing Research*, 38(2), 225-243.
- Sonnier, G., McAlister, L., & Rutz, O. (2011). A Dynamic model of the effect of online communications on firm sales. *Marketing Science*, 30, 702-716.
- Stock, J. H., Yogo, M. (2003). Asymptotic distributions of instrumental variables statistics with many weak instruments. In: Andrews, D. W. K., Stock, J. H. (Eds.), *Identification and Inference for Econometric Models: Essays in Honour of Thomas J. Rothenberg*. Cambridge University Press.
- Surowiecki, J. (2004). *The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies and nations*. New York, NY: Anchor Books.
- Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance*, 43(1), 1-19.
- Van Dolder, D., & Van den Assem, M. J. (2018). The wisdom of the inner crowd in three large natural experiments. *Nature Human Behaviour*, 2, 21.
- Wang, K., Sewon, O., & Claiborne, M. C. (2008). Determinants and consequences of voluntary disclosure in an emerging market: Evidence from China. *Journal of International Accounting, Auditing and Taxation*, 1, 14-30.
- Yu, Y., Duan, W., & Cao, Q. (2013). The impact of social and conventional media on firm equity value: A sentiment analysis approach. *Decision Support Systems*, 55(4), 919-926.
- Zolotoy, L., O'Sullivan, D., & Chen, Y. (2019). Local religious norms, corporate social responsibility, and firm value. *Journal of Banking and Finance*, 100, 218-233.

COVID-19 Dynamics and Financing of Cash Flow Shortages: Evidence from Firm-Level Survey

Yusuf Adeneye^{1*}, Fathyah Hashim², Yusuf Babatunde Rahman³ & Normaizatul Akma Saidi¹

¹*Faculty of Hospitality, Tourism and Wellness, Universiti Malaysia Kelantan, Malaysia.*

²*Graduate School of Business, Universiti Sains Malaysia, Malaysia.*

³*Faculty of Management Sciences, Lagos State University, Nigeria.*

Abstract: Research Question: We seek answers to two pertinent questions: (1) Do COVID-19 dynamics establish new determinants of financing structure following cash flow shortages, if yes, (2) To what extent do COVID-19 dynamics affect firms' financing sources? **Motivation:** Firms experiencing cash flow shortages due to the COVID-19 crisis respond either operationally, by making changes to the production process and production lines, or in management and strategy, by making changes to employee job engagement and new technological approaches to delivering goods and services, or financially, through the choice of equity and debt capital and filings of bankruptcy. **Idea:** This study investigates the effects of Covid-19 dynamics (i.e., productivity shocks, credit agreements, closure strategy, employee welfare, online activity adoption, and economic policy response) on the financing structure of establishments. **Data:** A unique cross-country firm-level survey data covering 28 countries was obtained from the World Bank Enterprise Survey (WBES). **Method/Tools:** The study uses the logit regression estimation technique. **Findings:** Logit regression findings reveal that firms that temporarily close business operations due to COVID-19 took fewer bank loans to finance cash flow shortages. The adoption of online sales and delivery services has significant negative effects on account payables whereas it has positive effects on bank loans. Firms adopting remote work arrangements increase their bank loans. Sales on credit and purchases on credit significantly increase the use of accounts payables. Firms actively involved in the production conversion process used more bank loans and less equity finance. Also, firms that engage temporary workers use more equity finance and accounts payables and fewer bank loans. However, we do not find evidence that firms where workers quit voluntarily change their capital structure. Overall, we find evidence of the "spare tire" effect of the capital market as equity finance (i.e., retained earnings) dominates the financing structure across sampled firms in health crisis periods. **Contributions:** Our study is among the first to provide new determinants of capital structure following a health crisis.

Keywords: Productivity shocks, employee welfarism, closure strategy, online activity adoption, economic policy response, financing structure.

JEL Classification: D53, G01, G32, G38, J21

* Corresponding author: Yusuf Adeneye. Tel.: +6010-9101459. Email: adeneye.yb@umk.edu.my

Received 1 Nov 2022; Final revised 15 Jan 2023; Accepted 10 Mac 2023; Available online 30 Sep 2023.

To link to this article: https://www.mfa.com.my/cmrv31_i2_a2/

© Malaysian Finance Association, 2023. This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

“COVID-19 in many cases has really threatened stability and also exacerbated the drivers of fragility”

Franck Bousquet (Senior Director, FCV, World Bank Group)

How do firms perform during COVID-19? What indicators have been overlooked by corporate managers in a set of pandemic dynamics in financing cash flow shortages? Do theories of corporate financial policy matter during the pandemic situation? This paper seeks to provide some possible answers to these pertinent questions and how investors and relevant stakeholders may perceive the principal-agency theory differently. The increasing conflict in profitability may pose a new direction into whether corporate managers could manage the risks of COVID-19 that affect firms' investments and the associated return on investments through internal and external finance (e.g., equity finance, bank loans, non-bank loans, and account payable).

Firms experiencing cash flow shortages due to the COVID-19 crisis respond either operationally, by making changes to the production process and production lines, or in management and strategy, by making changes to employee job engagement and new technological approaches to delivering goods and services or financially through the choice of equity and debt capital and filings of bankruptcy. Thus, firms respond to cash flow shortages due to productivity shock, employee welfare, closure strategy, online activity adoption, and economic policy response. Meanwhile, why do firms choose certain equity or debt capital sources to respond to these COVID-19 crisis dynamics over other financing sources? however, is largely unexplored. Therefore, analysing the firm's responses to cash flow shortages through various financing structures may shed light on addressing the dynamics of the COVID-19 crisis by firms and thus validate what financial structure matters significantly.

Corporate finance theory suggests that market imperfections, such as those caused by the financial crisis, create some economic and firm dynamics that result in cash flow shortages, and thus, disrupt production, create unlawful and illegal employee re-contracting agreements, and may induce firms to take an alternative route to production and delivery of business activities. Using a dataset of 276,998 firms across 75 countries, Demirgüç-Kunt *et al.* (2020) show that firm leverage declines during the start and immediate aftermath of the global financial crisis in both advanced economies and developing countries. Although the findings of Demirgüç-Kunt *et al.* (2020) confirmed the impacts of the global financial crisis on firms' capital structure, their study relies on country characteristics, legal systems, and financial development indicators on the type of firms; leveraged SMEs, large non-listed firms, and listed companies.

In this paper, we deviate from the study of Demirgüç-Kunt *et al.* (2020) on the response of country characteristics and financial systems to the impact of the financial crisis on capital structure. We focus on the dynamics created by the COVID-19 crisis and how they affect the financing structure of establishments. The COVID-19 crisis created some dynamics that can induce some agency costs on firms, which may be important for the financing structure of firms. In their agency cost model, Jensen and Meckling (1976) posit that increasing returns variance would induce high risk-taking among shareholders, especially in countries where bankruptcy costs and monitoring costs are high. In this situation, firms engage in deleveraging and shortening of debt maturities due to uncertainty, risk, and bad news (i.e., cash flow shortages and downgrade of credit ratings) (Diamond, 2004).

The wake of the COVID-19 crisis has uncovered some dynamics that may further explain the variation in the financing structure choice of the firms. In this study, we identified six main COVID-19 dynamics involving productivity shocks; employee welfarism (e.g., Kniffin *et al.*, 2021); closure strategy; online activity adoption; credit agreements, and economic policy response as factors responsible for the cash flow shortages in firms, and how firms thereafter choose between various types of debt and equity capital to address the firm's cash flow shortages. For instance, concerning employee welfarism, the increase in unemployment and declining female gender diversity in corporate firms may be responsible for debt level changes and perhaps corporate firms' takeover bids and liquidation. One reason behind the declining female board and the total number of female workforces is because of additional childcare and household obligations that emerged during the pandemic. This seems to have long-term ramifications on the firm's risk-taking policy and the ultimate capital structure choice.

In this paper, we survey more than 4,500 firms across 28 countries to test (i) whether the COVID-19 crisis dynamics -productivity shocks; employee welfarism; closure strategy; online activity adoption; credit agreements; and economic policy response- affect financing structure, and (ii) whether this effect varies across firms in developed countries (with developed financial systems) and developing countries (with less-developed capital markets). Our investigation into the nexus between the dynamics of the COVID-19 crisis and financing of cash flow shortages is motivated by Ayyagari *et al.* (2011) that during the financial crisis and episodes of credit-less recoveries, cash flows rarely recover without a recovery in external credit, positing that the equity and the bond markets are more instrumental to cash flow recovery. Thus, we investigate how COVID-19 dynamics impact the financing structure of firms during the pandemic situation in the firm's bid to address cash flow shortages.

Our paper provides evidence relevant to strengthening the effective functioning of the financial markets. Although past literature in corporate finance has investigated the link between financial development and capital structure, we, however, do not know how the business operations and activities during COVID-19 shaped the pattern and structure of firms' finances. Also, we do not know whether COVID-19 dynamics drive the use of equity finance over debt finance or "government as a palliate market" through government grants. For instance, a positive link between equity finance and productivity shocks may imply that the stock market serves as a "spare tire" in addressing the productivity problems that firms face during the COVID-19 crisis. This paper addresses these issues.

Our study also provides evidence of structural transformation in the form of reallocation shock. Several theoretical models assume that productivity shocks could decline through the reallocation from small retail outlets to more productive larger stores. The rise and start-off of online sales and delivery by many firms during the COVID-19 crisis brought another major firm's structural reallocation, supporting the cleansing dynamics model of Caballero and Hammour (1994) that the COVID crisis has triggered some reallocation effects that would persist long after the COVID-19 crisis recedes. For instance, the results of the forward-looking reallocation model of Barrero *et al.* (2020) show that the expected job reallocation rate and expected sales reallocation rate from January to April 2020 are 5.39 per cent and 3.78 per cent, respectively, which are both 2.4 times and 4.0 times pre-COVID crisis mean. We consider productivity shocks as an anecdote of the coronavirus pandemic and as an indicator of reallocation shock by relating productivity shocks with the financing structure of firms. On the supply side of the reallocation process, our findings may have long-term impacts on credit reallocation and reassessment of capital market efficiency on resource reallocation. Banks would need to raise costly equity buffers ex-ante before liquidating loans to poor prospects firms while reallocating the proceeds to expanding firms, a process that hinges on whether

the agency costs of outside equity financing are low and minimal (Keuschnigg and Kogler, 2020).

The richness of our firm-level survey allows us to examine the dynamics of the COVID-19 crisis and how firms finance their cash flow shortages, thus contributing to the corporate finance literature on corporate financing structure. Our paper also investigates how firms across developed and developing countries address the COVID-19 crisis dynamics and how they deal with cash flow shortages; in essence, we study how COVID-19 crisis dynamics impact the financing structure in firms. Our study differs from past studies on the impact of the financial crisis on capital structure. We not only study the financing structure of firms during the COVID-19 crisis, but we also extend our investigation into new determinants that affect the capital structure, rather than examining the variations of capital structure in pre- and during the COVID-19 crisis. These relatively new dynamics or determinants could reshape our understanding of the agency cost of equity, asset substitution, and the agency cost of debt in the firm's optimal capital structure.

The rest of the paper is organized as follows: Section 2 presents brief literature on the COVID-19 dynamics and capital structure. Section 3 discusses the data and methodology. Section 4 presents the results of the survey, while Section 5 discusses the findings and concludes the paper.

2. Literature Review and COVID-19 Dynamic

This section presents the related studies on COVID-19 dynamics and how may explain the financing structure in firms. These dynamics relate to industry dynamics and macroeconomic conditions: Productivity shocks, employee welfare, closure strategy, online activity adoption, credit arrangements mechanism, and economic policy response. For instance, employment dynamics adjust to the level of productivity shocks, in which case, the firm considers whether to temporarily or permanently close business operations and production, which may also be a function of the available debt capital (Rampini and Viswanathan, 2013; Nucci *et al.*, 2005).

2.1 Employee Welfare Mechanism

Several studies have argued that job loss, firing cost, and employee contracting induce a human cost of bankruptcy that affects the capital structure of firms (Berk *et al.*, 2010; Chemmanur *et al.*, 2013; Funke *et al.*, 1999; Serfling, 2016). Berk *et al.* (2010), arguing in support of the optimal capital structure, submit that firms trade off risk sharing for the benefits of debt. The authors further contend that employees with low-risk aversion would prefer firms with high leverage, while those employees with high-risk aversion prefer to work and stay in low-leverage firms. From the theoretical perspective of Funke *et al.* (1999), if the firm is financially distressed, bankruptcy effects will exceed tax effects, which indicates that labour demand will negatively correlate with the debt ratio. Although past studies seem to have addressed employee contracting and welfarism using employee risk aversion (Berk *et al.*, 2010), wrongful discharge laws (using a good faith, implied contract, and public policy exceptions) (Serfling, 2016), labour demand by using per capita wage and the total number of employees (Funke *et al.*, 1999), our model identifies new determinants of the cross-sectional distribution of firm leverage that have not been investigated in human capital and employee-finance literature. We contend that the shortage in cash flows induced by COVID-19 triggers some bankruptcy costs that influence employee welfarism across firms. Our paper shares an important insight with Ghaly *et al.* (2015), namely, that shortages in cash holdings trigger reduced and bad employee well-being, which may further create a "human cost of bankruptcy" that affects the optimal capital structure of the firm.

Although poor treatment of employees and re-contracting due to COVID-19 may increase the cost of setting court cases and post-recontracting and ex-post-recruitment expenses, it may

reinforce its tax advantages by securing additional debts and sustaining supply-manufacturing chain distribution channels. Our model identifies the effect of “voluntarily quitting of workers”, “change in temporary workers”, and workers laid off not because of poor financial performance (Wu, 2023) but because of the negative effects of COVID-19 on cash holdings. One significant contribution of our model is in relating these employee welfare factors to COVID-19 and how firms finance their cash flow shortages using various financing sources. That is, whether firms were able to reduce the human cost of bankruptcy induced by the pandemic and how it affects the optimal capital structure is investigated. This contrasts with most recent studies on the impact of COVID on workplace and job loss (Bapuji *et al.*, 2020; Lemieux *et al.*, 2020; Kniffin *et al.*, 2021; McFarland *et al.*, 2020), without assessing their effect on the financing structure of firms. Our results may have practical implications for economic and gender inequality (Alon *et al.*, 2020; Dang and Nguyen, 2020) since COVID-19 exacerbates inequalities in employees’ engagement, pay and benefits (Alon *et al.*, 2020; Bapuji *et al.*, 2020). We conjecture that the more the employees are voluntarily quitting their jobs and as more workers are laid off, the increasing agitation by employers to engage in recontracting agreements with staying employees and the ultimate cut in wages in a way to take advantage of tax shields. Thus, we conjecture a negative link between employee welfarism and leverage.

2.2 Productivity Shocks Mechanism

As argued in past literature, capital structure theories point to the relationship between productivity shock and capital structure. Meanwhile, there are mixed arguments on the theoretical views between capital structure and the firm’s level of productivity shocks (Berk *et al.*, 2010; Wang *et al.*, 2021). These differential views lend themselves to empirical scrutiny, which may further explain the mixed models on the productivity-financial structure nexus. This study investigates the exogenous variations in financing types induced by factors that affect productivity and business operations. Although we are not concerned about the time effects of the estimation framework due to the data availability structure of the World Bank Enterprise Survey, our model will be able to understand the cross-sectional differences in debt changes in firms following the pandemic dynamics, and why firms must plan for the long-term effects of the pandemic and if possible, take a financial contagion and risk management policies in terms of its business policies and operations for future similar pandemics.

We argue that the production conversion process, firm’s level of output, firm’s hours worked, firm demand, and firm supply are factors that affect the level of productivity shocks. We conjecture that (i) productivity shocks positively affect debt changes, (ii) in the situation of a negative direction between production shocks and debt changes, it suggests that higher productivity shocks are in line with debt decreases or debt level stagnancy, suggesting that firms or establishments may not have the required collaterals to secure further debt. It may also suggest that firms are not side-line for government economic response stimuli within the criteria of the establishment’s contribution to employment generation and government fiscal balances such as taxes. Our model on productivity shocks seems to also have theoretical implications for macroeconomics when Mises stated that:

“The period of production ... must be of such a length that exactly the whole available subsistence fund is necessary on the one hand and sufficient on the other for paying the wages of the labourers throughout the productive process.”

Mises (1912), (1953: 360)

2.3 Online Activity Adoption Mechanism

Many analysts expect that the adoption of online business activities will increase in the wake of COVID-19 since the lockdown policy covering businesses and industries to curb and reduce the spread of the virus generated an initial decline in productivity. Thus, it affected stockouts for most manufacturing firms and less demand for retail services across the globe. At the firm level, the number of shutdowns affected firms to reshape and adopt a new way of doing business via (a) started or increased “business online”, (b) started or increased “delivery of goods and services” after online booking orders, or (c) “remote work” arrangement i.e., “work from home (WFH)” employees (Kniffin *et al.*, 2021). Organizationally and financially, the economic shutdown policy appears to (i) reduce sales, (ii) result in changes in some firms’ fundamentals, (iii) reduce cash holdings leading to cash flow shortages, and (iv) increase the demands for financing sources to finance new firms’ fundamentals in doing businesses online and increasing cash flows. Given the economic uncertainty of COVID-19, financial analysts are trying to understand how the adoption of firms’ process of generating revenues through online sales, WFH, and business activities online would affect the financing structure of firms if must decide between the cost and benefits of debts and risk reduction in physical loss of goods, thefts, and delay in meeting customer demands may reduce the risk of bankruptcy and further increases the tax shields benefits.

The study of the firm’s online business practices and capital structure is still scanty. The literature on this relationship can be grouped into two parts. First, those who have examined online business activity in firms based on “perceived attitude and behaviour” towards online payment adoption (Daniel *et al.*, 2002; Liébana-Cabanillas and Lara-Rubio, 2017; Ming-Yen Teoh *et al.*, 2013; Shankar and Datta, 2018). Second, studies on corporate finance have been more linked to technology, technology transfer and technological risks (An and Rau, 2021; Audretsch *et al.*, 2016; Vismara, 2022). While the former studies are particular about the perceived factors that influence the adoption of online payment technologies in firms, the latter focuses more on expenses on research and development and patent but link it with capital structure. Through the COVID-19 dynamics, there is a need to bridge the gap between the “value-maximizing effect of online business practices” and capital structure.

Concerning agency problems, firms that adopt online platforms in the sales and delivery of goods and services are more likely to experience a higher return on assets, lower payback periods on investments, and higher profits available for rewarding purposes (e.g., payment of dividends). These factors may be responsible for reducing agency costs of finance. Dividends as rewarding tools are monitoring mechanisms that serve to reduce agency costs (Chen and Steiner, 1999; Hamdan, 2018). In contrast to the two strands of online business activity and capital structure, the wake of COVID-19 is like the global financial crisis that creates an exogenous shock to firms, triggering an increase in agency costs of both equity and debt (Tran *et al.*, 2017). Thus, while we may expect an increase in online business activity and sales to reduce agency cost of debt and equity financing, COVID-19 may induce an exogenous shock in which the expected return on investment reduces despite going online to address COVID-19 challenges. Intuitively, when firms raise external funds easily due to external financial constraints imposed by COVID-19, we will assume the positive impact of online business adoption mitigated agency cost of financing; otherwise, we will assume and conjecture that the investment into online business activity creates a cost that firms incur by not investing in better positive NPV projects rather than starting or increasing online sales.

In our analysis in the present paper, we focus on the factors of online business activities that were further triggered by COVID-19; started or increased business online, started or increased delivery of goods and services, WFH remote work engagement and share of online sales on the financing patterns of firms – and do not differentiate between highly technological firms and lowly technological firms. The broad survey by WBES allows us to identify these

issues and categorize them as “online activity adoption factors or mechanisms”. By recording the responses on these factors for estimation purposes, we investigate the link between firms’ adoption of online business practices and financing structure. Therefore, we conjecture that online sales and delivery activities will increase retained earnings, which may further help firms in securing debt cheaply. In the same vein, the firm may decide to reduce external equity financing as retained earnings increase (Park and Pincus, 2001). We hypothesized that online activity adoption increases debt and retained earnings while reducing the demand for external equity finance.

2.4 Credit Arrangements Mechanism

Several studies have linked trade credits with the capital structure of firms. Petersen and Rajan (1997) suggest that the firm uses trade credit when access to debt capital is difficult. Since the COVID-19 crisis has created high cash flow shortages and access to the external market is relatively difficult due to depleted liquidity, firms are triggered to go for more credit arrangements, which suggests that higher trade credit will decrease the demand for debt targets to finance cash flow shortages. Following the new demands in credit agreements by banks during and after the post-COVID-19 crisis, firms find it easier to engage in trade credit than seeking debt finance because it is more closely related to the production and distribution process. It may also be harder for firms to avoid it in supplier-customer relationships. For firms that adopt the open business strategy during the COVID-19 crisis, they find it important to engage more in trade credit to continually run business operations as the call for new credit agreements (i.e., demands for material adverse effect-MAE clauses) may further delay business production, lead to temporary closure decision, and a fall in the firm’s market competitive advantage.

The substitution theory of debt seems to explain the link between the firm’s demand for trade credit over the debt benefits (i.e. tax shields) in their optimal capital structure. Firms could substitute the use of trade credit for additional debt, especially during financial constraints, by trying to reduce the ex-post agency cost of additional debt between the owner-manager and the bondholders. This can induce equity holders to be less risky in their asset substitution decisions since Jensen and Meckling (1976) argue that in firms nearing financial distress, equity holders have the incentive to substitute riskier assets for existing ones in an attempt to “gamble for resurrection,” even if the new assets have negative net present value.

The uncertainty regarding the impact of the COVID-19 crisis on cash flows, as firms experience increased cash flow shortages, can make firms face higher variability in their credit terms. COVID-19 has triggered significant changes in credit agreements and terms, which may require banking institutions to evaluate and monitor firms’ credit risk levels. This will, in turn, affect the firm’s level of access to domestic credits from banks. In their assessment of the new credit arrangement patterns caused by the COVID-19 crisis, Montgomery *et al.* (2020, pp.1) submit that

“as revenues for many businesses sharply declined, borrowers have explored their range of liquidity options, including drawing on revolving credit facilities or delay draw facilities available under credit agreements with their existing lenders. This has caused lenders to take a closer look at the conditions under which they are obligated to fund such borrowings.”

This implies that while borrowers seek a delay in payment, they must equally meet minimum daily liquidity to ensure that enough cash on hand is maintained to service credit obligations. Thus, we conjecture a positive link between credit arrangements and the financing choice of firms.

2.5 Economic Policy Response Mechanism

Coronavirus has created uncertainty in business operations, which has called for government support for businesses to finance their cash flow shortages. In Australia, despite over 65% reduction in the revenue of Australian businesses in 2020, 80% of them experience a significant business survival in 2021, arguing that these firms receive support from the Australian federal government experience through the 'JobKeeper' scheme, designed as a 'wage subsidy' paid to employers in a bid to prevent business closures, reduce unemployment and maintain current staff strength (Grimmer, 2022). Although this subsidy might have come with a fiscal cost for the government, it reduces the cost of external borrowing for businesses as businesses may need to explore retained earnings and other non-bank loans to address cash flow shortages. On the contrary, MSMEs in Pakistan did not receive sufficient government support due to a decline in profits and bankruptcy problems (Shafi *et al.*, 2020). Shafi *et al.* (2020) contend that establishments in countries with economic and political instability could not get adequate government support, with most owners of establishments requesting the government to provide low-interest loans, and subsidies on utility charges.

In corporate finance literature, Ebrahim *et al.* (2014) link government support to debt finance. Patronised firms have higher leverage on average due to informal government support since these firms are more likely to service their debt during periods of economic uncertainties (i.e., COVID-19) and financial distress (Shleifer and Vishny, 1992). However, this implicit government support fades if the crisis increases systematic risk levels especially support extracts rents that cause low returns in firms (Ebrahim *et al.*, 2014). Due to COVID-19, we investigate how economic policy response factors (fiscal exemptions, government support, and wage subsidies) affect the financing structure of firms in response to cash flow shortages.

2.6 Business Closure Mechanism

The recent COVID-19 pandemic induced business closures that led to financial losses, insolvency concerns, and liquidity problems among businesses (Guerini *et al.*, 2020), which suggests that establishments that faced liquidity and cash flow challenges during the COVID-19 faced challenges in maintaining daily operations. This is usually understood that businesses characterized by insufficient cash reserves, and lack of access to credit lines would struggle to pay employees, and suppliers, and meet operational expenses, resulting in financial distress, and may ultimately lead to business closures. In Europe, there was economic contraction due to COVID-19, potentially impacting businesses' cash positions, leading to corporate bankruptcies, and temporary and permanent closure of business operations (Ebeke *et al.*, 2021).

The impact of COVID-19 was more severe during the early period of the crisis when there were forced closures and mass layoffs across businesses, suggesting that businesses that experienced more disruptions faced closure, and consequently, cash flow shortages. The risk of closure was negatively associated with lower finances, indicating that such businesses were more likely to reduce their plans to access banks and other credit supply mechanisms due to changes in credit terms that require good financial standings. The bureaucratic hassles and difficulties in establishing eligibility were of more concern to businesses (Bartik *et al.* 2020). These factors such as financial fragility and lower investment responsiveness to cash flow played significant roles in business closure during COVID-19, making it more likely to see a sharp drop in the financing structure of businesses. Thus, we conjecture that permanent and temporary closure of business operations could have a significant impact on the financing structure of establishments.

3. Material and Methods

3.1 Data Source

The dataset for this study consists of responses from firms (i.e., establishments) surveyed from over 4,919 firms in 28 countries¹ from the COVID Enterprise Survey conducted by the World Bank. We use the first-round COVID survey conducted between May and August 2020 as we consider the impacts of COVID-19 more severe in this collection period when government support and other credit arrangements are less or almost absent in some countries. We use the unaudited World Bank Enterprise Survey by establishments. Although there is the possibility of data bias following the audited self-reporting, it is believed that it cannot be a source of bias in this study. Like Beck *et al.* (2005) who also used the WBES to examine financial and legal constraints to growth concerning firm size, we contend that the goal of WBES is on enterprises and business environment and not firm performance. Firm performance is much linked to audited reports.

The essence of the survey is to identify the firm-level problems caused by the global COVID-19 pandemic and how firms finance their cash flow shortages. The firm-level issues range from closure decisions, productivity patterns, online business activity adoption, employee welfare, and credit arrangement to the economic policy response. General information on the establishments is limited to language, gender, sector, and designation as presented in Table 1. The survey has information relating to national sales, and the national language, and the main sources of finance used by firms to deal with cash flow shortages are government grants, account payables, equity finance, retained earnings, and bank and non-bank loans.

The study performs empirical estimation on a sample of 28 countries surveyed in 2020 during the COVID-19 pandemic. These countries are Albania, Armenia, Belarus, Bulgaria, Chad, Croatia, Cyprus, El-Salvador, Georgia, Greece, Guatemala, Guinea, Honduras, Hungary, Italy, Jordan, Moldova, Mongolia, Morocco, Nicaragua, Niger, Poland, Romania, Russia, Slovenia, Togo, Zambia, and Zimbabwe. Data are drawn from the World Bank Enterprise Survey (WBES) compiled by the World Bank. All the variables are collected from various establishments in these countries. We relate the assumptions of our empirical models to past studies. Although the measures of variables in the study are component-based measures rather than accounting or financial measures. For instance, we estimate components of the firm's productivity, including establishment output, establishment total hours worked, establishment product and service demands, establishment inputs supply, and establishment production conversion process instead of the total factor productivity used in Nucci *et al.* (2005). The use of establishment product demands supports the input demand used in the productivity function of Olley and Pakes (1992).

In addition, the survey covers many establishments. It covers three major sectors: manufacturing, retail services, and other sectors. Manufacturing firms constitute about 48.25% of the sampled firms, another 18.23% are from the retail service sector, and the remaining 33.52% are from other sectors. Tables A and B in the Appendix present the total number of firms surveyed in each of the 28 countries and the final number of firms used in this study. Equity finance is the most sourced finance in developed countries to deal with cash flow shortages, next to bank loans, then government grants, non-bank loans, and payables. Meanwhile, in developing countries, firms also used equity finance more than any other financing source but less than their counterpart in developed countries, this may be due to sound financial and institutional settings. Fewer bank loans, as well as retained earnings, are used in firms surveyed in developing countries with no report on account payables. The

¹ As at the collection of the data for this study, the World Bank Enterprise Survey (WBES) covers 28 countries involving about 15,605 firms. However, the sample is reduced to 4,919 firms because most firm-level variables and data are missing.

number of firms that used account payables in developed countries is higher than firms that use individual non-bank loans and government grants to finance cash flow shortages. This may be due to the trust factor in supplier-client relations.

3.2 Financing Cash Flow Shortages Models

Firms finance using either equity finance or debt finance or a combination of both. These forms of financing are used to finance cash flow shortages by establishments during the COVID-19. Thus, we conjecture that these finances represent the financing structure of firms. Thus, we consider account payables, equity finance, bank loans and non-bank loans as sources of financing cash flow shortages², and are related to the capital structure of firms. The logit regression equations connecting COVID-19 dynamics and cash flow shortages financing are presented in equations (1) to (6). Thus, to explain cash flow shortage financing during COVID-19, logit regressions are utilized. The dependent variables are dummies, which each represent $Y=1$ or otherwise $Y=0$ if the firm chooses one of the financing options. So, if a firm uses accounts payable to address cash flow shortages, the firm will be scored “1” and assigned “0” for firms that do not use this finance option.

Employee welfarism model:

$$Y_i^I = \beta_1 \Delta TemporaryWorkers_i + \beta_2 FemaleEmpDiv_i + \beta_3 QuitLeaveWorkers_i + \beta_4 LaidOffWorkers_i + \beta_5 Controls_i + \varepsilon_i \quad (1)$$

Productivity shocks model:

$$Y_i^I = \beta_1 ProductionCProcess_i + \beta_2 Output_i + \beta_3 HoursWorked_i + \beta_4 Demand_i + \beta_5 Supply_i + \beta_6 Controls_i + \varepsilon_i \quad (2)$$

Closure decision model:

$$Y_i^I = \beta_1 WeeksClosed_i + \beta_2 TemporaryClosure_i + \beta_3 Controls_i + \varepsilon_i \quad (3)$$

Credit arrangements model:

$$Y_i^I = \beta_1 CreditSales_i + \beta_2 CreditPurchases_i + \beta_3 Controls_i + \varepsilon_i \quad (4)$$

Online activity adoption model:

$$Y_i^I = \beta_1 StartedOnlinebus_i + \beta_2 StartedDeliverOnline_i + \beta_3 RemoteWork_i + \beta_4 OnlineSales + \beta_5 Controls_i + \varepsilon_i \quad (5)$$

Economic policy response model:

$$Y_i^I = \beta_1 FiscalExemp_i + \beta_2 GovtSupport_i + \beta_3 WageSubsidies_i + \beta_4 Controls_i + \varepsilon_i \quad (6)$$

Where Y_i^I represent the four sources of finance used in addressing cash flow shortages, which are account payables, equity finance, bank loans, and non-bank loans. As a general practice to avoid omitted variable bias, we controlled for GDP growth rate, inflation, private sector credit, and firm size. All variables including the dependent variables are defined in Appendix A2.

² In our initial data analysis, we consider government grants and retained earnings as part of financing cash flow shortages. However, our initial regression estimates show inconsistent results across the six model specifications. This suggests that the percentage of establishments financed by government grants and retained earnings to cushion the challenges of COVID-19 is less significant in the sampled firms. Also, the economic policy response factors are highly correlated with government grants. Thus, we excluded estimations with government grants and retained earnings models.

3.3 Summary Statistics

Table 1³ presents the frequencies of the variables in this study. Results in Table 1 reveal that approximately 50% of firms affected by COVID-19 were in the manufacturing sector (representing about 48.25%), which could be due to a lack of access to production resources possible due to governments' lockdown policies. Also, the firms most affected are those whose national languages are English (19.79%), Russian (11.32%), and Arabic (10.80%). Table I reports that most of the sampled respondents, respecting each firm, are members of the board of directors, representing about 47.63% of the total 5,749 firms used for the frequency analysis, followed by general managers with about 14.02%, account managers/officers with about 7.31%, and financial managers with about 6.89%. CEOs and shareholders sampled represent about 5.22% and 0.20% of the sampled firms, respectively.

There is evidence that businesses do not permanently close operations but are temporarily closed. About 45.14% of the firms confirmed that they temporarily closed due to the COVID-19. One aspect of COVID dynamics that was brought to the finance literature during the COVID is the adoption of online business activities and practices to increase the business supply-production chain and delivery of goods and services. About 25.43% of the firms started or increased business online, 23.85% of the firms started or increased online delivery of goods and services, and approximately 30% of employees work remotely from their respective homes. There is also a report that firms also filed for insolvency or bankruptcy during the COVID-19. About 26.77% needed to be tax-responsible, 19.55% had overdue financial obligations that they needed to exercise, and about 5.13% of firms filed for either insolvency or bankruptcy.

Concerning economic policy response, a smaller number of firms received wage subsidies, about 26.07% representing 1499 firms rated "Yes" that they received wage subsidies from the government. About 30% of the surveyed firms received government support, and a low percentage of 13.97 of the firms were able to secure fiscal exemptions and reductions. Among the items of productivity shocks, the percentage of firms that converted their products or services in response to COVID-19 (production conversion process) is 37.88%, less than those firms that were unable to convert their production (i.e., 61.94%). Productivity was obstructed as 66.97% of the firms acknowledged that the total number of firms' hours worked significantly reduced, which supports our reports on the number of firms that temporarily closed due to COVID-19. Less than 32% of firms still work normal business hours.

To assess the importance of credit arrangements during the global pandemic, firms were asked to rate four options, whether credit sales and credit purchases decrease, increase, remain the same, and don't know. Between credit sales and credit purchases, the percentage of firms that experience a decrease in credit sales (i.e. 42.82%) is higher than those firms that experience a decrease in credit purchases (i.e. 39.87%) while there is more increase (i.e. 10.82%) in credit purchases than credit sales (i.e. 9.67%). There seems to be an equal percentage of firms that maintain their credit sales (i.e., 41.83%) and credit purchase levels (43.75%) without further decrease or increase. This suggests that firms ensure a speedy cash conversion cycle during COVID-19 by delaying account payables while reducing the amount of account receivables. Thus, justifying the use of spontaneous financing to address cash flow shortages during the pandemic period.

³ We use a total of 5,749 firms to produce the summary statistics table as presented in Table 1 since some of the information could be relevant for our regression results. This is different from the final 4,919 firms used for performing the logit regression estimations.

Table 1: Firm descriptions and actions displayed during the COVID-19 crisis

Variable	Details	Freq.	Per cent	Variable	Details	Freq.	Per cent
Sector	Manufacturing	2774	48.25	Closure status	Open	5080	88.36
	Other services	1927	33.52		Temporarily closed	669	11.64
National language	Retail services	1048	18.23	Temporary closure due to COVID-19	Permanently closed	528	-
	Albanian	183	3.18		Don't know	673	11.71
	Arabic	621	10.80		No	2481	43.16
	Armenian	32	0.56	Yes	2595	45.14	
	Bulgarian	353	6.14	Started or increased business online	Don't know	9	0.16
	Croatian	190	3.30		No	4278	74.41
	English	1138	19.79		Yes	1462	25.43
	French	243	4.23	Started or increased delivery of G&S	Don't know	10	0.17
	Georgian	321	5.58		No	4368	75.98
	Greek	90	1.57		Yes	1371	23.85
Hungarian	291	5.06	Remote work arrangement (empl.)	Don't know	17	0.30	
Italian	148	2.57		No	4009	69.73	
Mongolian	190	3.30		Yes	1723	29.97	
Polish	348	6.05	Tax authorities	Don't know	30	0.52	
Romanian	324	5.64		No	4180	72.71	
Russian	651	11.32		Yes	1539	26.77	
Slovenian	121	2.10	Overdue financial obligations	Does not apply	201	3.50	
Spanish	505	8.78		No	4261	74.12	
Board	2739	47.63		Yes	1124	19.55	
Designation	Member	806	14.02	Filed for insolvency or bankruptcy	Don't know	14	0.24
	General Manager	420	7.31		No	5440	94.63
	Account Manager	396	6.89		Yes	295	5.13
	Financial Manager	300	5.22	Govt. (national or local) support	Don't know	33	0.57
	CEO	296	5.15		No	3500	60.88
	Admin. Manager	181	3.15		No, but in the next 3 months	455	7.91
	Marketing Manager	162	2.82	Yes	1761	30.63	
	Chief Accountant	137	2.38	Fiscal exemptions or reductions	Don't know	32	0.56
	Economic Manager	131	2.28		No	1381	24.02
	Supervisor	129	2.24		Yes	803	13.97
Head of Departments							

Table 1 (continued)

Variable	Details	Freq.	Per cent	Variable	Details	Freq.	Per cent
	CFO	117	2.03	Wage subsidies	Don't know	23	0.40
	HR Manager	110	1.91		No	694	12.07
	CEO & Est. Staff	42	0.73		Yes	1499	26.07
	Branch Manager	40	0.70	Establishment hours worked	Decrease	3850	66.97
		Assistant Manager	23		0.40	Don't know	3
	Shareholder	12	0.20	Change in temporary workers	Don't know (spontaneous)	23	0.40
		Agent	6		0.10	Increase	52
	Technical manager	5	0.09		Remain the same	1821	31.68
	Auditor	5	0.09		Decrease	1699	29.55
	Gender	Female	2061		35.85	Don't know	299
		Male	3666	63.77	Increase	104	1.81
	Financing Structure	Account payable	1224	21.29	Remain the same	3647	63.44
		Equity finance	2446	42.55	Sales on credit	Decrease	2462
Government grants		478	8.31	Don't know		326	5.67
Non-bank loans		153	2.67	Increase	556	9.67	
Bank loans		1196	20.80	Remain the same	2405	41.83	
Production conversion process	Retained earnings	252	4.38	Purchases on Credit	Decrease	2292	39.87
	Don't know	10	0.17		Don't know	320	5.57
		No	3561	61.94	Increase	622	10.82
	Yes	2178	37.88	Remain the same	2515	43.75	

Figure 1 depicts that firms rely on equity finance more than bank loans to finance cash flow shortages. Intuitively, the wake of the COVID-19 crisis creates a new hierarchy in the capital structure of firms, where firms finance first with equity finance and then with account payables. It may be surprising that firms experiencing cash flow shortages would demand equity finance during the COVID-19 crisis. However, the willingness of equity holders to release capital supports the claim by Jensen and Meckling (1976) that in firms nearing financial distress, equity holders have the incentive to substitute riskier assets for existing ones in an attempt to “gamble for resurrection,” even if the new assets have negative net present value. We also offer a closer explanation of why firms seek more equity finance during the COVID-19 crisis. This is because the capital markets play a “spare tire” role in providing an alternative source of external finance when the functioning of the banking sector has been impaired during the crisis (Levine *et al.*, 2016). Figure 1 shows that the hierarchy structure for firms in a crisis period follows a path of equity finance, accounts payable, bank loans, government grants, retained earnings, and non-bank loans.

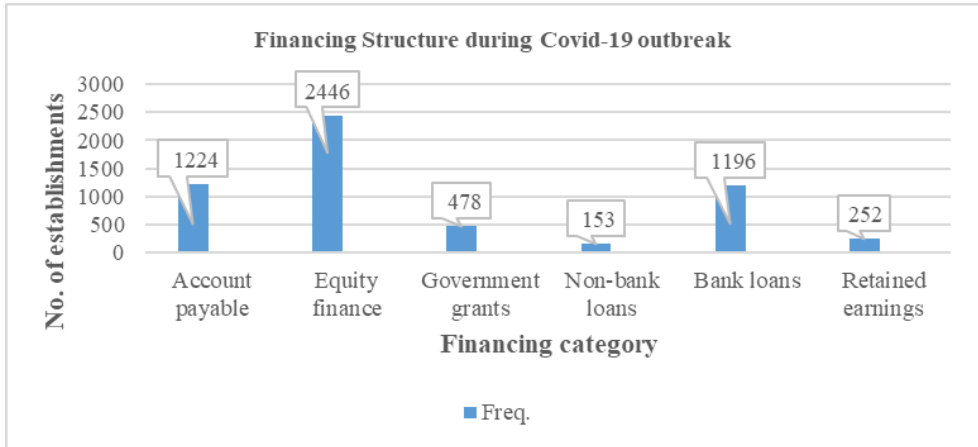


Figure 1: Financing structure during the COVID-19 outbreak

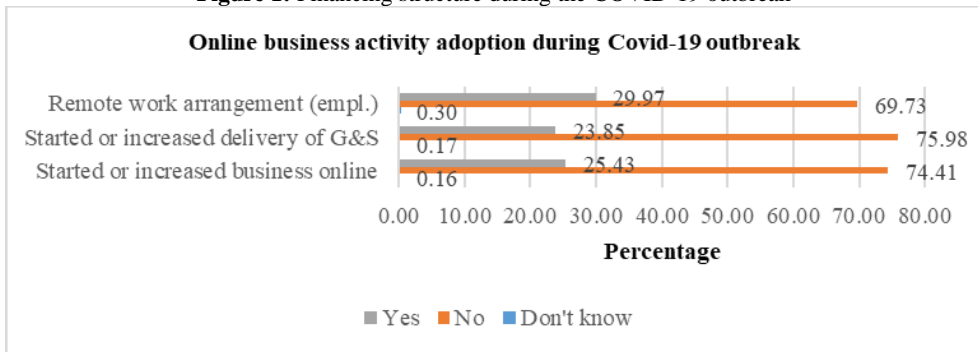


Figure 2: Online business activity during the Covid-19 outbreak

Figure 2 depicts that about 29.97% of the firms engage their employees to work from home, with about 69.73% still engaging their employees on work-in-office (WiO) conditions. Meanwhile, the percentage of firms that start or increase business online is 25.43%, higher than those that start or increase delivery of goods and services, representing about 23.85%. Figure 3 shows whether firms' cash shortages lead to bankruptcy or insolvency. We report evidence that more firms have overdue financial obligations than were filed for insolvency or bankruptcy. Supporting the growth in cash flow shortages, Figure 4 depicts that 45.64% of firms temporarily closed due to the COVID-19 crisis, while about 43.16% of the firms opened despite the pandemic outbreak, probably due to government grants and better fiscal exemptions or reductions in some countries.

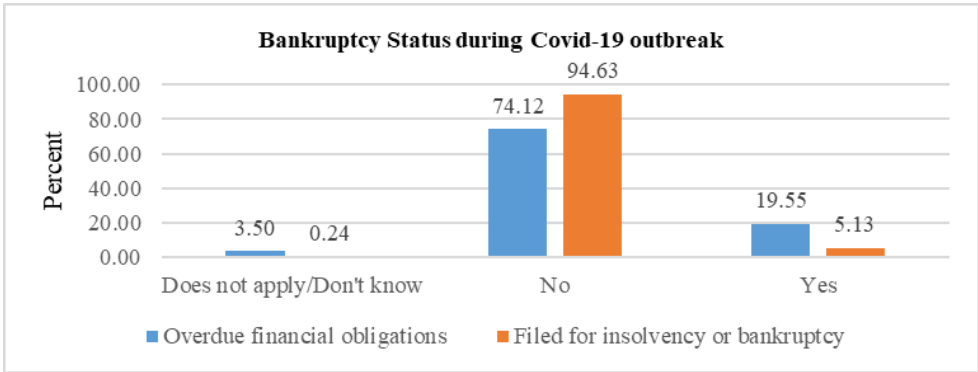


Figure 3: Bankruptcy status during the COVID-19 outbreak

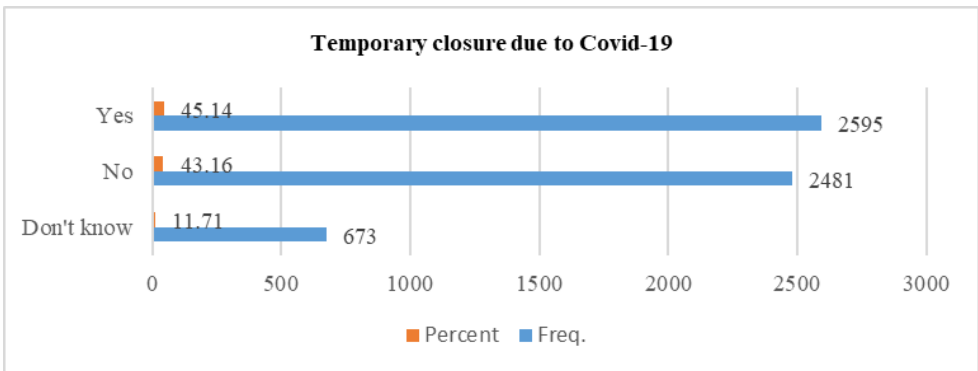


Figure 4: Temporary closure due to the COVID-19 outbreak

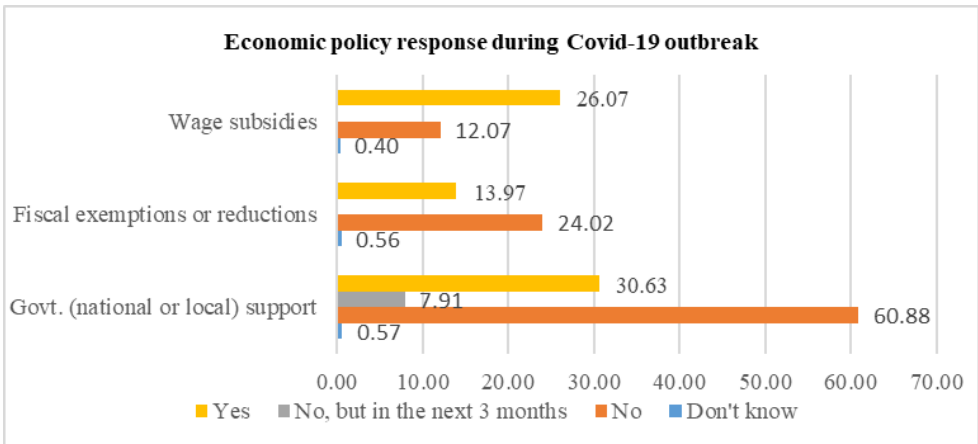


Figure 5: Economic policy response during the COVID-19 outbreak

Figure 5 shows that firms received more government support, representing about 30.63%. About 13.97% of firms received fiscal exemptions or reductions, and more than 25% of the firms received government wage subsidies as an economic policy response for firms during the COVID-19 outbreak. Figure 6 depicts the status of employees during the COVID-19 crisis. About 29.55% of the sampled firms have their temporary workforce reduced while about 63.44% of firms retain the number of their temporary workforce. There was a minimal

increase in temporary workers, probably due to the engagement of technology experts to run firms' online activity operations. Firms that reduce the number of temporary workers also reduced the number of hours worked by 66.97% while about half of the firms that did not change their temporary workers still worked for normal hours as before the pandemic.

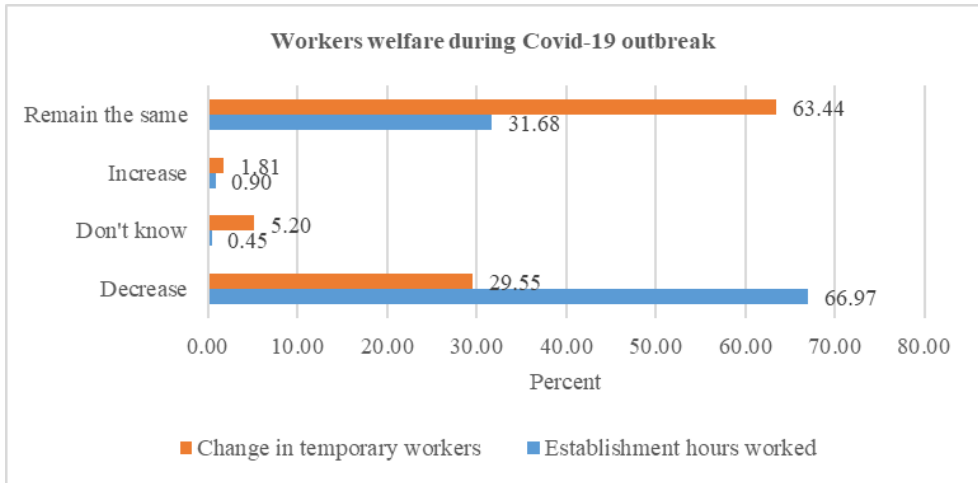


Figure 6: Status of employees during the COVID-19 crisis

Table 2 presents the results for the correlation matrix. We document that the production conversion process, hours worked, firm demand, and firm supply have a positive correlation with accounts payable. Also, we find a negative correlation between firm demand, firm supply, female employee diversity, workers laid off, tax authorities and equity finance. Furthermore, firms that filed for insolvency or bankruptcy experienced lower accounts payable, lower wage subsidies, and lower credit sales, following overdue financial obligations that could not be delayed. Similarly, we find that establishments that finance cash flow shortages using bank loans were able to perform their production conversion process, increase their outputs, and meet their tax obligations. We find a higher positive correlation between sales on credit and purchases on credit. This suggests that both accounts receivable and accounts payable increased simultaneously during COVID-19 due to economic uncertainty, supply chain disruptions, and reduced customer demands. For instance, lockdowns and travel restrictions led to supply chain disruptions, which resulted in delays in payments to suppliers while at the same time, customers are demanding flexible payment agreements. As presented in Table 1, the percentage of firms that experienced a higher decline in sales on credit (i.e., 42.82%) was much higher than firms experiencing a decrease (i.e., 39.87%) and an increase (i.e., 10.82%) in accounts payable, respectively.

Table 2: Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Accounts payable	1.000															
2. Equity Finance	-0.376	1.000														
3. Bank Loans	-0.331	-0.494	1.000													
4. Non-bank Loans	-0.081	-0.120	-0.106	1.000												
5. Production conversion process	0.014	-0.146	0.110	-0.007	1.000											
6. Establishment output	-0.062	-0.129	0.165	0.051	0.055	1.000										
7. Hours Worked	0.084	0.114	-0.186	0.055	0.104	0.232	1.000									
8. Firm Demand	0.084	-0.045	-0.072	0.042	0.008	0.127	0.217	1.000								
9. Firm Supply	0.064	-0.065	-0.094	0.163	0.023	0.181	0.227	0.402	1.000							
10. Closure Status	0.040	0.229	-0.249	-0.012	-0.013	-0.248	0.023	-0.033	-0.036	1.000						
11. Temporary closure due to COVID-19	0.186	-0.041	-0.120	-0.042	-0.090	-0.246	-0.084	-0.034	-0.031	0.225	1.000					
12. Temporary workers	0.210	0.020	-0.226	0.144	-0.053	-0.034	-0.013	0.035	0.141	-0.037	-0.032	1.000				
13. Female employee diversity	0.104	-0.035	-0.076	0.054	0.198	0.018	0.083	-0.023	0.062	0.011	-0.059	0.090	1.000			
14. Quit and leave-seeking workers	-0.022	0.057	-0.023	0.008	-0.072	0.051	0.132	-0.024	-0.011	0.007	-0.051	0.016	0.041	1.000		
15. Workers laid off due to COVID-19	0.105	-0.029	-0.060	0.032	0.010	-0.038	-0.060	-0.003	0.026	0.009	-0.043	0.133	0.106	0.023	1.000	
16. Tax Authorities	-0.069	-0.001	0.017	-0.013	0.014	-0.137	-0.055	-0.023	-0.073	0.103	0.155	-0.040	-0.062	0.030	-0.047	1.000

Variables	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17. Overdue financial obligations	1.000														
18. Filed for insolvency or bankruptcy	0.222	1.000													
19. Sales on credit	-0.076	-0.089	1.000												
20. Purchases on credit	-0.084	-0.073	0.703	1.000											
21. Fiscal exemptions or reductions	0.018	0.088	-0.072	-0.068	1.000										
22. Govt. (national or local) support	-0.013	-0.069	0.081	0.038	-0.090	1.000									
23. Wage subsidies	0.002	-0.036	0.014	-0.005	-0.018	0.198	1.000								
24. Started or increased business online	0.003	-0.013	-0.038	-0.063	0.075	-0.071	-0.109	1.000							
25. Started or increased delivery of G&S	-0.021	0.023	-0.069	-0.079	0.063	-0.094	-0.093	0.460	1.000						
26. Remote work arrangement (empl.)	-0.045	-0.029	-0.040	-0.055	-0.031	-0.023	-0.033	0.292	0.147	1.000					
27. Share of online sales	0.023	0.015	-0.042	-0.079	0.042	-0.064	-0.071	0.470	0.290	0.267	1.000				
28. GDP growth rate	0.014	0.105	0.066	0.092	-0.107	0.231	0.091	-0.106	-0.065	-0.051	-0.076	1.000			
29. Inflation	-0.034	0.256	0.075	0.100	-0.033	-0.073	-0.209	0.130	0.149	0.066	0.117	0.358	1.000		
30. Private sector credit	0.013	-0.081	-0.166	-0.167	0.196	-0.088	0.018	0.021	-0.013	0.023	0.025	-0.412	-0.569	1.000	
31. Firm size	0.023	0.073	-0.069	-0.064	0.038	-0.089	-0.081	0.041	0.105	-0.069	-0.019	-0.068	0.025	0.114	1.000

Source: Authors' computation

4. Empirical Results

This section presents the results of the various COVID-19 dynamics and mechanisms used in this study. Logit regressions are used to estimate the relation between productivity shocks and the probability that the firm uses a particular form of financing structure. The dependent variables are various sources of financing structure, which are individual binary variables that take the value of 1.0 if the firm uses either accounts payable or equity finance and zero otherwise. Past studies have adopted logistic regression to examine capital structure determinants (Ofek, 1993). Tables 3-8 present the main results.

Table 3 presents the results for the relationship between employee welfarism factors and financing structure. We find that firms that change their temporary workers use accounts payable, equity finance, and non-bank loans to finance their cash flow shortages. Also, we find a negative and significant relationship between female employee diversity, equity finance, and bank loans. However, we found that there are no significant relationships between financing choices and workers who quit and are laid off. This implies that establishments do not have to border about increasing their finances as the number of workers quitting and leaving the business does not have any significant impact on their finances, which contradicts the submission of Berk *et al.* (2010) and Serfling (2016) that firing cost induces a human cost of bankruptcy, although these authors do not establish whether the human cost of bankruptcy is relevant in periods when the firms are faced with variabilities in cash flows.

Table 3: Employee welfarism and financing structure

	[Accounts Payable] (1)	[Equity] (2)	[Bank Loans] (3)	[Non-bank Loans] (4)
Change in temporary workers	0.288*** (0.047)	0.123*** (0.041)	-0.393*** (0.053)	0.771*** (0.116)
Female employee diversity	0.016*** (0.002)	-0.003* (0.002)	-0.005** (0.002)	0.002 (0.005)
Quit and leave-seeking workers	0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Workers laid off due to COVID-19	0.001 (0.003)	-0.001 (0.003)	-0.002 (0.004)	0.002 (0.007)
GDP growth rate	0.145*** (0.022)	0.278*** (0.032)	-0.248*** (0.017)	-0.241*** (0.043)
Inflation	-0.720*** (0.048)	0.364*** (0.031)	0.390*** (0.031)	-0.290*** (0.055)
Private sector credit	-0.053*** (0.004)	0.081*** (0.004)	-0.003 (0.004)	-0.117*** (0.015)
Firm size	-0.032 (0.211)	0.382* (0.224)	-0.690*** (0.235)	-0.886** (0.347)
Constant	1.407*** (0.489)	-7.183*** (0.541)	0.180 (0.524)	1.858** (0.882)
Pseudo R square	0.264	0.269	0.258	0.271
Chi-Square	552.40	745.18	596.46	158.32
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	2,058	2,058	2,058	2,058
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 4: Productivity shocks and financing structure

	[Account Payables]	[Equity]	[Bank Loans]	[Non-bank Loans]
	(1)	(2)	(3)	(4)
Production conversion process	-0.538*** (0.124)	-0.523*** (0.107)	0.899*** (0.131)	0.178 (0.242)
Establishment output	-0.001 (0.003)	-0.013*** (0.002)	0.013*** (0.003)	0.015*** (0.006)
Firm's hours worked	0.091*** (0.033)	0.011 (0.030)	-0.154*** (0.040)	0.129* (0.067)
Firm demand	0.023 (0.049)	-0.029 (0.046)	-0.051 (0.065)	-0.267** (0.105)
Firm supply	-0.089** (0.041)	0.078** (0.037)	-0.106** (0.052)	0.109 (0.073)
GDP growth rate	0.135*** (0.023)	0.296*** (0.032)	-0.410*** (0.022)	-0.151*** (0.043)
Inflation	-0.434*** (0.039)	0.167*** (0.033)	0.760*** (0.045)	-0.140*** (0.042)
Private sector credit	-0.040*** (0.004)	0.067*** (0.004)	0.035*** (0.006)	-0.108*** (0.011)
Firm size	-0.437*** (0.168)	-0.174 (0.174)	-0.160 (0.269)	-1.062*** (0.269)
Constant	3.417*** (0.533)	-3.064*** (0.506)	-6.765*** (0.709)	2.106** (0.966)
Pseudo R square	0.130	0.222	0.378	0.268
Chi-Square	284.78	645.79	918.49	194.41
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	2,188	2,188	2,188	2,188
No of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 4 provides the results of the logit regressions for the relationship between productivity shocks and financing structure – measured using payables (Model 1), equity finance (Model 2), bank loans (Model 3), and non-bank loans (Model 4). The results reveal that the production conversion process and establishment output are negatively related to account payables and equity finance whereas both productivity shock factors are found to be positively related to bank loans and non-bank loans. The results are significant at the 1 per cent level. The number of hours worked during COVID-19 in establishments is positively related to accounts payable and non-bank loans whereas it is negatively related to bank loans. Suggesting that establishments that open and continue business operations have more financial support from non-bank loans to fund their cash flow shortages, consistent with Grimmer (2022) and Shafi *et al.* (2020), contending that about 75% of establishments received stimulus measures such as loans that do not attract interests and government incentives that were crucial for their survival and adaptability.

Table 5: Closure decision and financing structure

	[Accounts Payable] (1)	[Equity] (2)	[Bank Loans] (3)	[Non-bank Loans] (4)
Closure status	-0.048*** (0.017)	0.069*** (0.014)	-0.121*** (0.016)	-0.010 (0.042)
Temporary closure due to COVID-19	-0.134 (0.201)	0.400** (0.156)	-0.145 (0.188)	-4.254*** (0.919)
GDP growth rate	0.392*** (0.036)	0.430*** (0.039)	-0.364*** (0.019)	-0.178*** (0.046)
Inflation	-1.117*** (0.068)	0.273*** (0.031)	0.699*** (0.041)	-0.328*** (0.076)
Private sector credit	-0.081*** (0.005)	0.087*** (0.004)	0.017*** (0.005)	-0.148*** (0.021)
Firm size	-0.025 (0.250)	0.154 (0.252)	-0.368 (0.315)	-1.274*** (0.446)
Constant	5.014*** (0.873)	-8.796*** (0.767)	-1.821** (0.881)	18.831*** (3.517)
Pseudo R square	0.357	0.352	0.342	0.277
Chi-Square	841.13	1189.08	930.00	137.78
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	2,453	2,453	2,453	2,453
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

The results of the closure decision model are presented in Table 5. Here, we conjecture that there are positive relations between financing structure and the measures of closure decision: closure status and temporary closure due to COVID-19. The results reveal that the establishments that permanently closed businesses have reduced accounts payable, bank loans, and non-bank loans but were able to maintain their internal retained earnings. This result is similar to those that closed business temporarily. Therefore, they avoid loans while also trying to settle their suppliers.

Table 6 provides the results for the relationship between credit arrangements and financing structure. We find a positive and significant relationship between sales on credit, accounts payable, and non-bank loans. Both sales on credit and purchases on credit have a negative relationship with equity finance, suggesting that firms that accumulate a significant amount of their capital in accounts receivable are faced with high financial risk that could reduce their access to equity finance. Similarly, in situations of economic uncertainty (i.e., COVID-19) where equity finance is costly, firms may use accounts payable as a source of spontaneous financing to address current cash flow problems.

Table 7 provides the logit regression results for the factors of online activity adoption (started or increased business online, started or increased delivery of goods and services, remote work arrangement, and share of online sales) and financing structure. The results reveal that establishments that started businesses online reduce their equity finance while increasing their bank loans, suggesting that firms' adoption of online business technologies required huge investments that need banking loans to execute. In addition, establishments that increased their delivery of goods and services, and made more online sales shortened their payments to suppliers since the number of credit sales is very low or almost absent in online sales. More so, results show that establishments require bank loans to finance increased online sales, delivery of goods and services, and remote work arrangements. This indicates that establishments used bank loans to invest in infrastructure needed to support employees' remote work to increase their satisfaction and reduce employee turnover.

Table 6: Credit arrangements and financing structure

	[Accounts Payables]	[Equity]	[Bank Loans]	[Non-bank Loans]
Variables	(1)	(2)	(3)	(4)
Sales on credit	0.230*** (0.041)	-0.059* (0.035)	0.037 (0.042)	0.234** (0.098)
Purchases on credit	0.117*** (0.041)	-0.062* (0.035)	-0.050 (0.043)	0.106 (0.099)
GDP growth rate	0.146*** (0.016)	0.307*** (0.022)	-0.341*** (0.013)	-0.117*** (0.031)
Inflation	-0.535*** (0.028)	0.266*** (0.020)	0.535*** (0.025)	-0.179*** (0.029)
Private sector credit	-0.040*** (0.003)	0.073*** (0.003)	0.008** (0.003)	-0.093*** (0.008)
Firm size	-0.167 (0.147)	0.135 (0.153)	-0.387** (0.197)	-1.049*** (0.239)
Constant	1.017*** (0.341)	-5.617*** (0.360)	-2.166*** (0.431)	1.938*** (0.618)
Pseudo R square	0.173	0.244	0.301	0.209
Chi-Square	815.67	1524.81	1485.06	259.06
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	4,588	4,588	4,588	4,588
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 7: Online activity adoption and financing structure

	[Accounts Payable]	[Equity]	[Bank Loans]	[Non-bank Loans]
Variables	(1)	(2)	(3)	(4)
Started or increased business online	0.093 (0.120)	-0.328*** (0.101)	0.646*** (0.112)	-0.143 (0.284)
Started or increased delivery of G&S	-0.348*** (0.113)	-0.071 (0.094)	0.207* (0.106)	0.002 (0.244)
Remote work arrangement (empl.)	-0.157* (0.093)	0.119 (0.080)	0.207** (0.098)	0.005 (0.222)
Share of online sales	-0.010*** (0.003)	-0.003 (0.002)	0.002 (0.003)	-0.008 (0.008)
GDP growth rate	0.166*** (0.016)	0.286*** (0.022)	-0.335*** (0.013)	-0.085*** (0.029)
Inflation	-0.502*** (0.027)	0.293*** (0.021)	0.498*** (0.025)	-0.172*** (0.029)
Private sector credit	-0.040*** (0.003)	0.076*** (0.003)	0.002 (0.003)	-0.088*** (0.007)
Firm size	-0.249* (0.147)	0.172 (0.153)	-0.380* (0.203)	-1.107*** (0.241)
Constant	3.010*** (0.456)	-5.536*** (0.431)	-4.313*** (0.504)	3.107*** (0.904)
Pseudo R square	0.157	0.245	0.321	0.195
Chi-Square	737.06	1531.39	1580.40	241.94
Prob. (Chi-square)	0.000	0.000	0.000	0.000
Observations	4,588	4,588	4,588	4,588
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 8: Economic policy response and financing structure

Variables	[Accounts Payable] (1)	[Equity] (2)	[Bank Loans] (3)	[Non-bank Loans] (4)
Fiscal exemptions or reductions	-0.680*** (0.132)	-0.323*** (0.114)	0.376** (0.178)	0.779* (0.406)
Govt. (national or local) support	-0.303* (0.177)	0.214 (0.145)	-0.230 (0.215)	1.446* (0.802)
Wage subsidies	0.335** (0.147)	0.303** (0.121)	0.352* (0.196)	1.382*** (0.528)
GDP growth rate	0.100* (0.053)	0.124*** (0.047)	-1.362*** (0.087)	1.402** (0.565)
Inflation	-0.857*** (0.080)	0.382*** (0.042)	0.579*** (0.059)	0.468** (0.210)
Private sector credit	-0.047*** (0.005)	0.103*** (0.005)	-0.065*** (0.007)	-0.324*** (0.048)
Firm size	-0.247 (0.210)	-0.175 (0.236)	-0.720*** (0.270)	-0.827* (0.452)
Constant	4.860*** (1.016)	-8.041*** (0.890)	4.203*** (1.262)	-9.877*** (3.806)
Pseudo R square	0.141	0.264	0.426	0.602
Chi-Square	273.23	677.13	684.49	336.18
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	1,870	1,870	1,870	1,870
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 8 presents the logit regression results for the relationship between the measures of economic policy response: fiscal exemptions or reductions, govt. support (national or local), and wage subsidies, and financing structure. The results show that fiscal exemptions have a negative relationship with accounts payable and equity finance but a positive relationship with bank loans and loan bank loans. Government support has a negative and significant relationship with accounts payable, suggesting that firms that do not receive government support extend payments to their suppliers to have liquidity for the firm to finance cash flow shortages. In contrast, wage subsidies have a positive and significant relationship with all the various forms of financing cash flow shortages, with non-bank loans having the largest effect. This suggests that establishments during the COVID-19 employed different forms of financing to retain their employees to prevent lay off or voluntarily quitting.

5. Robustness Test

The present study further examines the COVID-19 dynamics across developed countries and developing countries. Although bankruptcy has been examined in the past corporate finance literature, we re-examine the factors that are induced by COVID-19 on cash flow shortages.

5.1 The Role of Bankruptcy in Financing Cash Flow Shortages

Just like the global financial crisis, firms often risk bankruptcy and insolvency during COVID-19. Several studies in capital structure literature have linked debt maturity, capital structure and insolvency together (e.g., Hussain *et al.*, 2020). Hussain *et al.* (2020) contend that firms that have overdue financial obligations are more likely to experience higher insolvency risk. This is in support of the submission of Cathcart *et al.* (2020) that links financial leverage with default risk in European firms, arguing that firms that rely more on short-term debt are more likely to experience default risk, and they must survive by shifting from short-term debt to long-term finance.

Moreover, loss of business operation and shortfall in cash holdings are dynamic factors that trigger default risk (Della Seta *et al.*, 2020). This leads some firms to have overdue

financial obligations and others to file for insolvency or bankruptcy. Firms with high bankruptcy risk seek more equity issuance than firms with low bankruptcy or insolvency risk that issue debt (Dierker *et al.*, 2019). Firms that often file for bankruptcy have a lower tendency to repay loans, possess more leverage and are common among financially distressed and small-sized firms (Mselmi *et al.*, 2017). In this study, we test some bankruptcy-related factors different from previous bankruptcy measures and that are induced by COVID-19 on financing types of cash flow shortages.

Table 9: Bankruptcy and financing structure

Variables	[Accounts Payable] (1)	[Equity] (2)	[Bank Loans] (3)	[Non-bank Loans] (4)
Tax authorities	-0.677*** (0.109)	0.283*** (0.091)	-0.517*** (0.115)	0.484** (0.213)
Overdue financial obligations	0.311*** (0.100)	-0.260*** (0.086)	-0.145 (0.106)	-0.555** (0.227)
Filed for insolvency or bankruptcy	-0.351 (0.264)	-0.446** (0.179)	0.285 (0.181)	-1.197** (0.575)
GDP growth rate	0.155*** (0.016)	0.315*** (0.023)	-0.360*** (0.014)	-0.082*** (0.030)
Inflation	-0.497*** (0.027)	0.280*** (0.022)	0.539*** (0.026)	-0.190*** (0.029)
Private sector credit	-0.040*** (0.003)	0.075*** (0.003)	0.008** (0.003)	-0.091*** (0.008)
Firm size	-0.251* (0.147)	0.194 (0.154)	-0.398** (0.199)	-1.071*** (0.240)
Constant	3.611*** (0.632)	-5.400*** (0.483)	-1.286** (0.541)	5.370*** (1.368)
Pseudo R square	0.155	0.246	0.300	0.209
Chi-Square	719.96	1498.31	1417.07	256.77
Prob. (Chi-square)	0.000	0.000	0.000	0.000
No. of Firms	4,469	4,469	4,469	4,469
No. of countries	28	28	28	28

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 9 reveals that establishments used equity finance (i.e., retained earnings) and non-bank loans to finance their tax obligations. Similarly, firms that have overdue financial obligations delayed payments to suppliers, while using non-bank loans and equity finance to settle these obligations. In particular, the results reveal that establishments that filed for insolvency could not obtain adequate equity finance, non-bank loans and spontaneous finance such as account payables to address cash flow shortages. We find a negative relationship between insolvency, accounts payable, equity finance, and non-bank loans.

5.2 COVID-19 Dynamics and Financing Structure in Developed and Developing Countries

Proponents of the economic theory argue that the degree to which a crisis impacts the capital structure of the firm, creating higher risk and uncertainty, and lower returns, depends on how developed the financial institutions are (Ayyagari *et al.*, 2021). Thus, we test how the COVID-19 dynamics impact the financing structure of firms with developed financial institutions and those with less-developed institutions, which be categorized as developed vs. developing countries. We grouped firms by using the Human Development Index (HDI).

Table 10 provides the results for COVID-19 and financing structure. The economic factors reveal intriguing dynamics among developed nations. There is a positive and significant relationship between the production conversion process and accounts payable, suggesting that firms might be expanding their payment terms with suppliers as they intensify their

production activities. This trend is counterbalanced by a negative impact on equity, potentially attributable to the rise in operational expenses linked to production. Moreover, it is worth noting that government support has demonstrated significant efficacy in mitigating financial burdens and ensuring the preservation of equitable conditions during COVID-19. Also, remote work arrangements led to a rise in bank loans, presumably indicating investments in technologies. However, it has also resulted in a marginal decline in accounts payable. In developing nations, the production conversion process exhibits a substantial link with the increase in accounts payable and bank loans, exerting an adverse impact on equity. Furthermore, implementing online business activities and delivery services leads to a rise in accounts payable, indicating a trend towards expanding commercial operations. Implementing remote work arrangements has been shown to have a dual impact on bank loans, as well as accounts payable and equity, hence highlighting the difficulties encountered during the shift to remote work in developing countries. In general, the findings on COVID-19 dynamics in developing nations underscore the intricacies associated with the adjustment to new corporate financing structures.

Table 10: COVID-19 dynamics across developed and developing countries

VARIABLES	Full Sample		
	Accounts Payable	Equity	Bank Loans
Production conversion process	0.572 (0.371)	-0.341 (0.267)	0.461* (0.265)
Establishment output	-0.013* (0.008)	-0.020*** (0.006)	0.004 (0.006)
Closure status	-0.027 (0.043)	0.094*** (0.034)	-0.153*** (0.036)
Temporary closure due to COVID-19	-0.482 (0.579)	-0.550 (0.418)	0.562 (0.442)
Change in temporary workers	0.508*** (0.133)	-0.027 (0.105)	-0.329*** (0.123)
Quit and leave-seeking workers	0.003 (0.002)	0.000 (0.002)	-0.001 (0.001)
Workers laid off due to COVID-19	0.002 (0.005)	-0.001 (0.005)	0.004 (0.007)
Tax authorities	-0.188 (0.425)	-0.313 (0.320)	0.223 (0.305)
Overdue financial obligations	0.635 (0.417)	-0.145 (0.268)	-0.495* (0.280)
Sales on credit	0.378** (0.155)	-0.105 (0.116)	0.058 (0.125)
Purchases on credit	0.326** (0.164)	-0.119 (0.120)	0.002 (0.123)
Govt. (national or local) support	-0.993*** (0.213)	-0.162 (0.153)	0.194 (0.194)
Started or increased business online	0.313 (0.497)	-0.649** (0.314)	1.250*** (0.291)
Started or increased delivery of G&S	-0.675 (0.470)	0.041 (0.309)	0.151 (0.297)
Remote work arrangement (empl.)	-0.320 (0.402)	-0.088 (0.277)	0.654** (0.264)
Share of online sales	0.005 (0.014)	0.001 (0.009)	-0.017** (0.008)
Controls	YES	YES	YES
Constant	YES	YES	YES
Observations	549	549	549

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

Table 10 (continued)

VARIABLES	Developed Countries			Developing Countries		
	Accounts Payable	Equity	Bank Loans	Accounts Payable	Equity	Bank Loans
Production conversion process	0.283 (0.526)	-1.088** (0.514)	0.053 (0.564)	1.556 (1.350)	-1.126 (1.243)	1.161* (0.625)
Establishment output	-0.001 (0.010)	-0.017* (0.010)	0.003 (0.012)	-0.099** (0.046)	0.051* (0.030)	0.012 (0.016)
Closure status	-0.030 (0.070)	0.137** (0.068)	-0.096 (0.084)	-0.160 (0.172)	0.155 (0.123)	-0.135 (0.089)
Temporary closure due to COVID-19	-0.663 (0.854)	0.153 (0.700)	-0.451 (0.848)	-2.097 (1.981)	-1.232 (1.655)	2.181* (1.135)
Change in temporary workers	0.658*** (0.205)	0.023 (0.186)	-0.651*** (0.207)	1.883*** (0.717)	-0.850* (0.443)	-0.351 (0.334)
Quit and leave-seeking workers	0.004** (0.002)	0.001 (0.003)	-0.001 (0.003)	-0.102 (0.077)	0.003 (0.009)	-0.006 (0.011)
Workers laid off due to COVID-19	0.006 (0.009)	-0.024 (0.022)	0.004 (0.017)	0.010 (0.033)	0.014 (0.037)	0.003 (0.026)
Tax authorities	-0.393 (0.643)	0.663 (0.603)	0.406 (0.740)	2.364 (1.622)	-5.415** (2.284)	1.288* (0.659)
Overdue financial obligations	1.051* (0.638)	-0.798 (0.507)	-0.749 (0.591)	-0.560 (1.250)	-0.883 (1.217)	-0.266 (0.646)
Sales on credit	0.063 (0.268)	0.232 (0.248)	0.012 (0.282)	1.738** (0.740)	-0.782* (0.461)	0.120 (0.310)
Purchases on credit	0.860*** (0.298)	-0.078 (0.253)	-0.294 (0.292)	-0.320 (0.519)	-0.407 (0.466)	-0.129 (0.245)
Govt. (national or local) support	-1.110*** (0.299)	-0.027 (0.285)	0.684* (0.358)	-0.936 (0.919)	0.221 (0.830)	0.772 (0.874)
Started or increased business online	0.460 (0.634)	-1.269** (0.606)	0.575 (0.644)	-2.185 (2.043)	-1.041 (1.310)	2.740** (1.076)
Started or increased delivery of G&S	-0.205 (0.683)	0.110 (0.641)	0.011 (0.687)	-4.682** (1.853)	2.371* (1.368)	-0.249 (0.655)
Remote work arrangement (empl.)	-1.566** (0.652)	1.079* (0.559)	0.942 (0.603)	3.293** (1.518)	-2.003 (1.351)	0.148 (0.600)
Share of online sales	0.025 (0.024)	-0.061*** (0.024)	0.016 (0.022)	0.040 (0.046)	0.049* (0.029)	-0.119** (0.050)
Controls	YES	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
Observations	318	318	318	231	231	231

Notes: Asterisks *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All variables are defined in Appendix A2.

6. Summary of Findings and Conclusion

This paper investigates how the COVID-19 dynamics affect the firm's choice of financing structure; whether to use equity financing, account payables (delaying payments to suppliers or workers), government grants, commercial bank loans, non-bank loans, or retained earnings (i.e. using establishment's saving), the bankruptcy signals and liquidation of firms. A model was developed, a pandemic-leverage choice model of COVID-19 dynamics, involving six mechanisms: productivity shocks, credit agreements, closure strategy, employee welfare, online activity adoption, and economic policy response. Using a world enterprise survey in

28 countries across 12038 enterprises, this study provides empirical support for the six mechanisms of financing structure. With a calibrated model, the study investigates the effect of productivity shocks, credit agreements, temporary-permanent closure strategy, worker welfare, and online activity adoption on financing structure. The study finds that (i) productivity shocks lower debt capital but influence a higher probability of accessing new credit, (ii) firms that adopt temporary-permanent closure strategy practice more workforce lay-offs and do not require further debt increase, (iii) firms that experience an increase in debt level benefit more from fiscal exemptions and government economic relieve palliatives, and (iv) firm-online activity adoption also matters for access to fiscal exemptions and debt increases, mostly common across manufacturing firms than retailing firms. Evidence shows that prior or overdue financial obligations may induce temporary or permanent business exit, induced by pandemic dynamics rather than firms' management dynamics. Our findings have strong policy implications, suggesting that economic policy response during a pandemic favours debt decreases and may have substantial effects on business continuation, temporary closure strategy, and stoppage in workers lay-off.

Grounded on productivity, welfarism, technology adoption, and bankruptcy mechanisms, in the present paper we have put forward arguments in terms of the likely relationships between COVID-19 dynamics and capital structure.

We have conjectured that *ceteris paribus*, firms' productivity activities leading to productivity shocks would affect the financing structure of establishment during the global pandemic situation, that is, firms' productivity activities in terms of establishment outputs, hours worked during COVID-19 and production conversion production will reduce retained earnings and equity financing while positively influencing government grants and loans from commercial banks and non-financial institutions. Moreover, accounts payable, equity finance, government grants, retained earnings, bank loans, and non-bank loans dominated the financing structure of establishments during the global COVID-19 outbreak. Government grants provide collateral protection to establishments to cushion the possible agency problem that may arise from the global pandemic and for firms relying on account payables by delaying payments to suppliers, and those using retained earnings possibly use these media of financing to avoid takeover bids, insolvency and any shocks in productivity and revenue. We have also argued that firms that engage in the reduction of temporary workers should go for account payables and those establishments involved in laying off workers during the pandemic can reduce the cost of employees to further finance retained earnings and continue to open without necessarily engaging in temporary business closure or permanent closure of business. If the net increase in retained earnings and accounts payable persist following undue workers quitting or officially laid off, firms can reduce their bankruptcy signals while also using government grants and debt to fund taxes and overdue financial obligations. We have also conjectured that the closure and credit arrangements of establishments impact their financing structure. Firms deciding to open and avoid temporary closure due to COVID-19 may benefit from increased account payables, government grants, and non-bank loans while those establishments that temporarily closed their businesses due to COVID-19 may want to source for additional equity finance, bank loans and maintain high retained earnings to fund business operations and commence online goods and services delivery when reopened. Thus, we have also conjectured that online activity adoption and economic policy response impact the financing structure of establishments during the COVID-19 outbreak.

Our empirical result on establishments across 28 countries indicating developed and developing nations suggests that productivity shocks do impact financing structure. Consistent with our hypothesis, the study finds that the production conversion process and establishment output are positively related to a government grant and debt finance (through loans from commercial banks) but have negative relations with equity finance and accounts

payable. Our result contradicts the findings of Nucci *et al.* (2005) that the firm's total factor productivity reduces leverage due to favourable market policy interventions.

The study also finds that closure status and temporary closure due to COVID-19 significantly affect the financing structure of establishments. That is the nexus between closure and temporary closure due to COVID-19 on financing structure moves in an inverse direction. While closure status has a negative link with equity, retained earnings and bank loans, temporary closure due to COVID-19 has positive effects on equity, retained earnings and bank loans, suggesting that temporary closure due to COVID-19 may influence the further purchase of the firm's stocks and securitization of bank loans.

References

- Alon, T. M., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020). *The impact of COVID-19 on gender equality* (No. w26947). National Bureau of Economic Research.
- An, J., & Rau, R. (2021). Finance, technology and disruption. *The European Journal of Finance*, 27(4-5), 334-345.
- Audretsch, D. B., Lehmann, E. E., Paleari, S., & Vismara, S. (2016). Entrepreneurial finance and technology transfer. *The Journal of Technology Transfer*, 41, 1-9.
- Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2011). *Small vs. young firms across the world: contribution to employment, job creation, and growth*. Policy Research Working Paper Series 5631, The World Bank.
- Bapuji, H., Ertug, G., & Shaw, J. D. (2020). Organizations and societal economic inequality: A review and way forward. *Academy of Management Annals*, 14(1), 60-91.
- Barrero, J. M., Bloom, N., & Davis, S. J. (2020). *Covid-19 is also a reallocation shock* (No. w27137). National Bureau of Economic Research.
- Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the National Academy of Sciences*, 117(30), 17656-17666.
- Beck, T., Demirgüç-Kunt, A. S. L. I., & Maksimovic, V. (2005). Financial and legal constraints to growth: does firm size matter?. *The Journal of Finance*, 60(1), 137-177.
- Berk, J. B., Stanton, R., & Zechner, J. (2010). Human capital, bankruptcy, and capital structure. *The Journal of Finance*, 65(3), 891-926.
- Caballero, R., & Hammour, M. (1994). The cleansing effect of recessions. *American Economic Review*, 84(5), 1350-1368.
- Cathcart, L., Dufour, A., Rossi, L., & Varotto, S. (2020). The differential impact of leverage on the default risk of small and large firms. *Journal of Corporate Finance*, 60, 101541.
- Chemmanur, T. J., Cheng, Y., & Zhang, T. (2013). Human capital, capital structure, and employee pay: An empirical analysis. *Journal of Financial Economics*, 110(2), 478-502.
- Chen, C. R., & Steiner, T. L. (1999). Managerial ownership and agency conflicts: A nonlinear simultaneous equation analysis of managerial ownership, risk taking, debt policy, and dividend policy. *Financial Review*, 34(1), 119-136.
- Dang, H. A. H., & Nguyen, C. V. (2020). Gender inequality during the COVID-19 pandemic: Income, expenditure, savings, and job loss. *World Development*, 140, 105296.
- Daniel, E., Wilson, H., & Myers, A. (2002). Adoption of e-commerce by SMEs in the UK: Towards a stage model. *International Small Business Journal*, 20(3), 253-270.
- Della Seta, M., Morellec, E., & Zucchi, F. (2020). Short-term debt and incentives for risk-taking. *Journal of Financial Economics*, 137(1), 179-203.
- Demirgüç-Kunt, A., Peria, M. S. M., & Tressel, T. (2020). The global financial crisis and the capital structure of firms: Was the impact more severe among SMEs and non-listed firms?. *Journal of Corporate Finance*, 60, 101514.

- Diamond, D. W. (2004). Presidential address, committing to commit: Short-term debt when enforcement is costly. *Journal of Finance*, 59(4), 1447-1479.
- Dierker, M., Lee, I., & Seo, S. W. (2019). Risk changes and external financing activities: Tests of the dynamic trade-off theory of capital structure. *Journal of Empirical Finance*, 52, 178-200.
- Ebeke, M. C. H., Jovanovic, N., Valderrama, M. L., & Zhou, J. (2021). *Corporate liquidity and solvency in Europe during COVID-19: The role of policies*. International Monetary Fund.
- Ebrahim, M. S., Girma, S., Shah, M. E., & Williams, J. (2014). Dynamic capital structure and political patronage: The case of Malaysia. *International Review of Financial Analysis*, 31, 117-128.
- Funke, M., Maurer, W., & Strulik, H. (1999). Capital structure and labour demand: investigations using German micro data. *Oxford Bulletin of Economics and Statistics*, 61(2), 199-215.
- Ghaly, M., Dang, V. A., & Stathopoulos, K. (2015). Cash holdings and employee welfare. *Journal of Corporate Finance*, 33, 53-70.
- Grimmer, L. (2022). Lessons from the COVID19 pandemic: The case of retail and consumer service firms. *Journal of Retailing and Consumer Services*, 68, 103012.
- Guerini, M., Nesta, L., Ragot, X., & Schiavo, S. (2020). *Firm liquidity and solvency under the Covid-19 lockdown in France*. OFCE Policy Brief.
- Hamdan, A. M. (2018). Dividend policy, agency costs and board independence. *International Journal of Critical Accounting*, 10(1), 42-58.
- Hussain, R. Y., Wen, X., Hussain, H., Saad, M., & Zafar, Z. (2022). Do leverage decisions mediate the relationship between board structure and insolvency risk? A comparative mediating role of capital structure and debt maturity. *South Asian Journal of Business Studies*, 11(1), 104-125.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Keuschnigg, C., & Kogler, M. (2020). The Schumpeterian role of banks: Credit reallocation and capital structure. *European Economic Review*, 121, 103349.
- Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., ... & Vugt, M. V. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American psychologist*, 76(1), 63.
- Lemieux, T., Milligan, K., Schirle, T., & Skuterud, M. (2020). Initial impacts of the COVID-19 pandemic on the Canadian labour market. *Canadian Public Policy*, 46(S1), S55-S65.
- Levine, R., Lin, C., & Xie, W. (2016). Spare tire? Stock markets, banking crises, and economic recoveries. *Journal of Financial Economics*, 120(1), 81-101.
- Liébana-Cabanillas, F., & Lara-Rubio, J. (2017). Predictive and explanatory modeling regarding adoption of mobile payment systems. *Technological Forecasting and Social Change*, 120, 32-40.
- McFarland, L. A., Reeves, S., Porr, W. B., & Ployhart, R. E. (2020). Impact of the COVID-19 pandemic on job search behavior: An event transition perspective. *Journal of Applied Psychology*, 105(11), 1207-1217.
- Ming-Yen Teoh, W., Choy Chong, S., Lin, B., & Wei Chua, J. (2013). Factors affecting consumers' perception of electronic payment: An empirical analysis. *Internet Research*, 23(4), 465-485.
- Montgomery, S., Moudgil, B., & Lam, S. (2020). *Exceptions in credit agreements addressing COVID-19 crisis*. Los Angeles & San Francisco: Daily Journal
- Mselmi, N., Lahiani, A., & Hamza, T. (2017). Financial distress prediction: The case of French small and medium-sized firms. *International Review of Financial Analysis*, 50, 67-80.
- Nucci, F., Pozzolo, A., & Schivardi, F. (2005). Is firm's productivity related to its financial structure? Evidence from microeconomic data. *Rivista di politica economica*, 95(1), 269-290.
- Ofek, E. (1993). Capital structure and firm response to poor performance: An empirical analysis. *Journal of Financial Economics*, 34(1), 3-30.
- Olley, G. S., & Pakes, A. (1992). The dynamics of productivity in the telecommunications *equipment industry* (No. w3977). National Bureau of Economic Research.

- Park, C. W., & Pincus, M. (2001). Internal versus external equity funding sources and earnings response coefficients. *Review of Quantitative Finance and Accounting*, 16, 33-52.
- Petersen, M. A., & Rajan, R. G. (1997). Trade credit: theories and evidence. *The Review of Financial Studies*, 10(3), 661-691.
- Rampini, A. A., & Viswanathan, S. (2013). Collateral and capital structure. *Journal of Financial Economics*, 109(2), 466-492.
- Serfling, M. (2016). Firing costs and capital structure decisions. *Journal of Finance*, 71(5), 2239-2286.
- Shafi, M., Liu, J., & Ren, W. (2020). Impact of COVID-19 pandemic on micro, small, and medium-sized Enterprises operating in Pakistan. *Research in Globalization*, 2, 100018.
- Shankar, A., & Datta, B. (2018). Factors affecting mobile payment adoption intention: An Indian perspective. *Global Business Review*, 19(3_suppl), S72-S89.
- Shleifer, A., & Vishny, R. W. (1992). Liquidation values and debt capacity: A market equilibrium approach. *The Journal of Finance*, 47(4), 1343-1366.
- Tran, Q. T., Alphonse, P., & Nguyen, X. M. (2017). Dividend policy: Shareholder rights and creditor rights under the impact of the global financial crisis. *Economic Modelling*, 64, 502-512.
- Vismara, S. (2022). Expanding corporate finance perspectives to equity crowdfunding. *The Journal of Technology Transfer*, 47(6), 1629-1639.
- Wang, M., Xu, M., & Ma, S. (2021). The effect of the spatial heterogeneity of human capital structure on regional green total factor productivity. *Structural Change and Economic Dynamics*, 59, 427-441.
- Wu, R. (2023). COVID-19's impacts on business activities and female workers: Empirical evidence from global developing economies. *Journal of International Development*, 35(1), 163-197.

Appendix

Appendix A: Number of firms in each country

Country	Establishment Surveyed	No. of Firms Sampled
Albania	377	172
Armenia	120	3
Belarus	600	98
Bulgaria	772	306
Chad	153	60
Croatia	404	184
Cyprus	240	81
El-Salvador	719	187
Georgia	701	210
Greece	600	276
Guatemala	345	84
Guinea	150	61
Honduras	332	65
Hungary	805	271
Italy	760	130
Jordan	601	95
Moldova	360	134
Mongolia	360	167
Morocco	1096	475
Nicaragua	333	68
Niger	151	23
Poland	1369	307
Romania	814	216
Russia	1323	464
Slovenia	409	109
Togo	150	28
Zambia	601	304
Zimbabwe	960	341
Total	15605	4,919

Appendix B: Variables and sources

Variable	Definition	Original Source
Bank loans	The dummy variable that takes the value of 1 if the firm sources bank loans (loans from commercial banks) to deal with cash flow shortages, 0 otherwise (IF COVe2=1)	WBES
Non-bank loans	The dummy variable that takes the value of 1 if the firm sources non-bank loans (loans from non-financial banks) to deal with cash flow shortages, 0 otherwise (IF COVe2=2)	WBES
Equity finance	The dummy variable that takes the value of 1 if the firm sources equity finance to deal with cash flow shortages, 0 otherwise (IF COVe2=3)	WBES
Accounts payable	The dummy variable that takes the value of 1 if the firm sources payables to deal with cash flow shortages, 0 otherwise (IF COVe2=4)	WBES
Production conversion process	Has the establishment adjusted or converted, partially or fully, its production or the services it offers in response to the COVID-19 outbreak: don't know (1), no (2), or yes (3)? (COVe3)	WBES
Establishment output	The percentage of the establishment's output produced (COVe1)	WBES
Sales on credit	How sizable are sales on credit due to the COVID-19 outbreak: decrease (1), don't know (2), increase (3), or remain the same (4)? (COVe1b)	WBES
Purchases on credit	How sizable are purchases on credit due to the COVID-19 outbreak: decrease (1), don't know (2), increase (3), or remain the same (4)? (COVe1c)	WBES
Tax authorities	Has the establishment delayed payments due to the COVID-19 outbreak for more than one week (excluding payments postponed following current regulation) to tax authorities? don't know (1), no (2), or yes (3) (COVe3c)	WBES
Overdue financial obligations	Are obligations to any financial institution due: does not apply (1), no (2), or yes (3)? (COVe4)	WBES
Filed for insolvency or bankruptcy	Is the firm filed for insolvency or bankruptcy: don't know (1), no (2), or yes (3)? (COVe5)	WBES
Closure status	Has the number of temporary workers remained the same? Permanently closed = 1, Temporarily closed = 2, Open = 3, and don't know is -9. (COVd3b)	WBES
Temporary closure due to Covid-19	Did this establishment close temporarily due to the COVID-19 outbreak? Yes is 1, No is 0, and don't know is -9. (COVb1a)	WBES
Change in temporary workers	Has the number of temporary workers remained the same? Increased = 1, Remained the same = 2, Decreased = 3, and don't know is -9. (COVd3b)	WBES
Quit and leave-seeking workers	The number of workers that quit or took leave (COVd4)	WBES
Workers laid off due to Covid-19	The number of workers who have been laid off due to the COVID-19 outbreak (COVd6).	WBES
Started or increased business online	Did this establishment start or increase business activity online in response to the COVID-19 outbreak? Yes is 1, No is 0, and don't know is -9. (COVe4a)	WBES
Started or increased delivery of G&S	Did this establishment start or increase the delivery or carry-out of goods or services in response to the COVID-19 outbreak? Yes is 1, No is 0, and don't know is -9. (COVe4b)	WBES
Remote work arrangement (empl.)	Did this establishment start or increase remote work arrangements for its workforce in response to the COVID-19 outbreak? Yes is 1, No is 0, and don't know is -9. (COVe4c)	WBES
Share of online sales	The percentage of online sales as the ratio of total establishment's sales (COVe5)	WBES
Fiscal exemptions or reductions	Fiscal exemptions or reductions: Yes is 1, No is 0, and don't know is -9. (COVf2d)	WBES
Govt. (national or local) support	Fiscal exemptions or reductions: Yes is 1, No is 0, and don't know is -9. (COVh2f)	WBES
Wage subsidies	Did your establishment involve wage subsidies as a policy measure in response to the COVID-19 crisis? don't know (1), no (2), or yes (3) (COVf2e)	WBES
Firm size dummies	A firm is defined as small if it has between 5 and 50 employees, medium-sized if it has between 51 and 500 employees, and large if it has more than 500 employees.	Beck <i>et al.</i> (2005)

Appendix B (*continued*)

Variable	Definition	Original Source
National sales	The percentage of establishment's sales of the number of goods sold (COVb3a)	WBES
National language	Nominal scale of country's language. Nominal scale for 17 different languages, ranked from the most spoken language to the least spoken language in the firm's country destination (a1a)	WBES

CSR Performance and Profitability of the Banking Industry in Southeast Asia Nations (ASEAN)

Berto Usman^{1*}, Ridwan Nurazi¹, Intan Zoraya¹ & Nurna Aziza¹

¹*Faculty of Economics and Business, University of Bengkulu, Indonesia.*

Abstract: Research Question: Is non-financial information in CSR reports associated with the banking profitability? Is CSR performance related to profitability of public banks in ASEAN? **Motivation:** Literature have provided comprehensive empirical findings with respect to the relationship between CSR performance and its economic consequences for companies operating in the Environmentally Sensitive Industries (ESIs). However, little is known when it comes to the context of Non-Environmentally Sensitive Industries (i.e., banks) in ASEAN. **Idea:** This study aimed to investigate the relationship between CSR performance and profitability in the banking industry of Southeast Asia Nations (ASEAN), which is of interest to practitioners and academics in accounting finance as it relates to driving a company's value. **Data:** The study used data from the banking industry of ASEAN (i.e., Indonesia, Malaysia, Singapore, the Philippines, and Thailand). **Method/Tools:** The study used panel data regression analysis to examine observations from 2011 to 2021. The results showed that CSR performance is not positively related to profitability in the banking industry in ASEAN. This was due to the use of CSR information availability and banks' CSR performance scores as the main proxies of CSR performance, which were tested against the banking industry's profitability measured using the market profitability value and the accounting net interest margin. Additionally, the study selected an appropriate model, clustering error standards, and several company-specific attributes as control variables to minimize estimation bias. **Findings:** The results contravened the proposed hypothesis, necessitating an intellectual discussion and a literature review. This means that CSR practices in the ASEAN banking industry have not met the expectations regarding non-financial information reporting. However, non-financial information reporting is an effort to show the public that the company is operating ethically and sustainably. Additionally, CSR practice is often considered symbolic rather than substantive in the ASEAN banking industry. **Contributions:** This study is among the first investigating the CSR performance and bank profitability nexus in ASEAN. Thus, it contributes to the new empirical evidence of CSR studies in the Non-Environmentally Sensitive Industry (NESI).

Keywords: CSR, profitability, banking, ASEAN.

JEL Classification: M1, M14, M41

* Corresponding author: Berto Usman. Tel.: +62-73621170.

Email: berto_usman@unib.ac.id

Acknowledgements: This research was supported by the Office of Research and Community Services, University of Bengkulu, Fundamental Scheme No: 2028/UN30.15/PP/2022.

Received 24 Jan 2023; Final revised 19 Jul 2023; Accepted 21 Sep 2023; Available online 30 Sep 2023.

To link to this article: https://www.mfa.com.my/cmrv31_i2_a3/

© Malaysian Finance Association, 2023. This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Studies on Corporate Social Responsibility (CSR) have developed significantly, attracting the government, investors, suppliers, employees, communities, as well as academics in accounting and finance. This has triggered competition among companies to disclose financial and non-financial performance information annually. Non-financial information is relevant because it helps the company improve its future economic performance. Additionally, the information demonstrates the company's commitment to social and environmental sustainability.

CSR refers to financial information commonly studied in accounting and finance. CSR reports contain information on environmental, social, and governance impacts, often abbreviated as ESG (Usman and Yennita, 2018; Yoon *et al.*, 2018). This non-financial information is usually expected to boost the company's future economic performance. The company's attention to environmental, social, and corporate governance sustainability is sensitive for stakeholders (GRI, 2014). However, inappropriate CSR optimization can make the company's expenditure on this information unproductive, reducing profitability, where involvement in CSR activities does not positively impact the company's value.

The company's involvement in CSR activities is a strategic decision that impacts its reputation. In this context, the banking industry was chosen as the study setting because of its significant role in supporting the national economy. The industry also serves as a financial intermediary between parties with excess and insufficient funds, which makes the social impact of the banking industry relevant to this study. Banks should contribute positively to the public because many actors in this industry manage public funds and thus are subject to policy regulations. This implies that CSR policies implemented by banks provide social impact and contribute back to the public. However, decisions regarding CSR policies must be made through a comprehensive cost-and-benefit analysis (Cormier and Magnan, 2015). This is necessary because such decisions are considered charity activities as well as an effort to gain and increase the company's public legitimacy (Lys *et al.*, 2015). Therefore, management should analyse the positive impact of CSR activities on the bank's overall value in terms of both economic motivation and social legitimacy (Cormier and Magnan, 2015; Bagnoli and Watts, 2017).

Studies have shown that businesses implementing CSR policies enjoy many conveniences and benefits, especially for those incorporating into Environmentally Sensitive Industries (ESIs). However, the same propensity may not always be applicable to companies operating in Non-Environmentally Sensitive Industries (NESIs), such as banks and other diversified service sectors. ESIs are those that have a significant impact on the environment, either through their operations or their products (e.g., Oil and gas extraction, Mining, Agriculture, Manufacturing, Power generation). NESIs, on the other hand, have a relatively low impact on the environment (e.g., Finance, Retail, IT, Services, Logistics). Firms operating in the ESIs are subject to more stringent environmental regulations than NESIs. This is because the potential environmental impacts of these industries are more significant (Arena *et al.*, 2018). Meanwhile, Non-environmentally sensitive industries are also subject to environmental regulations, but these regulations are typically less stringent. This is because the potential environmental impacts of these industries are lower (Tandelilin and Usman, 2023).

According to Dhaliwal *et al.* (2012), companies that publish non-financial CSR information to the public help financial analysts reduce information asymmetry by minimizing errors in estimating potential earnings. Cheng *et al.* (2014) also found that publicly disclosed non-financial information helps companies access financing sources easily. As a result, companies gain community social recognition and legitimacy as a license to operate (Bebbington *et al.*, 2008a). Usman *et al.* (2020) identified conditions in which CSR information could help the public reduce information asymmetry. However, excessive CSR

information could obscure other substantial information, indicating that CSR reporting could contain managers' motives for making reputation through risk management. Afeltra *et al.* (2021) used a bibliometric analysis of previous literature published in reputable CSR journals. The results showed that current studies on CSR have proliferated into five distinct clusters. These clusters include: (i) factors influencing companies to disclose social information, (ii) CSR assurance practices and reporting, (iii) integrated reporting and sustainability reports, (iv) the relationship between intellectual capital disclosure and corporate governance, and (v) the relevance of developing theories on the latest CSR topics.

Previous studies on the benefits of engaging companies with social responsibility activities have rarely examined the role of social responsibility in the banking industry. Therefore, studies on the banking industry in Southeast Asia (ASEAN) are interesting. This industry is highly dynamic and heavily depends on rapid regulatory changes. For this reason, banks need to increase their social impact by empowering the community through disbursing funds and implementing CSR-based activities. The potential for broader market penetration and efforts to improve the banks' strategic reputation could also be optimized by implementing ASEAN market integration through the ASEAN Economic Community (AEC). A better reputation and increased organizational legitimacy through CSR activities could positively impact the banking profitability. This would be reflected in positive public perceptions, views of the banking business model, and CSR practices. However, this assumption requires an in-depth study by asking two questions: (i) Is non-financial information in CSR reports associated with the banking profitability? and (ii) Is CSR performance related to profitability of public banks in ASEAN?

2. Literature Review and Hypotheses Development

2.1 Legitimacy Theory

This study used the theory of legitimacy defined by Suchman (1995, p. 574) as a general perception of an action or entity deemed to fit within a socially constructed system, values, beliefs, and definitions. Referring to the legitimacy theory, the company is trying to gain public sympathy to maintain business operations continuity. This means the company's main motives could be grouped into conducting charity activities to gain, increase, or maintain social legitimacy (Milne and Patten, 2002; Afeltra *et al.*, 2021).

The issue of social legitimacy sometimes overlaps with some of the company's motives and goals. As decision-makers in every company activity, managers view charity or CSR activities from a different perspective. For instance, sometimes CSR activities are implemented to gain social legitimacy from the community or get a good impression. The implementation could also aim to hide actual events related to CSR activities for strategic corporate reputation management (Neu *et al.*, 1998; Bebbington *et al.*, 2008b; Michelon *et al.*, 2016; Usman *et al.*, 2020).

2.2 Drivers of Non-Financial Information Disclosure as A Reflection of CSR Performance

Previous studies showed that many factors drive companies to take policies in disclosing non-financial information. According to Dhaliwal *et al.* (2011), voluntary disclosure of non-financial information helps companies lower capital costs. Investors or stakeholders interested in the company's sustainability perceive that disclosing non-financial information helps reduce the information asymmetry between them and the company. Furthermore, Dhaliwal *et al.* (2012) found that voluntarily disclosed non-financial information helps financial analysts reduce the error rate in estimating potential earnings. This finding supports Cheng *et al.* (2014) that the availability of non-financial information increases the company's opportunities to gain better financial access from the capital and the money markets.

Axjonow *et al.* (2016) showed that information disclosure as well as sound and correct CSR activities help companies gain a positive reputation from professional stakeholders. This is relevant because more individual and institutional investors are realizing the importance of economic, social, and environmental sustainability. Additionally, this is reflected in the increasing stock indexes or portfolios made for companies focusing on sustainability issues.

In Europe, companies have several motivations to publish CSR reports, an obligation stated in European Directive No. 94 of 2014 (European Commission, 2014). In line with this, Park and Brorson (2005) identified several motives for companies to be involved in CSR activities. The motives include i) The company conducts bench-marking by imitating other companies that implement CSR and feel positive results from these activities. ii) In Europe, awards are given to companies that perform well in environmental sustainability. Companies also have a reason not to conduct CSR activities. In Sweden, several new companies with no sizeable operational scope think that CSR activities are unnecessary because they are related to cost and benefit analysis. The allocation of CSR funds is considered a cost item, not an investment. Small companies also perceive CSR activities as unnecessary because the benefits cannot be felt directly. Therefore, Park and Brorson (2005) stated that most companies in Sweden only conduct CSR activities after attaining financial stability.

2.3 The Relationship Between CSR Performance and Company Profitability

Non-financial information has a positive association with the company's future value or profitability (Devine and Halpern, 2001; Manchiraju and Rajgopal, 2017; Yoon *et al.*, 2018). However, several studies state that the company's involvement in CSR activities does not significantly impact its profitability (Buallay, 2019; Tandelilin and Usman, 2023). This contradicts the consensus shown by previous studies that involvement in CSR activities positively relates to the company's long-term profitability. For instance, Famiyeh (2017) found a positive relationship between CSR implementation and company performance. In this case, companies directly involved with CSR activities have the opportunity to manage costs more flexibly. Based on the legitimacy theory and empirical findings of the previous literature, this study hypothesized a relationship between the company's involvement in CSR activities and future profitability. Therefore, the first hypothesis was formulated as follows:

Hypothesis 1: The availability of CSR reports positively impacts the banking industry's profitability in ASEAN.

The second hypothesis suggested an association between CSR scores and company profitability. In this case, the third party evaluates the amount of non-financial information distributed to the public. The third party does not provide assurance services but conducts independent analyses of the economic, environmental, social, and organizational governance impact of the company's involvement in CSR activities. According to a previous study, CSR performance scores could be relevant information for stakeholders and investors. This is important because only a few stakeholders or investors directly interpret and extract useful information from CSR reports (Cho *et al.*, 2013). Therefore, third-party services such as rating agencies Bloomberg, Thomson Reuters ASSET4, and KLD (MSCI) provide an objective ranking weight to reflect the company's CSR performance. This study also examined whether the performance of CSR activities could be relevant information in viewing variations in banks profitability. In this regard, a second hypothesis that uses information on the average performance of CSR activities as a function of changes in banks profitability was proposed as follows:

Hypothesis 2: A high CSR performance score positively relates to the banking industry's profitability in ASEAN.

2.4 Research Model

The research model was clarified by visualizing the relationship between the variables proposed for testing and those used as proxies in the following framework.

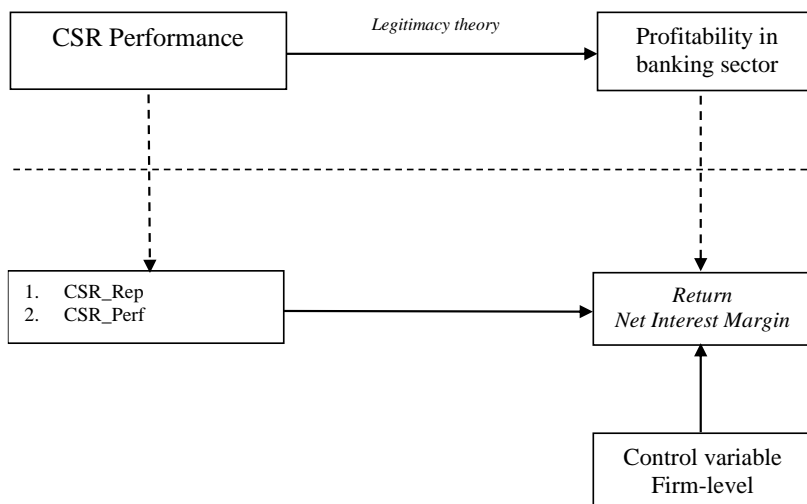


Figure 1: Research Framework

The framework Figure 1 shows the associations between the concepts proposed for testing. Dotted lines separate the framework, while the two boxes above the line are the main concepts proposed for testing. CSR performance was assumed to be associated with the banking industry's profitability. Furthermore, the boxes below the dotted line are a technical measure of the variables proposed. The two variables are the availability of CSR reports and CSR performance measured by ranking scores provided by 3rd parties.

The construct of the banking CSR performance was measured using the results of CSR score ranking prepared by the ASSET4 database. The banking industry's profitability was measured using two proxies based on stock returns and net interest margin.

3. Methods

3.1 Data and Sample

This study used data and samples from public banks in ASEAN capital market. The sample comprised the banks registered in the banking industry in the capital markets of Indonesia, Malaysia, Singapore, Thailand, and the Philippines. The financial industry was chosen because public banks have exposure and a strong social impact on national economic development. Furthermore, CSR contribution from banks is remuneration to the public. This is due to the banks' intermediary financial function using third-party funds channelled as credit to debtors.

Table 1: Sampling procedures

No	Sampling procedures	Total bank	Observation (bank x 11 years)	%
1	Total publicly listed banks in the Indonesian capital markets (IDX), Malaysia (BM), Singapore (SES), Thailand (SET) and the Philippines (PSE) during the observation period from 2011 to 2021.	84	924	100
2	The number of with no CSR reports data from ASSET4 database.	(57)	(627)	(67.85)
3	The final sample of banks with sufficient observations of CSR information and complete financial information during the observation period from 2011 to 2021.	27	297	32.15

Notes: The final sample of 27 banks consists of 5 banks from Indonesia, 8 banks from Malaysia, 3 banks from Singapore, 7 banks from Thailand, and 4 banks from the Philippines.

Data on financial and non-financial information were extracted from the Thomson Reuters EIKON and ASSET4 databases, respectively. Samples were sorted using several criteria. The sample must be a public bank that has disclosed non-financial information in CSR reports and ranking scores, should be indexed on the ASSET4 database and must have annual data from 2011 to 2021. With respect to the particular components of CSR performance score, Refinitiv (2020) reported that it is based on a number of factors, including Environmental, Social, and Governance (ESG) performance. The ASSET4 CSR performance score is made up of three components; (i) Environmental: which measures a company's environmental performance, such as its greenhouse gas emissions, water use, and waste management. (ii) Social: the component that measures a company's social performance, such as its employee relations, community engagement, and human rights record, and (iii) Governance: components that measures a company's governance performance, such as its board composition, executive compensation, and risk management. The ASSET4 CSR performance score is further calculated using a proprietary methodology developed by Refinitiv (2020). The methodology is based on a number of factors, including the company's environmental, social, and governance performance. As mentioned by Batae *et al.* (2021), the score is then scaled from 0 to 100, with a score of 100 representing the highest CSR performance. The formula for CSR performance score construction is written as follows:

$$\text{CSR score} = (\text{Environmental score} + \text{Social score} + \text{Governance score}) / 3 \quad (1)$$

3.2 Operational Definition

Table 2 describes tests on the association between CSR performance and profitability of the banking industry in ASEAN.

Table 2: Definition of operational variables

No	Variables	Definition	Data form	Data source
1	RET	Stock return	Continuous	EIKON
2	NIM	Net interest margin	Continuous	EIKON
3	CSR_Report	Availability of bank CSR reports	Categorical	ASSET4
4	CSR_Perf	Banking CSR performance	Continuous	ASSET4
5	ROE	Return on equity	Continuous	EIKON
6	CAR	Capital Adequacy ratio	Continuous	EIKON
7	NPL	Non-performing loan	Continuous	EIKON
8	AGE	Firms' age	Continuous	EIKON
9	SIZE	Natural logarithm of total assets	Continuous	EIKON

Notes: The research variables were adopted from various previous literature

Table 2 shows the operational definitions of variables, data forms, and data sources used in statistical analysis. This aimed to determine the association between CSR performance and the banking industry's profitability in ASEAN. The two main variables were CSR reports and

CSR performance scores. Furthermore, the study used other financial information variables strongly suspected to be the basis for considering the benefits and costs analysis. The financial information Represents Profitability Ratios (ROE), Capital Adequacy Ratios (CAR), Non-Performing Loans ratio (NPL), banks age (AGE), and banks size (SIZE).

3.3 Econometric Model

The study model used cross-sectional and time-series data. Panel data analysis has a better predictive ability because variations of data between objects with different periods produce efficient estimation results (Baltagi, 2008). The analysis model with the panel data approach used in this study is as follows:

$$\begin{aligned} \text{Banking profitability} = & \alpha + \beta_1 \text{CSR}_{\text{Rep}_{i,t}} + \beta_2 \text{CSR}_{\text{perf}_{i,t}} + \beta_3 \text{ROE}_{i,t} \\ & + \beta_4 \text{CAR}_{i,t} + \beta_5 \text{NPL}_{i,t} + \beta_6 \text{Age}_{i,t} + \beta_7 \text{SIZE}_{i,t} \\ & + \sum \beta \text{Year}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

3.3.1 Dependent Variable

The main dependent variables in this study are related to banks profitability. The measuring instrument that represents market profitability is the stock return (RET). Profitability is represented by accounting information such as Net Interest Margin (NIM). The two proxies are variables with continuum data in the ratio form. More specifically, we use NIM as the proxies of accounting-based measure. Net interest margin (NIM) is a metric of a bank's profitability that shows the difference between the interest income it earns on loans and the interest it pays on deposits. We do not used Return on assets (ROA) and return on equity (ROE) as the measure of profitability since the previous studies have used them in the empirical tests. Also, the literature mentions that ROA and ROE are not as specific to banks as NIM. ROA measures the return on all of a bank's assets, including all type of assets that are not necessarily related to the banks' core business operations. Whilst, ROE measures the return on the equity invested in the bank. NIM is deemed as a more specific measure of profitability for banks because it focuses on the income that banks earn from their core business activity (i.e., lending money). Therefore, NIM was chosen as the accounting-based measure because it describes the banking industry's profitability and its efficiency, as explained by the previous studies of Demirgüç-Kunt and Levine, (2001) and Douissa and Azrak (2021).

3.3.2 Independent Variable

This study used CSR information availability and CSR report scores as independent variables. CSR report availability (CSR_Rep) was measured using categorical variables. Banks issuing and not issuing CSR reports during the observation period were labelled 1 and 0, respectively. Furthermore, CSR score was measured using the ranking results made by Thomson Reuters analysts. The results were used as considerations in preparing CSR ranking by the ASSET4 database. This variable was labelled CSR_PERF containing a ratio between 0 and 100 for low and high CSR performance, respectively. The two main independent variables were used in hypotheses testing as stated in the analytical framework.

3.3.3 Control Variable

The control variable is needed to neutralize the effect of the main independent variable on the dependent variable. Endogeneity problems cannot ignore other factors outside the study model. Therefore, the banking financial characteristics were used as a control variable to

minimize the potential for endogeneity problems. CSR activities and reporting must be conducted with a comprehensive cost and benefit analysis. For this reason, the study used financial information deemed important and relevant in managerial decision-making. The financial information comprised the ratio of ROE, CAR, NPL, AGE, and SIZE.

4. Results and Discussion

4.1 Statistical Descriptive Analysis

This section begins by describing the statistical results of the dependent, independent, and control variables as follows.

Table 3: The output of descriptive statistics analysis

Variables	count	mean	sd	p25	p50	p75	min	max
RET	297	0.030	0.255	-0.134	0.009	0.230	-0.581	0.576
NIM	297	0.034	0.019	0.021	0.029	0.038	0.013	0.095
CSR_REP	297	0.724	0.447	0	1	1	0	1
CSR_PERF	297	50.601	14.318	39.57	51.7	62.13	18.6	78.07
ROE	297	0.137	0.050	0.104	0.126	0.159	0.030	0.326
CAR	297	0.107	0.028	0.089	0.101	0.119	0.052	0.216
LNNPL	297	13.385	1.101	12.799	13.453	14.328	10.166	15.164
AGE	297	65.333	31.071	50	58	73	7	166
SIZE	297	17.829	0.925	17.359	17.861	18.347	15.761	19.774

Notes: Each continuous variable has gone through the stages of winsorization at the level of 1 and 99%.

Table 3 describes the distribution of data through the winsorization stage. This stage is essential in ensuring that the model is free from estimation bias problems caused by outlier data. The Winsor2 function in the STATA syntax code treated outlier data. Each non-dichotomous variable received the same treatment to ensure normal data distribution. The indicators are proxies for the dependent variables of RET and NIM. The return value for the market profitability performance shows a RET average for each annual sample of 27 companies measured from 2011 to 2021. In this case, the 297 companies-year observation is 0.03 or 3%. This average value means that banks generate a positive return, with a standard deviation of 0.255 or 25.5%. The data set also shows that some banks have a minimum negative and maximum positive return performance of -0.581 (58.1%) and 0.576 (57.6%), respectively. Profitability performance was measured through the performance of the NIM. The average NIM value is 0.034 (3.4%), with a low standard deviation of 0.019 (1.9%). Additionally, the lowest minimum and highest maximum values are 0.013 (1.3%) and 0.095 (9.5%), respectively.

CSR performance was the main independent variable represented by CSR reports availability (CSR_REP) and CSR performance (CSR_PERF). The average value of CSR_REP was 0.724 (72.4%), with a standard deviation of 0.447 (44.7%). This information shows that almost half of the sample adopted non-financial CSR information reporting published independently or incorporated in the annual financial report during the 11-year observation period. Moreover, CSR_PERF variable obtained an average value of 0.60 percent. This figure implies moderate CSR_PERF in the ASEAN banking sector. The minimum and maximum values for CSR performance are 18.6% and 78.07%, respectively. This variation implies that the standard deviation value after winsorization is 14.31%. More information on the use of control variables is shown in Table 3.

4.2 Correlation Analysis

The next step was to perform a correlation analysis.

Table 4: The output of correlation matrix

Variable	RET	NIM	CSR_REP	CSR_PERF	ROE	CAR	LNNPL	AGE	SIZE
RET	1								
NIM	0.065	1							
CSR_REP	-0.027	0.169**	1						
CSR_PERF	-0.014	0.160*	0.592***	1					
ROE	0.145*	0.452***	0.136*	-0.015	1				
CAR	0.055	0.755***	0.140*	0.270***	0.024	1			
LNNPL	-0.019	-0.239***	0.218***	0.396***	-0.222***	-0.225***	1		
AGE	0.039	0.081	0.082	0.096	0.116	0.079	-0.027	1	
SIZE	-0.006	-0.335***	0.090	0.280***	-0.125	-0.298***	0.812***	0.002	1

Notes: An asterisk means * p<0.05, **p<0.01, ***p<0.001.

Correlation analysis was performed to justify the findings on the potential relationship between the dependent variable (RET, NIM) and the main independent variable (CSR_REP, CSR_PERF). The correlation matrix results show a varied relationship between the measurement proxies used. First, the market value measurement using RET indicated that CSR_REP and CSRPERF are negatively but insignificantly correlated. Second, accounting value measurements were used as a proxy for company profitability in the form of NIM. the results showed that CSR_REP and CSR_PERF are positively and significantly correlated at alpha levels of 1 and 5%. This indicates that the market value measurement of profitability performance and accounting information shows a different correlation when associated with CSR_PERF.

The study also analysed the relationship between the control and dependent variables. The control variable was included to control some of the company's internal characteristics to obtain unbiased estimation results. Furthermore, this study investigated the multicollinearity problem with the use of independent and control variables. Studies in statistics have shown that a correlation value >0.70 between two independent variables implies a high potential for multicollinearity. In this case, one variable must be excluded from the model. The CAR variable showed a very strong positive correlation of 0.967 with NIM, with a significant p<0.01. However, this is not a problem because the CAR and NIM are control and dependent variables. The next step was the main analysis and hypotheses testing.

4.3. Hypothesis Testing and Panel Data Regression Analysis

Hypotheses were tested using panel data regression analysis. The observations recorded were 297 banks years obtained by 27 companies x 11 years. Table 5 shows the results of testing the association between CSR performance and banks profitability in ASEAN.

Table 5 presents the results of hypothesis testing using panel data regression analysis with the Fixed-Effect model at Company FE and Year FE levels. Panel data analysis inserts a clustered Standard Error (SE) function to reduce potential overestimation in the standard error. The results show that the main independent variable (CSR_REP) negatively but insignificantly relates to company profitability as measured by the RET proxy. CSR_REP was also tested against profitability measured using accounting information performance. The results showed that the beta coefficient of CSR_REP variable was positive but insignificant. These results contradict the first hypothesis that CSR performance positively relates to the banking profitability in ASEAN.

Table 5: The output of hypothesis testing

VARIABLES	Return			NIM		
	(1)	(2)	(3)	(4)	(5)	(6)
CSR_REP	-0.0260 (-0.812)		-0.0278 (-0.789)	0.0004 (0.365)		0.0007 (0.559)
CSR_PERF		-0.0002 (-0.210)	0.0001 (0.119)		-1.01e-05 (-0.250)	-2.05e-05 (-0.531)
ROE	1.228*** (2.748)	1.178** (2.539)	1.217*** (2.606)	0.0485** (2.397)	0.0508** (2.438)	0.0497** (2.331)
CAR	0.658 (0.728)	0.712 (0.776)	0.637 (0.690)	0.201*** (5.662)	0.202*** (5.703)	0.203*** (5.696)
LNNPL	0.0098 (0.318)	0.0076 (0.240)	0.0088 (0.274)	0.0023* (1.668)	0.0024* (1.680)	0.0024* (1.663)
AGE	-0.0002 (-0.608)	-0.0002 (-0.657)	-0.0002 (-0.609)	1.74e-05 (1.171)	1.80e-05 (1.215)	1.75e-05 (1.175)
SIZE	-0.0140 (-0.368)	-0.0122 (-0.322)	-0.0138 (-0.362)	-0.0036** (-2.376)	-0.0036** (-2.386)	-0.0036** (-2.367)
Constant	0.0776 (0.201)	0.0729 (0.189)	0.0868 (0.226)	0.0664*** (5.317)	0.0653*** (5.053)	0.0653*** (5.045)
Observations	297	297	297	297	297	297
R-squared	0.623	0.622	0.623	0.886	0.886	0.886
Year FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES

Notes: The value of the t statistic is in parentheses. Each asterisk in the sequence means *** p<0.01, **p<0.05, *p<0.1.

Testing the second independent variable (CSR_PERF) against two proxies of the banking profitability obtained similar results. The second hypothesis suggests that a high CSR_PERF positively correlates with company profitability. In proving this hypothesis, CSR_PERF was tested against the performance of market profitability as measured by RET. The results showed that CSR_PERF is not positively and significantly associated with RET. Similar results were obtained in the second dependent variable (NIM) test. These results contravene the second hypothesis that CSR performance positively relates to the banking profitability. Moreover, several control variables indicated varying relationship patterns, as shown in Table 5.

4.4. Additional Analysis (Robustness Check)

Additional analysis was performed using each independent variable's lag construct determined one year back. The assumption is that CSR performance takes time to be reflected in the banking profitability measured using market performance (RET) and accounting information performance (NIM). The results of the additional analysis are shown in Table 6.

The results in Table 6 were obtained through a test procedure similar to the main analysis in Table 5. However, the independent variable used was a lag variable determined one year back. Some previous analyses (i.e., Wu and Shen, 2013; Maqbool and Hurrah 2020; Tandililin and Usman 2023) found that this procedure is necessary to determine whether the past performance of reports availability and their impact are associated with profitability. However, the results showed that the coefficient values of the main independent variables tested on the two proxies of profitability significantly differed. The difference was seen in the sign of the reduction in the magnitude of the beta coefficients CSR_REP (-1) and CSR_PERF (-1) tested against RET and NIM.

Table 6: The additional analysis using independent lag variables

VARIABLES	Return			NIM		
	(1)	(2)	(3)	(4)	(5)	(6)
CSR_REP(-1)	0.0096 (0.291)		0.0032 (0.0929)	0.0002 (0.185)		0.0001 (0.0974)
CSR_PERF(-1)		0.0006 (0.520)	0.0005 (0.450)		1.13e-05 (0.277)	9.25e-06 (0.230)
ROE(-1)	0.132 (0.305)	0.111 (0.261)	0.106 (0.243)	0.0303 (1.435)	0.0300 (1.412)	0.0298 (1.357)
CAR(-1)	-0.624 (-0.628)	-0.692 (-0.686)	-0.687 (-0.683)	0.172*** (4.482)	0.171*** (4.416)	0.171*** (4.396)
LNNPL(-1)	-0.0114 (-0.399)	-0.0141 (-0.491)	-0.0142 (-0.489)	0.0011 (0.798)	0.0010 (0.737)	0.0010 (0.729)
AGE(-1)	-3.63e-05 (-0.0929)	-3.47e-05 (-0.0887)	-3.71e-05 (-0.0946)	1.58e-05 (1.078)	1.59e-05 (1.074)	1.58e-05 (1.072)
SIZE(-1)	-0.0013 (-0.0363)	-0.0009 (-0.0276)	-0.0009 (-0.0267)	-0.0023 (-1.481)	-0.0023 (-1.477)	-0.0023 (-1.472)
Constant	0.504 (1.231)	0.526 (1.286)	0.527 (1.282)	0.0666*** (4.885)	0.0670*** (4.795)	0.0670*** (4.790)
Observations	297	297	297	297	297	297
R-squared	0.606	0.606	0.606	0.887	0.887	0.887
Year FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES

Notes: The value of the t statistic is in parentheses. Each asterisk in sequence has the meaning *** p<0.01, **p<0.05, *p<0.1.

4.5. Discussion

This study aimed to examine the association between CSR performance and the banking sector's profitability in ASEAN. The legitimacy theory was adopted to hypothesize that banks are responsible for community and regional economic success as financial intermediaries and public fund collectors. Therefore, a bank's impact is seen in the performance of non-financial information in CSR reports. The company's commitment to CSR activities was considered a cost through revenue depletion. However, studies have shown that involvement in CSR activities is an investment reflecting the company's long-term commitment to corporate environmental, social, and economic sustainability.

Studies on CSR performance and profitability have been conducted in sensitive industries. For instance, Dhaliwal (2012) found that the company's decision to issue a non-financial stand-alone CSR report gives a positive impression to financial analysts. This has implications for investors' willingness to pay more for the shares of companies committed to environmental, social, and governance sustainability. The findings are consistent with the theory that companies incorporated in the more advanced capital market are more committed to environmental and social aspects. However, other studies (Usman *et al.*, 2020; Tandelilin and Usman 2023) have shown inconsistencies regarding the relationship between CSR_PERF and the company's short and long-term profitability. Usman *et al.* (2020) found differences in implementing the mandatory non-financial report issuance policy between Portugal and Indonesia. The study showed that countries with clear systems and regulations consider non-financial information relevant to stakeholders. In this context, Portugal is part of the European Union that has required non-financial information reporting since 2014, especially for companies with environmentally sensitive (ESI) characteristics. On the contrary, some countries do not require the issuance of CSR_REP. These countries do not prioritize practices related to company involvement in environmental, social, and corporate governance. Indonesian regulations require the reporting of non-financial information for all public companies. However, not all companies falling into the criteria must publish such information to comply with the rules for issuing CSR_REP.

The results showed that CSR_PERF of the banking industry in ASEAN is not positively related to profitability. This was evidenced by the previous studies (e.g., Wu and Shen, 2013; Buallay, 2019; Tandelilin and Usman, 2023) using CSR information availability and CSR_PERF scores as the main proxies of CSR_PERF. The two proxies were tested against the banking industry's profitability measured using the market return and net interest margin. The results were also evaluated through the panel data regression testing procedure. Potential estimation bias was avoided by selecting an appropriate model, clustering error standards, and controlling several company specific attributes. However, the findings contradicted the two hypotheses proposed in this study. This means that CSR practices in the ASEAN banking industry have not met expectations regarding non-financial information reporting. However, non-financial information reporting is still an effort to show the public that the company has attempted to operate ethically and sustainably. This practice is also symbolic rather than substantive in the ASEAN banking industry.

5. Conclusion

The results showed no significant association between CSR performance and profitability in the ASEAN banking industry. Two proxies each of CSR performance and the banking industry's profitability showed beta coefficients and a statistically unsupported significance probability. The results indicate that non-financial report issuance data is not the main commitment for measuring CSR performance by the banking industry. This is marked by the many banks in five ASEAN countries that were not screened as samples. Therefore, variations in CSR performance do not explain the banking industry's profitability measured by market returns and net interest margin.

The results also showed that not all the banking industries in sample countries are committed to ESG (CSR). This implies the absence of a mechanism for implementing non-financial information reporting in the five ASEAN countries studied. There are diverse variations in applying non-financial information reporting obligations. However, there is no procedure for implementing rewards and punishments for not reporting non-financial information. This means the government should devise a suitable mechanism for leading companies to commit to environmental, social, and governance sustainability.

References

- Afeltra, G., Alerasoul, A., & Usman, B. (2021). Board of directors and corporate social reporting: A systematic literature network analysis. *Accounting in Europe*, 19(1), 48-77.
- Arena, C., Liong, R., & Vourvachis, P. (2018). Carrot or stick: CSR disclosures by Southeast Asian companies. *Sustainability Accounting, Management and Policy Journal*, 9(4), 422-454.
- Axjonow, A., Ernstberger, J., & Pott, C. (2018). The impact of corporate social responsibility disclosure on corporate reputation: A non-professional stakeholder perspective. *Journal of Business Ethics*, 151, 429-450.
- Bagnoli, M., & Watts, S. G. (2017). Voluntary assurance of voluntary CSR disclosure. *Journal of Economics and Management Strategy*, 26(1), 205-230.
- Baltagi, B. H. (2008). *Econometric analysis of panel data*. John Wiley & Sons Ltd., Chichester.
- Bătae, O. M., Dragomir, V. D., & Feleagă, L. (2021). The relationship between environmental, social, and financial performance in the banking sector: A European study. *Journal of Cleaner Production*, 290, 125791.
- Bebbington, J., Larrinaga, C., & Moneva, J. M. (2008a). Corporate social reporting and reputation risk management. *Accounting, Auditing & Accountability Journal*, 21(3), 337-361.
- Bebbington, J., Larrinaga-González, C., & Moneva-Abadía, J. M. (2008b). Legitimizing reputation/the reputation of legitimacy theory. *Accounting, Auditing & Accountability Journal*, 21(3), 371-374.
- Buallay, A. (2019). Is sustainability reporting (ESG) associated with performance? Evidence from the

- European banking sector. *Management of Environmental Quality: An International Journal*, 30(1), 98-115.
- Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, 35(1), 1-23.
- Cho, S. Y., Lee, C., & Pfeiffer, R. J. (2013). Corporate social responsibility performance and information asymmetry. *Journal of Accounting and Public Policy*, 32(1), 71-83.
- Cormier, D., & Magnan, M. (2015). The economic relevance of environmental disclosure and its impact on corporate legitimacy: An empirical investigation. *Business Strategy and the Environment*, 24(6), 431-450.
- Demirgüç-Kunt, A., & Levine, R. (2001). *Financial Structure and Economic Growth*, MIT Press, Cambridge, MA.
- Devine, I., & Halpern, P. (2001). Implicit claims: the role of corporate reputation in value creation. *Corporate Reputation Review*, 4(1), 42-49.
- Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The Accounting Review*, 86(1), 59-100.
- Dhaliwal, D. S., Radhakrishnan, S., Tsang, A., & Yang, Y. G. (2012). Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review*, 87(3), 723-759.
- Douissa, I. B., & Azrak, T. (2022). Long-run dynamics between CFP and CSP in the GCC banking sector: estimation of non-stationary heterogeneous panels allowing for cross-sectional dependence. *Social Responsibility Journal*, 18(3), 518-533.
- European Commission. (2014). *Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014*. Retrieved from https://doi.org/http://eur-lex.europa.eu/pri/en/oj/dat/2003/l_285/l_28520031101en00330037.pdf
- Famiyeh, S. (2017). Corporate social responsibility and firm's performance: empirical evidence. *Social Responsibility Journal*, 13(1), 131-148.
- GRI. (2014). *G4 Sustainability Reporting Guidelines - Reporting Principles and Standard Disclosures*. *Global Reporting Initiative*. Retrieved from <https://doi.org/https://www.globalreporting.org/resource/library/G3-Guidelines-Incl-Technical-Protocol.pdf>
- Lys, T., Naughton, J. P., & Wang, C. (2015). Signaling through corporate accountability reporting. *Journal of Accounting and Economics*, 60(1), 56-72.
- Manchiraju, H., & Rajgopal, S. (2017). Does corporate social responsibility (CSR) create shareholder value? evidence from the Indian companies act 2013. *Journal of Accounting Research*, 55(5), 1257-1300.
- Maqbool, S., & Hurrah, S. A. (2021). Exploring the Bi-directional relationship between corporate social responsibility and financial performance in Indian context. *Social Responsibility Journal*, 17(8), 1062-1078.
- Michelon, G., Pilonato, S., Ricceri, F., & Roberts, R. W. (2016). Behind camouflaging: Traditional and innovative theoretical perspectives in social and environmental accounting research. *Sustainability Accounting, Management and Policy Journal*, 7(1), 2-25.
- Milne, M. J., & Patten, D. M. (2002). Securing organizational legitimacy: An experimental decision case examining the impact of environmental disclosures. *Accounting, Auditing & Accountability Journal*, 15(3), 372-405.
- Neu, D., Warsame, H., & Pedwell, K. (1998). Managing public impressions: environmental disclosures in annual reports. *Accounting, Organizations and Society*, 23(3), 265-282.
- Park, J., & Brorson, T. (2005). Experiences of and views on third-party assurance of corporate environmental and sustainability reports. *Journal of Cleaner Production*, 13(10-11), 1095-1106.

- Refinitiv. (2020). *Environmental, Social, and Governance (ESG) Scores from Refinitiv*. Retrieved from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf.
- Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review*, 20(3), 571-610.
- Tandelilin, E., & Usman, B. (2023). Toward a better understanding of social impact, CSR reporting and firm performance: A look at the ASEAN banking industry. *Social Responsibility Journal*, 19(3), 579-600.
- Usman, B., & Yennita, Y. (2018). CSR Practice and asymmetry information of Indonesian public listed companies. *International Research Journal of Business Studies*, 11(1), 45-66.
- Usman, B., Bernardes, O. T. F., & Kananlua, P. S. (2020). On the nexus between CSR practices, ESG performance, and asymmetric information. *Gadjah Mada International Journal of Business*, 22(2), 151-177.
- Wu, M.W., & Shen, C.H. (2013), Corporate social responsibility in the banking industry: Motives and financial performance. *Journal of Banking & Finance*, 37(9), 3529-3547.
- Yoon, B., Lee, J. H., & Ryan, B. (2018). Does ESG performance enhance firm value? Evidence from Korea. *Sustainability*, 10, 1-18.

Financial Performance as a Determinant of The Cost of Capital: An Empirical Study on Listed Companies in India

Naseem Ahamed^{1*} & Nitya Nand Tripathi¹

¹*Faculty of Finance and Accounting, ICFAI Business School, Hyderabad, ICFAI Foundation for Higher Education University, India.*

Abstract: Research Question: The purpose of this study is to examine the relationship between financial performance and the cost of capital of firms. **Motivation:** Access to inexpensive capital is a great enabler for firms especially during periods of uncertainty. The cost of capital reflects the investor's attitude towards risk. The McKinsey Quarterly (in the December 2008) edition, found that the long-term price of risk has increased over time. This motivated us to examine the impact of firms performance on its cost of capital. **Idea:** The premise forming the bedrock of this study is that access to inexpensive capital would help a firm undertake multiple projects that would otherwise have not been financially feasible. **Data:** This study takes all non-financial companies listed on the National Stock Exchange (NSE hereafter) of India from 2004 to 2020 from the Prowess database containing more than 12,369 firm-year data points. **Method/Tools:** Multivariate panel regression model is used for analysis using firm and year fixed effects. We used financial data, board profile and dummies for sector and affiliation of firms. **Findings:** We found an inverse relationship between asset and cost of capital. This implies the corporate landscape of India is dominated by business groups and they are better placed to raise inexpensive capital than their standalone counterparts. Firms with a high dividend pay-out ratio also enjoy a lower cost of capital. Better corporate governance mechanisms such as board independence help lower the cost of capital. The results are particularly important for policymakers of emerging economies like India. Making policy decisions that would encourage wider retail investors' participation in markets would go a long way in expanding the available capital pool for commercial enterprises. **Contributions:** One of the primary contributions of this study is the examination of the relationship between firm performance and cost of capital in the context of an emerging economy that is characterized by the predominance of business groups, concentrated ownership and institutional voids.

Keywords: Cost of capital, firm performance, emerging economy.

JEL Classification: G32, O16, L25

* Corresponding author: Naseem Ahamed. Tel.: +91-8247619024.
Email: naseemahamed@ibsindia.org

Received 1 Nov 2022; Final revised 5 May 2023; Accepted 15 Sep 2023; Available online 30 Sep 2023.

To link to this article: https://www.mfa.com.my/cmrv31_i2_a4/

© Malaysian Finance Association, 2023. This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The cost of capital of firms warrants special attention by the top management owing to the significance it holds in corporate finance. Extant studies on the cost of capital are sparse, especially with respect to emerging economies (Barry *et al.*, 1998; Omran and Pointon, 2004). Few studies related to the cost of capital conducted on emerging economies (Exley and Smith, 2006; Ibrahim and Ibrahim, 2015; Pouraghajan *et al.*, 2012; Hussain *et al.*, 2019) report conflicting results. On one hand, Pouraghajan *et al.*, 2012 assert the existence of a positive and significant relationship between the cost of capital and financial performance. Ibrahim and Ibrahim, 2015, on the other hand, report that there is no association between the cost of capital and financial performance. Others have reported an inverse relationship between the cost of capital and a company's reputation and corporate reputation is correlated with financial performance (Cao *et al.*, 2015).

Emerging economies are characterised by distinct features in their corporate landscape such as a less vibrant capital market, corporate control through duality/family holdings, concentrated ownership, a predominance of business groups and institutional voids (Khanna and Palepu, 1997; Harrison *et al.*, 2018) to name a few, setting them apart from their counterparts in developed economies. The outcome of these structural differences manifests itself in the form of information asymmetry between stakeholders. This asymmetry leads to an increase in the cost of equity for firms raising capital in developing economies (Lambert and Verrecchia, 2010; Barth *et al.*, 2013). Firms tend to pay dividends to their shareholders to reduce this informational asymmetry (Lin *et al.*, 2017).

This study examines the impact of financial performance on the overall cost of capital of listed companies on NSE. Along with that, this study also examines the impact of universally accepted best practices of corporate governance, corporate control and the sector to which a firm belongs on the cost of capital.

The remainder of this article is organized as follows. Section 2 contains the background and premise of this study; Section 3 contains the review of relevant literature; Section 4 contains data, variables, and the research method used in this study; Section 5 contains the hypotheses; Section 6 contains the results; Section 9 contains the conclusion and implications of this study.

2. Background and Premise

The emergence of publicly traded companies on stock exchanges paved way for the creation of companies of unprecedented size. The opportunity for investors to invest in companies of their choice is better than ever. In a well-functioning financial system, intermediaries (stock exchanges) help mobilize the surplus funds in the economy towards its most efficient usage. Shareholders can indicate their happiness/disappointment through their buy/sell actions respectively. With the advent of internet-based trading platforms, the process of investing in companies has become simple and fast.

Companies require funds all the time for all sorts of activities such as financing their working capital; capital budgeting expenditure; expansion of business; modernization of plants and factories etc. These funds are broadly arranged from two sources namely debt-based sources of funds such as term loans and debentures/bonds and equity-based sources of funds such as equity shares and preference shares.

The expectation of the creditors and shareholders against their investments are technically known as the cost of debt and cost of equity respectively. Combining these two costs with their proportion in the total capital structure is called the cost of capital. The performance of businesses is intricately linked with their cost of capital (see Artha and Mulyana, 2018; Schwarz, 2018). It can be observed that the cost of financing increases with the increase in asymmetric information. Hence, the equity holders should be compensated commensurate to

the risk undertaken. The cost of equity is higher than the cost of debt for various reasons. First, debt is considered a cheaper source of capital because creditors are concerned with their interest amount and have no share in the profit. Also, a debt obligation is for a limited period. In the normal course of business, creditors don't have voting rights. On the other hand equity capital is expensive because equity is a lifelong obligation (unless the firm goes for a buy-back). Also, equity holders enjoy voting rights granting them higher control over the management compared to creditors. Also, ordinary shareholders, by virtue of being the claimants of residual income undertake the maximum amount of risk.

Donaldson (1961), came up with the pecking order theory which was later ameliorated by Myers and Majluf (1984). The pecking order theory ranks the mode of financing requirements of companies in order of their preference. According to the pecking order theory, a company would first utilize its retained earnings; then issue debt; then issue equity as a last resort to gather funds.

Figure 1 exhibits the increase in the cost of various sources of capital. This figure exhibits the increase in the cost of various sources of capital. Debt capital is cheaper compared to equity capital. The overall cost of capital is the weighted average cost of individual components of capital. Firms with high creditworthiness and reputation would be able to raise debt and equity capital at a relatively lower cost, thus helping them reduce the overall cost of capital.

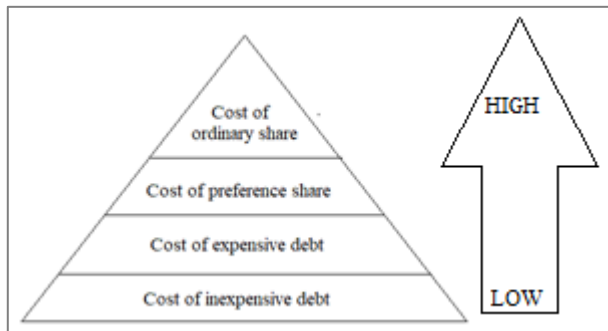


Figure 1: The increase in the cost of various sources of capital

It is observed that the cost of financing increases with the increase in asymmetric information. Reputed companies pay a lower cost for raising capital (see Cao *et al.*, 2015). Investors also comprehend the action of companies as a signal of the firms' financial capacity. Issuing equity by a firm to raise funds would be perceived by the potential shareholders as a lack of the firm's ability to pay interest for debt capital, so the expected return (cost of equity) would increase accordingly. For the existing shareholders, the issuance of new equity would dilute their ownership and make their claim over residual income even riskier.

When a company assumes debt or issues debt-based financial instruments such as debentures, then investors ascribe that action to the company's ability to pay off the interest in future.

The degree of information asymmetry between management and investors is less in the case of debt issuance. Whereas, when it issues equity shares towards raising additional funds, then it is construed by the investors that the firm couldn't get debt and is issuing equity shares as a last resort. The investors perceive that the management knows something which they don't and hence require higher cost for equity commensurate to the information asymmetry.

Figure 2 exhibits the formula used for arriving at the overall cost of capital (also known as the weighted average cost of capital or the hurdle rate). The cost of equity plays an important role in the overall cost of capital as a lower cost of equity would pull the overall

cost of capital down. The overall cost of capital is the weighted average of the cost of debt and the cost of equity

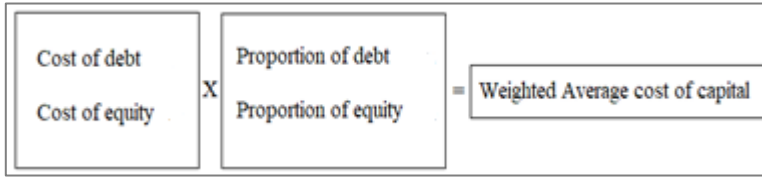


Figure 2: The weighted average cost of capital (WACC) and its determinants

Firms would like to source capital from these sources at the least cost possible because inexpensive capital motivates entrepreneurial spirit. Low cost of capital gives the companies some degree of flexibility to choose projects with low yield and still be profitable. When companies finance their funds at a higher cost, then they limit themselves to choosing only those projects which would yield returns higher than the cost of capital.

The cost of capital, also known as the hurdle-rate determines the criteria for acceptance or rejection of projects. Having a lower cost of capital would allow firms to take up projects with lower yields and still be profitable. In Table 1 there is a tabular representation of how different firms with different costs of capital would not be able to take up different projects with expected yields. As the cost of equity is a component of the overall cost of capital, raising funds at a lower cost of equity would reduce the overall cost of capital.

Table 1 Project options and hurdle rates

Firms	Kcap (%)	Projects in the market	Firms that can accept the projects
A	7	Project 1 yields a return of 7.2 %	Firm A
B	8	Project 2 yields a return of 7.25%	Firm A
C	9	Project 3 yields a return of 7.5%	Firm A
D	10	Project 4 yields a return of 8.4%	Firm A; Firm B
E	12	Project 5 yields a return of 9.2 %	Firm A; Firm B; Firm C
		Project 6 yields a return of 10.15%	Firm A; Firm B; Firm C; Firm D
		Project 7 yields a return of 11%	Firm A; Firm B; Firm C; Firm D

Notes: Table 1 exhibits the project options available for companies and the benefit of having a lower hurdle rate. (kcap stands for overall cost of capital). There are five firms namely Firm A; Firm B; Firm C; Firm D and Firm E with the hurdle rate of 7 percent; 8 percent; 9 percent; 10 percent and 12 percent respectively. Considering that a total of seven projects namely Project 1; Project 2; Project 3; Project 4; Project 5; Project 6 and Project 7 with a yield of 7.2 percent; 7.25 percent; 7.5 percent; 8.4 percent; 9.2 percent; 10.15 percent and 11 percent respectively are available in the market, Firm A would be able to undertake all the projects because its hurdle rate is lower than the yield of all the projects. In fact, only Firm A would be able to accept the first three projects; Firm B can accept only the last four projects as the first three projects are out of its reach due to the high hurdle rate. Firm C can accept the last three projects; Firm D can accept the last two projects. Firm E wouldn't be able to accept any project as none of the project's yield is surpassing its cost of capital.

3. Literature Review

The extant literature on the cost of capital examines it from multiple aspects by studying its relationship with various variables. One such study is conducted by Bhattacharya and Daouk (2002), where they study the influence of laws pertaining to insider trading and enforcement thereof on the cost of equity across 103 countries using four approaches. They found that strong enforcement of such laws reduces the cost of equity. Ashbaugh *et al.* (2004) studied the effect of good governance practices on the cost of equity in U.S. firms to find an inverse relationship between the variables of interest. Another study with similar results as that of Ashbaugh *et al.* (2004) is conducted by Easton (2004) where governance mechanisms are

quantified based on parameters such as shareholder's rights, ownership structure etc. in order to assess overall firm risk.

The impact of the cost of capital on the financing decisions of firms and thus on their capital structures for Brazilian companies is discussed by Albanez (2015). She presents evidence that Brazilian firms follow the pecking order hierarchy to obtain financing when the cost of equity is high. The decision, however, is not based on just the pecking order hierarchy, rather it is based on the cost of alternative sources of finance due to the information asymmetry between market agents.

One of the seminal papers in the area of corporate governance is by Gompers *et al.*, (2003) where they create a corporate governance index (GIM index) using a comprehensive list of parameters. Some of those parameters include tactics adopted for delaying hostile takeover, voting rights, protection measures accorded to the director/officer, other takeover defences and state laws. Each provision of the GIM index imposing restrictions on shareholder rights and increasing managerial power is accorded a point. A high GIM score alludes to a weaker level of shareholder rights and *vice-versa*. It is found that firms with high GIM scores have a higher level of the cost of equity, leading to a higher cost of capital and *vice-versa*. The GIM index study strengthens the theory that strong rights accorded to shareholder helps in reducing the cost of equity. Using the corporate governance index created by Gompers *et al.* (2003) and Cheng *et al.* (2006) examines the impact of shareholder rights on the cost of equity in the context of U.S firms and corroborated the results found by Gompers *et al.* (2003) and early literature. Firms with better quality governance mechanisms are associated with lower risk and cost of equity. Hence, firms with good quality governance mechanisms also enjoy an overall lower cost of capital.

Another angle from which the cost of equity has been studied is the impact of legal institutions and securities regulations in the country. Legal jurisprudence of the region where securities are issued has a profound effect on the investors' willingness to finance the firms (see La Porta *et al.*, 1998). Countries that accord strong legal protection (both through strong laws and enforcement) have funds available to firms at an inexpensive rate compared to countries that have weak investor protection. It is found that common law countries provide a higher degree of protection compared to countries following other legal traditions, especially French civil law. Hail and Leuz (2006), study the relationship between legal jurisprudence/securities regulation and the cost of equity using data points across forty countries. They found that their results are in conciliation with Cheng *et al.* (2006), as they discovered that countries with effective legal systems coupled with strong securities law help reduce the cost of equity. Chen *et al.* (2009) examine the impact of corporate governance and investor protection on the firms' cost of equity in seventeen emerging markets from 2001 to 2002. The results strengthen the previous findings of La Porta *et al.* (1998) by establishing an inverse relationship between the country-level strength of legal provisions and the cost of equity.

Gupta *et al.* (2010) did a similar study but utilized firm-level CG data instead of country-level CG data on a sample size of 7,380 firms across 22 developed economies over a 5-year period. They assert that there is an inverse association between corporate governance index score and the cost of equity in line with extant literature especially for firms in Common Law countries and financially developed economies. This finding implies that the legal origin of a firm complements the financial development effect. A similar study was conducted by Byun *et al.* (2008), where they investigated the effect of corporate governance measures on the cost of equity in the context of Korean companies. Using a sample set of more than 1600 companies, they created a governance index using eighty-six items across five categories. Unlike the GIM index, the index created by Byun *et al.* (2008) indicates strong corporate

governance practices for a higher score. Using OLS regression, they found that quality corporate governance leads to a reduced cost of equity.

Sarkar and Sarkar (2008) in an important study pertaining to the significance of debt in corporate governance assert that the role of debt as a disciplining tool for top executives has increased with time. As the institutions become more market-oriented, the creditors used debt as a disciplining instrument for both standalone and group-affiliated firms. The cost of debt would have the risk of misappropriation embedded into it.

There are other studies that study the link between financial disclosure and the cost of equity (see Richardson and Welker, 2001) where they find a positive and statistically significant relationship between the degree of social disclosure and the cost of equity. Firms attempt to mitigate this by higher financial performance. Poshakwale and Courtis (2005) studied the impact of voluntary disclosures on the cost of equity in the banking industry across three continents. They discovered that more disclosures lead to a reduction in the cost of equity especially disclosure about risk management practices. In a study conducted by Déjean and Martinez (2009) on French-listed companies investigating the impact of voluntary corporate environmental disclosures on the cost of equity, they found no conclusive evidence that firms disclosing environmental information necessarily lower the cost of equity. Raimo *et al.* (2020) investigated the impact of environmental, social and governance disclosure on the cost of equity in the food and beverage industry and found an inverse relationship between disclosure and cost of equity. A higher degree of disclosure leads to improved access to financial resources for firms. Similarly, Anthony and Rezaee (2015) find that economic sustainability disclosures have an inverse relationship with the cost of equity.

Pahi and Yadav (2019) found that firms with more robust governance practices have a higher dividend payout ratio. Extant studies with respect to the cost of equity have chartered multiple streams e.g. some of them have investigated the association between board attributes and the cost of equity (Bozec and Bozec, 2011; Mazzotta and Veltri, 2014; Zhu, 2014; Teti *et al.*, 2016). Others have inspected the relationship between disclosures (financial information and otherwise) and the cost of equity (Richardson and Welker, 2001; Poshakwale and Courtis, 2005; Déjean and Martinez, 2009; Anthony and Rezaee, 2015; Raimo *et al.*, 2020).

The literature review manifests that there are significant studies in allied areas but there is almost no literature on the relationship between the cost of capital and firm performance. Our study is based on the premise that firms with superior performance would be perceived favourably by the market, enabling them to raise funds at an inexpensive rate. A lower, overall cost of capital would lead to firms accepting projects of lower yield as well, thus enhancing its value.

4. Data and Methodology

The data used for this study is secondary in nature and has been extracted from the “Prowess” database, which is managed by the Centre for Monitoring Indian Economy (CMIE)¹. The risk-free rate is taken from the Reserve Bank of India² website. The data is collected for all non-financial companies listed on the National Stock Exchange (NSE) of India from 2004 to 2020. The raw data and its symbol are tabulated in Table 2. Using these data we then construct the required variables for this study, as tabulated in Table 3.

¹ CMIE gathers comprehensive data about economic indicators of India. It also collects information about financial indicators of listed companies in India.

² The proxy for the risk free rate is the 10 year rate of return on the Government of India bond.

Table 2: The financial and ownership data into symbol

Financial data	Symbol
Cash outflow for interest payment	I
Liability	L
Owners' equity	OE
Debt to equity ratio	D_E
Beta of the stock	B
Return generated by market	R _m
Return generated by stock	R _e
Total borrowings	Debt
Tax rate	t
Total asset	TA
Market capitalization	Cap
Profit after tax	PAT
Cash outflow for dividend payment	Div

Table 3: The variables and formula

Variables	Notation	Formulae
Cost of debt	k _d	$\left(\frac{I}{Debt}\right) * (1 - t)$
Cost of equity	k _e	$R_f + \{\beta * (R_m - R_f)\}$
Debt in the capital structure	w _d	$\frac{L}{L + E}$
Equity in the capital structure	w _e	$\frac{E}{L + E}$
Cost of capital	k _c	$(k_d * w_d) + (k_e * w_e)$
Leverage	Lev	$\frac{Debt}{TA}$
Dividend rate	Div_rate	$\frac{Div}{PAT}$
Return on asset	ROA	$\frac{PAT}{TA}$
Return on equity	ROE	$\frac{PAT}{OE}$
Board size	B_size	No. of board members
Board independence	B_ind	$\frac{Independent\ members}{B_size}$
Board meetings	meet	No. of board meetings
CEO duality	dual	1 if CEO and chairman are same person, 0 otherwise
Dual and promoter	Dual_prom	1 if dual CEO is also the promoter, 0 otherwise
Risk free rate	r _f	The 10 year Govt. of India bond rate
Research & development expense	RnD	Total expense incurred towards research and development
GDP growth rate	GDP_growth	The growth rate of GDP
Manufacturing/Services	Man_Ser	1 if the firm belong to manufacturing sector, 0 otherwise
Group/Standalone	Group_dummy	1 if the firm belong to a business group, 0 otherwise
Natural logarithm of total asset	lnTA	Natural logarithm of total assets

Notes: The table above exhibits the variables used for this study. The variables are categorized into three categories namely financial data; ownership data and corporate governance data.

The Capital asset pricing model (CAPM) is used to determine the cost of equity.

$$k_e = r_f + \{\beta * (r_m - r_f)\} \quad (1)$$

The symbol k_e denotes the cost of equity; r_f denotes the existing risk-free rate of return; β denotes the beta i.e. the sensitivity of the stock with respect to the market; r_m denotes the return generated from the market portfolio.

Then, using the cost of debt and cost of equity, the overall cost of capital is created which is the dependent variable for our study. The values of these variables are then winsorized at 1% and 99% in order to remove outliers.

The research method used in this study is a multivariate regression analysis of dynamic panel data estimation using fixed/random effects model. The dependent variable is the cost of capital and the constituents thereof. The main independent variables are the performance indicators (Return on Assets/ Return on Equity. As far as the issue of endogeneity is concerned, we have considered the lagged value of the main regressor. Any significant change in the dependent variable because of any latent unobservable factor gets captured through the coefficient of the lagged regressor. The panel dataset used in this study helps because the values and years act as a control group for themselves. Equation 2 exhibit the model that is used in this study to determine the impact of financial performance on the overall cost of capital.

$$\begin{aligned} k_c = & \alpha + (\beta_1 * \text{Performance}_{t-1}) + (\beta_2 * \text{Lev}_{t-1}) + (\beta_3 * \text{lnTA}_{t-1}) \\ & + (\beta_4 * \text{Divrate}_{t-1}) + (\beta_5 * \text{RnD}_{t-1}) + (\beta_6 * \text{B}_{\text{Ind}t}) + (\beta_7 * \text{Meet}_t) \\ & + (\beta_8 * \text{Dual}_t) + (\beta_9 * \text{Dual}_{\text{prom}t}) + (\beta_{10} * \text{10Ybond}_t) \\ & + + (\beta_{11} * \text{GDP}_{\text{growth}t}) + (\beta_{12} * \text{Man}_{\text{Ser}t}) + (\beta_{13} * \text{Group}_{\text{dummy}}) + \varepsilon_t \end{aligned} \quad (2)$$

The independence of the board; frequency of board meetings are the variables that fall under the umbrella of corporate governance variables. All the corporate governance variables used as independent variables are taken at level i.e. year 0. All the control variables are lagged by one year. Control variables are lagged by a period because of the nature of the persistence effect of these variables. In order to probe the intensity of the relationship between firm performance and cost of capital in a business group affiliated forms and standalone firms, we introduce a dummy variable “Group” that takes a value of 1 for group-affiliated firms and 0 otherwise. Other important independent variables are board independence, dividend pay-out ratio and a dummy variable “Man_Ser” that takes a value of 1 for manufacturing firms and 0 otherwise.

The premise on which the first hypothesis is based is that firms with superior financial performance would be perceived favourably by the market. Hence, it would be able to raise debt at a cheaper rate. The ability to be able to raise inexpensive debt makes the firm less risky for equity holders as well and they would discount the future cash flows of such firms at a lower rate of discount (Akhtar *et al.*, 2012; David and Olorunfemi, 2010; Enekwe *et al.*, 2014). Based on the arguments presented above regarding the relationship between firm performance and cost of capital, we postulate the following hypotheses:

H₁: All else being equal, firms with better financial performance have a lower cost of capital compared to firms with worse financial performance.

The premise on which the second hypothesis is based is that firms affiliated with business groups develop an internal capital market for themselves (see Khanna and Palepu, 2000) and

have less dependency on the external capital market. The predominance of companies affiliated with business groups is a characteristic of the South-East Asian corporate landscape. Such structures help mitigate financial constraints and exercise greater control at the firm level. So, group-affiliated firms can raise funds at a lower rate (Masulis *et al.*, 2011).

H₂: All else being equal, group-affiliated firms have a lower cost of capital compared to standalone firms.

The fundamental premise on which the third hypothesis is based is that firms having an independent board would monitor the policy and decisions of top executives more objectively, limiting the scope for mismanagement. Hence, creditors would attribute less riskiness to such firms' demand for a lower cost of capital. Similar assertions are found in the extant literature in their studies conducted across multiple economies (Zhu, 2014; Wu *et al.*, 2014; Tran, 2014). Other studies echoing similar findings are Am-ugsorn *et al.* (2022) and Pham *et al.* (2012). So, firms having a higher proportion of independent directors on the board can raise funds at a lower rate.

H₃: All else being equal, firms with higher board independence have a lower cost of debt/equity/capital compared to firms with lower board independence.

The premise on which the fourth hypothesis is based is that firms with a higher dividend payout ratio would have less reserve, thus making them less vulnerable to misappropriation by the management. It certainly limits the growth prospects of the firm on the other hand. However, it limits the scope of exploitation of the investors at the hand of executives by reducing the degree of information asymmetry (Manos, 2003, Zhao and Qi, 2009). On the other hand, dividend payout would reduce available funds for the firm forcing it to raise capital from external sources. Hence, we postulate no resultant effect of dividend payout on the cost of capital of firms.

H₄: All else being equal, firms with higher dividend payout ratios have a lower cost of debt/equity/capital compared to firms with lower dividend payout ratios.

The premise for the fifth hypothesis is that manufacturing firms have more tangible fixed assets that can serve as collateral towards debt compared to service firms. Manufacturing firms thus not only should be valued for their earning potential but also should be valued for their fixed asset base. A few extant studies assert that the cost of capital differs on the basis of different sectors. Hence, manufacturing firms can raise funds at a lower rate.

H₅: All else being equal, manufacturing firms have a lower cost of capital compared to service firms.

5. Results

5.1 Descriptive Statistics

The descriptive statistics of the variables used in this study are exhibited below. It displays that the mean value of the cost of debt is 10.5%, and the cost of equity is almost double that of the cost of debt at 19.1%. On average, the cost of overall capital is 15.1% for the listed firms. The mean and standard deviation values for other variables are shown in Table 4.

Table 4: Descriptive statistics

Variable	N	Mean (μ)	StdDev (σ)	Minimum	Maximum
Cost of capital	12639	0.151	0.05	0.04	0.365
Cost of equity	12639	0.191	0.053	0.05	0.3
Cost of debt	12666	0.105	0.074	0.03	0.4
lnTA	12666	8.859	1.546	5.263	15.865
Lev	12666	1.116	2.157	0.002	83.122
ROA	12666	0.049	0.550	-25.27	4.334
ROE	12666	0.053	0.656	-30.52	5.461
Div_rat	12666	0.132	0.206	0	1
RnD	12666	0.405	0.491	0	1
B_size	12224	9.202	3.015	1	25
B_ind	12224	0.733	0.139	0.333	1
Meet	11642	4.887	2.259	1	32.8
Dual	12224	0.341	0.484	0	3
Dual_prom	12224	0.238	0.428	0	2
10Y_Bond	12639	0.075	0.007	0.059	0.086
GDP_growth	12639	0.046	0.036	-0.089	0.071

Notes: This table exhibits the sample size, mean, standard deviation and minimum and maximum values of the variables used in the study. The variable lnTA is natural logarithms of total size; Leverage is calculated as total debt divided by total assets; ROE is calculated as the ratio of profit after tax to shareholders equity; Div_rat is the dividend payout ratio; RnD is the research and development expense adjusted with total assets; B_size is the number of members in the board; B_ind stands for board independence and is calculated as the ratio of independent members to total board size; B_meet shows the number of board meetings conducted each year; Dual is a dummy variable that takes a value 1 when the chairman and the managing director of the board are the same individuals and 0 otherwise; Dual_prom is dummy variable that takes a value 1 when the dual executive is also a promoter of the company and 0 otherwise; 10Y_Bond is the yield from government 10 years bonds and is used as a proxy for the risk-free rate of return; GDP_growth represent the growth in GDP from last year.

The mean value of the natural logarithm of total assets held by each firm is 8.859. Taking the antilog of 8.859 gives the mean value of total assets as Rs 6975 million. On average, the proportion of debt with respect to total assets is 1.116% indicating that firms are mostly funded by equity holders. The mean value for return on assets and return on equity are 4.9% and 5.3% respectively. The dividend payout ratio of the firms in the sample is 13.2% on average. On the data from the corporate governance front, we find that the average size of the board is just above nine members, and the proportion of independent members on the board is close to 75 percent. On average, around 5 (4.88 meetings to be precise) board meetings are conducted on an annual basis. Around one-third, (34.1%) of the CEOs occupy the office of chairman simultaneously. The implementation of the Companies Act, 2013, prohibits executives from occupying dual positions unless there is a provision for it in the articles of association of the company or unless the company carries multiple businesses. Around a quarter (23.8%) of the dual CEOs i.e. the same person occupying the offices of CEO and chairman simultaneously, is also one of the promoters of the company. The mean value of the 10-year Government of India bond which serves as the proxy for the risk-free rate is 7.5 percent. Hence the risk premium for debt comes out to be 3 percent (Cost of debt is 10.5 percent – Risk free rate is 7.5 percent); and the risk premium for equity funds are 11.6 percent (Cost of equity is 19.1 percent – Risk free rate is 7.5 percent). The average difference in risk premium demanded by equity holders is 8.6 percent higher than that of the creditor.

Next, we exhibit the Pearson correlation coefficient values in Table 5. The sign and magnitude of correlation coefficients don't establish causality but serve as an initial starting point by demonstrating a positive/inverse relationship between two variables.

Table 5: This table exhibits the Pearson Correlation Coefficients between variables used in this study

	Ko	Ke	Kd	LnTA	Lev	ROE	ROA	Div	RnD	BSize	Bindp	Meet	Dual	Dualprom	10Ybond	GDPgrowth
Ko	1															
Ke	0.63	1														
Kd	0.56	0.02	1													
LnTA	0.04	0.04	0.00	1												
Lev	0.26	0.03	0.10	0.04	1											
ROE	-0.03	-0.02	-0.09	-0.06	-0.66	1										
ROA	-0.03	-0.02	-0.08	-0.06	-0.65	0.66	1									
Div	-0.03	-0.04	-0.06	0.05	-0.08	0.11	0.10	1								
RnD	0.00	0.02	-0.08	0.17	-0.04	0.05	0.04	0.12	1							
Bsize	-0.02	0.03	-0.07	0.47	0.02	-0.01	-0.00	0.09	0.21	1						
Bindp	-0.05	0.02	-0.11	0.03	0.02	-0.02	-0.02	0.03	0.07	0.08	1					
Meet	-0.06	-0.03	-0.02	-0.06	0.00	0.02	0.01	-0.07	-0.10	-0.16	-0.16	1				
Dual	0.00	-0.01	0.02	-0.02	0.00	0.00	0.00	-0.01	0.03	-0.03	-0.23	0.05	1			
Dualprom	0.00	0.00	0.01	-0.05	0.00	0.01	0.01	-0.02	0.01	-0.05	-0.17	0.02	0.77	1		
10Ybond	-0.02	-0.09	0.08	0.02	-0.02	0.03	0.02	0.05	-0.01	-0.02	-0.04	0.03	0.02	0.01	1	
GDPgrowth	-0.01	0.11	-0.06	-0.10	0.05	0.04	0.03	-0.06	0.00	-0.04	0.03	0.03	-0.01	0.00	0.37	1

The correlation coefficient between components of cost of capital is positive in line with our expectation. The cost of capital is the weighted average of the cost of debt and the cost of equity. So, an increase in either one of them would increase the overall cost of capital proportional to its weight. The negative relationship between firm size and cost of capital is surprising as we expected the existence of a size effect. Firms with a large asset base should be able to raise inexpensive capital but in our case, it is the opposite. One plausibility for such a relationship could be the quantum of funds raised by large firms. Large firms would raise a bigger amount compared to smaller firms. So, the weighted marginal cost of capital increases for every extra dollar raised. There is a positive relationship between cost and capital and leverage in line with our expectations. Highly levered firms are riskier, so the capital providers demand more risk premiums. There is an expected inverse relationship between financial performance indicators (ROA and ROE) and cost of capital. Firms with better financial performance are less risky and hence funds are available to them at a cheaper rate compared to financially stressed firms. Firms with a higher dividend payout ratio exhibit an inverse relationship with the cost of capital. Higher payout of dividends leaves less money under the custody of the management reducing chances of misappropriation, and unfair advantages due to information asymmetry. Payment of dividends also means that all the obligations (payment to employees, suppliers, creditors, government) of the firm have already been met. Such firms that fulfil all of their financial obligations and still maintain a higher dividend payout ratio are favoured by investors. The correlation coefficient between research and development expenses and the cost of capital is intriguing. It is because the coefficient between research and development expenses and the cost of debt and the coefficient between research and development expenses and the cost of equity exhibit opposite signs. While the cost of debt would be higher with an increased expenditure towards research and development, the cost of equity declines. This could be because of the fact that research and development expenses don't necessarily yield results in the short run driving creditors to account for the additional risk. The correlation coefficient of the cost of capital and its constituent components with board characteristics reveal that firms with boards having higher independent members and higher frequency of meetings lead to a reduction in the cost of capital. There is no discernible relationship between CEO duality with the cost of capital and dual promoters with the cost of capital.

5.2 Inferential Statistics

In order to deduce the causality between the regressor and regressand variables, we employed a multivariate panel regression on the dataset. Pooled OLS regression on the dataset also exhibits similar results so they are not demonstrated here in the interest of parsimony. The results of the panel regression for Eq (1) are provided in Table 6. Panel A, B and C of Table 6 exhibit the regression results of financial performance measured by return on assets (ROA) on the cost of debt, cost of equity and cost of capital respectively.

Panel A of Table 6 exhibits the impact of the performance variable (ROA) on the cost of debt along with other control variables. The model is good as evident from the significance of the F value. We test all the hypotheses in light of the coefficients of Table 6 and Table 7. There is a negative and statistically significant relationship between return on asset (ROA) and cost of debt, unable to reject the first hypothesis (H_1). Next, the coefficient for the group dummy implies that the cost of debt is lower for group-affiliated firms compared to standalone firms, unable to reject the second hypothesis (H_2). The coefficient for board independence implies that the cost of debt is lower for firms that have a higher proportion of independent directors on the board, unable to reject the third hypothesis (H_3). There is an inverse and statistically significant relationship between the dividend payout ratio and cost of capital, unable to reject the fourth hypothesis (H_4). Finally, the coefficient for the

manufacturing/services dummy implies that the cost of debt is lower for manufacturing firms compared to services firms, unable to reject the fifth hypothesis (H₅). Hence, we assert that on the basis of the results, we are not in a position to reject any of the hypotheses.

Table 6: The result of fixed effects regression analysis with ROA as financial performance

	Dependent Variables					
	Cost of Debt Panel A		Cost of Equity Panel B		Cost of Capital Panel C	
	Coeff	VIF	Coeff	VIF	Coeff	VIF
Intercept	0.077*** (7.54)	0	0.263*** (33.60)	0	0.198*** (28.41)	0
ROA	-0.148*** (-16.22)	1.124	-0.016*** (-2.39)	1.124	-0.018*** (-2.93)	1.124
LnTA	0.002*** (4.16)	1.394	0.001*** (3.84)	1.394	0.002*** (6.93)	1.394
Leverage	-0.004*** (-13.86)	1.084	0.000 (0.66)	1.084	-0.006*** (-26.73)	1.084
Div_rat	-0.013*** (-3.98)	1.072	-0.009*** (-3.67)	1.072	-0.010*** (-4.60)	1.072
RnD	-0.007*** (-4.94)	1.212	0.000 (0.80)	1.212	0.000 (0.73)	1.212
B_size	-0.001*** (-4.31)	1.301	0.000 (0.07)	1.301	-0.000*** (-4.52)	1.301
B_ind	-0.037*** (-6.54)	1.213	-0.007* (-1.79)	1.213	-0.019*** (-5.04)	1.213
B_meet	-0.001*** (-4.95)	1.075	-0.000*** (-3.09)	1.075	-0.001*** (-7.74)	1.075
Dual	0.007*** (3.03)	2.913	-0.000 (-0.22)	2.913	0.001 (0.87)	2.913
Dual_prom	-0.009*** (-3.44)	2.854	0.000 (0.12)	2.854	-0.004** (-2.24)	2.854
10Y_bond	0.966*** (9.20)	1.212	-1.159*** (-14.58)	1.212	-0.353*** (-4.97)	1.212
GDP_growth	-0.164*** (-7.91)	1.232	0.255*** (16.17)	1.232	0.048*** (3.40)	1.232
Man_Ser	0.016*** (7.86)	1.131	-0.001 (-0.75)	1.131	-0.001 (-1.28)	1.131
Group	-0.015*** (-9.20)	1.346	0.001 (1.25)	1.346	-0.007*** (-6.52)	1.346
F-value	66.52		29.30		67.76	
Adj-R ²	0.0838		0.0374		0.085	
Firms-year	10,196		10,196		10,196	
Firm & Year fixed effects	Yes		Yes		Yes	

Notes: This table exhibits empirical findings where three dependent variables are the cost of debt; the cost of equity and the cost of capital. This study use variable LnTA as natural logarithms of total size; Leverage is calculated total debt divided by total assets; ROA is calculated as the ratio of profit after tax to total asset; Div_rat is the dividend pay-out ratio; RnD is the research and development expense adjusted with total assets; B_size is the number of members in the board; B_ind stands for board independence and is calculated as the ratio of independent members to total board size; B_meet shows number of board meetings conducted each year; Dual is a dummy variable that takes a value 1 when the chairman and the managing director of the board are the same individual and 0 otherwise; Dual_prom is dummy variable that takes a value 1 when the dual executive is also a promoter of the company and 0 otherwise; 10Y_Bond B10Y the yields from government 10 years bonds and is used as a proxy for the risk free rate of return; GDP_growth represent the growth in GDP from last year; Man_Ser is a dummy variable that takes a value 1 for manufacturing firms and 0 otherwise; Group is a dummy variable that a value 1 for business group affiliated forms and 0 otherwise. We have provided t-values in parentheses. Superscripts ***, ** and * represent significance levels at 1%, 5% and 10% level.

Panel B of Table 6 exhibits the impact of performance variables along with other control variables on the cost of equity. There is a negative and statistically significant relationship between return on asset (ROA) and cost of equity, unable to reject the first hypothesis (H₁). The coefficient for board independence implies that the cost of equity is lower for firms that have a higher proportion of independent directors on the board, unable to reject the third hypothesis (H₃). There is an inverse and statistically significant relationship between the dividend payout ratio and cost of capital, unable to reject the fourth hypothesis (H₄). The coefficient for the group dummy and manufacturing/services dummy is not statistically significant so we reject hypotheses H₂ and H₅. This implies that equity holders don't differentiate between group-affiliated and standalone firms.

Panel C of Table 6 exhibits the impact of the performance variable along with other control variables on the cost of capital. The model is good as evident from the significance of the F value. There is a negative and statistically significant relationship between return on asset (ROA) and cost of capital. The coefficient for the group dummy implies that the cost of capital is lower for group-affiliated firms compared to standalone firms. The coefficient for board independence implies that the cost of capital is lower for firms that have a higher proportion of independent directors on the board. There is an inverse and statistically significant relationship between the dividend payout ratio and the cost of capital. We also found a positive relationship between the general state of the economy (GDP growth) and the cost of capital alluding that during strong economic growth, funds are expensive. All the panels of Table 6 exhibit an inverse relationship of financial performance with the cost of components of capital. So, all the panels of Table 6 allude to the existence of an inverse relationship between firm performance and cost of capital. Corporate Governance board-related variables also exhibit an inverse relationship with the cost of capital. So, hypotheses 1, 3 and 4 can't be rejected based on these results. Hypotheses 2 and 5 don't have a unanimous sign across panels of Table 6.

In order to check the robustness of the results found in Table 6, we replace the performance variable ROA with ROE and run the regression in Table 7. Panels A, B and C of Table 7 exhibit the regression result of financial performance measured by return on equity (ROE) on the cost of debt, cost of equity and cost of capital respectively. Panel A of Table 7 exhibits the impact of the performance variable (ROE) on the cost of debt along with other control variables. There is a negative and statistically significant relationship between return on equity (ROE) and cost of debt. So, we are unable to reject Hypothesis 1. Next, the coefficient for the group dummy implies that the cost of debt is lower for group-affiliated firms compared to standalone firms. So, we are unable to reject Hypothesis 2. The coefficient for board independence implies that the cost of debt is lower for firms that have a higher proportion of independent directors on the board. So, we are unable to reject Hypothesis 3. There is an inverse and statistically significant relationship between the dividend payout ratio and the cost of capital. So, we are unable to reject Hypothesis 4. Based on the coefficients of regression, we can't reject hypotheses 1, 2, 3 and 4

Panel B of Table 7 exhibits the impact of ROE on the cost of equity. There is a negative and statistically significant relationship between return on equity (ROE) and cost of equity. So, we are unable to reject Hypothesis 1. The coefficient for board independence implies that the cost of debt is lower for firms that have a higher proportion of independent directors on the board. So, we are unable to reject Hypothesis 3. There is an inverse and statistically significant relationship between the dividend payout ratio and the cost of capital. So, we are unable to reject Hypothesis 4. Other coefficients are either not significant statistically or have a sign contrary to our expectation.

Table 7: The result of fixed effects regression analysis with ROE as financial performance

	Dependent Variables					
	Cost of Debt Panel A		Cost of Equity Panel B		Cost of Capital Panel C	
	Coeff	VIF	Coeff	VIF	Coeff	VIF
Intercept	0.076*** (7.48)	0	0.262*** (33.55)	0	0.201*** (29.78)	0
ROE	-0.028*** (-20.15)	1.861	-0.030*** (-0.66)	1.861	-0.025*** (-27.32)	1.861
LnTA	0.002*** (3.84)	1.395	0.001*** (3.87)	1.395	0.002*** (6.23)	1.395
Leverage	-0.009*** (-21.12)	1.855	0.000 (0.51)	1.855	-0.011*** (-38.94)	1.855
Div_rat	-0.018*** (-5.38)	1.047	-0.010*** (-4.08)	1.047	-0.007*** (-3.37)	1.047
RnD	-0.009*** (-6.52)	1.201	0.000 (0.58)	1.201	0.000 (0.50)	1.201
B_size	-0.001*** (-4.44)	1.299	-0.000 (-0.03)	1.299	-0.000*** (-3.75)	1.299
B_ind	-0.037*** (-6.60)	1.213	-0.007* (-1.79)	1.213	-0.019*** (-5.21)	1.213
B_meet	-0.001*** (-4.61)	1.076	-0.000*** (-3.13)	1.076	-0.001*** (-6.94)	1.076
Dual	0.008*** (3.22)	2.912	-0.000 (-0.19)	2.912	0.001 (0.82)	2.912
Dual_prom	-0.009*** (-3.51)	2.853	0.000 (0.09)	2.853	-0.003** (-2.07)	2.853
10Y_bond	0.954*** (9.14)	1.212	-1.159*** (-14.58)	1.212	-0.366*** (-5.33)	1.212
GDP_growth	-0.140*** (-6.75)	1.241	0.254*** (16.08)	1.241	0.079*** (5.84)	1.241
Man_Ser	0.019*** (9.37)	1.138	-0.001 (-0.70)	1.138	0.000 (0.73)	1.138
Group	-0.013*** (-8.16)	1.347	0.001 (1.33)	1.347	-0.006*** (-5.69)	1.347
F-value	66.52		28.91		125.32	
Adj-R ²	0.0838		0.0382		0.1470	
Firms-year	10,196		10,196		10,196	
Firm & Year fixed effects	Yes		Yes		Yes	

Notes: This table exhibits empirical findings where three dependent variables are the cost of debt; the cost of equity and the cost of capital. This study use variable LnTA as natural logarithms of total size; Leverage is calculated total debt divided by total assets; ROE is calculated as the ratio of profit after tax to shareholder's equity; Div_rat is the dividend pay-out ratio; RnD is the research and development expense adjusted with total assets; B_size is the number of members in the board; B_ind stands for board independence and is calculated as the ratio of independent members to total board size; B_meet shows number of board meetings conducted each year; Dual is a dummy variable that takes a value 1 when the chairman and the managing director of the board are the same individual and 0 otherwise; Dual_prom is dummy variable that takes a value 1 when the dual executive is also a promoter of the company and 0 otherwise; 10Y_Bond B10Y the yields from government 10 years bonds and is used as a proxy for the risk free rate of return; GDP_growth represent the growth in GDP from last year; Man_Ser is a dummy variable that takes a value 1 for manufacturing firms and 0 otherwise; Group is a dummy variable that a value 1 for business group affiliated forms and 0 otherwise. We have provided t-values in parentheses. Superscripts ***, ** and * represent significance levels at 1%, 5% and 10% level.

Panel C of Table 7 exhibits the impact of ROE on the cost of capital along with other control variables. There is a negative and statistically significant relationship between return on equity (ROE) and cost of capital. So, we are unable to reject Hypothesis 1. The coefficient for the group dummy implies that the cost of capital is lower for group-affiliated firms compared to standalone firms. So, we are unable to reject Hypothesis 2. The coefficient for board independence implies that the cost of capital is lower for firms that have a higher proportion of independent directors on the board. So, we are unable to reject Hypothesis 3. There is an inverse and statistically significant relationship between the dividend payout ratio and the cost of capital. So, we are unable to reject Hypothesis 4. All the panels of Table 7 exhibit an inverse relationship of financial performance with the cost of components of capital. The results of both Table 6 and Table 7 allude to the existence of an inverse relationship between various components of cost of capital and financial performance variables.

As far as the relationship between financial performance and cost of capital is concerned, the findings of this study are consistent with earlier studies like Cao *et al.* (2015), Artha and Mulayana (2018) and Schwarz (2018). With respect to the relationship between affiliation to a business group and the cost of capital is concerned, the findings of this study are consistent with earlier studies like Masulis *et al.* (2011). With respect to the relationship between board independence and cost of capital, the findings of this study are consistent with earlier studies like Zhu (2014) and Wu *et al.* (2014). Similarly, our study corroborates the findings of Zhao and Qi (2009) regarding the relationship between the dividend payout ratio and the cost of capital. We, however, do not find statistical significance through all the components of the cost of capital and industry dummy.

6. Conclusion and Implications

This study concludes that all else being equal, firms with superior performance are able to raise capital at a lower rate of interest. This would be advantageous for the firm as it can undertake projects with a low yield that it might have avoided if the cost of capital were higher. Corporate governance best practices variables such as board independence, and the number of board meetings help firms raise capital at a lower cost. Firms where the dual CEO is also the promoter of the firm also exhibit an assuaging effect of cost of capital. This finding alludes that the investors have faith in the board composition and allied governance variables when entrusting their funds to the firm. Firms should work towards reinforcing this confidence of investors towards their board. The results attest that firm performance and the cost of capital have an inverse relationship. Improved financial performance help firms access capital at a lower cost. It enables them to take up projects that would otherwise have been financially unviable because the hurdle rate is low. Finance managers would strive to improve and sustain the performance of the firm in order to avail capital from the market at an inexpensive rate.

The results hold immense significance for policymakers, especially for emerging economies characterised by rapid growth, industrialization and technology adoption. In order to fuel the growth of the economy on multiple fronts, governments invite investments from foreign and domestic investors/entrepreneurs. In a bid to facilitate the process, the government would build a conducive investment environment such as lower tax rates, special subsidies etc. Making policy decisions that encourage wider retail investors' participation in markets would go a long way in expanding the available capital pool for commercial enterprises. Retail investor participation in the equity markets of India is dismally low owing to the volatile nature of the markets and lack/erosion of trust due to corporate governance scams. Conducting awareness programs, educating the masses, introducing financial/market literacy, and sensitizing about the advantages of participating in the market are some of the ways to

lure more investors towards the equity market. Higher participation would lead to the channelization of more surplus funds towards production units. Firms can use those funds for capital expenditure, manufacturing new/more/innovative products/services; creating more employment opportunities; more disposable income spurring spending in the economy; generating higher tax revenues for the government that can be used for investment in infrastructure/healthcare/education etc. The availability of inexpensive funds for commercial enterprises plays an instrumental role in project approval, job creation, and the overall well-being of the economy. This study can be extended by studying the relationship between firm performance and firm value by using the cost of capital as a moderator variable. Conducting this study across sectors on cross-country data can provide us with new insights.

References

- Akhtar, S., Maryam, J. B., & Sadia, H. (2012). Relationship between financial leverage and financial performance: Evidence from fuel and energy sector of Pakistan. *European Journal of Business and Management*, 4(11), 1-12.
- Albarez, T. (2015). Impact of the cost of capital on the financing decision of the Brazilian companies. *International Journal of Managerial Finance*, 11(3), 285-307.
- Am-ugsorn, S., Dampitakse, K., & Ngudgratoke, S. (2022). Mediating effects of accounting conservatism on the relationship between corporate governance and cost of capital. *Central European Management Journal*, 30(3), 271-283.
- Anthony, N. G., & Rezaee, Z. (2015). Business sustainability performance and cost of equity capital. *Journal of Corporate Finance*, 34, 128-149.
- Artha, I. W. B., & Mulyana, B. (2018). The effect of internal and external factors of companies on profitability and its implications on stock price index of state-owned banks. *The Economics and Finance Letters*, 5(2), 58-71.
- Ashbaugh, H., Collins, D. W., & LaFond, R. (2004). Corporate governance and the cost of equity capital. *Emory, University of Iowa. Retrieved on January, 26(2006)*, 329-340.
- Barry, C. B., Peavy III J. W. and M. Rodriguez. (1998). Performance characteristics of emerging capital markets. *Financial Analysts Journal*, 1(1), 72-80.
- Barth, M. E., Konchitchki, Y., & Landsman, W. R. (2013). Cost of capital and earnings transparency. *Journal of Accounting and Economics*, 55, 206-224.
- Bhattacharya, U., & Daouk, H. (2002). The world price of insider trading. *The Journal of Finance*, 57(1), 75-108.
- Bozec, Y., & Bozec, R. (2011). Corporate governance quality and the cost of capital. *International Journal of Corporate Governance*, 2(3-4), 217-236.
- Byun, H. Y., Kwak, S. K., & Hwang, L. S. (2008). The implied cost of equity capital and corporate governance practices. *한국증권학회지*, 37(1), 139-184.
- Cao, Y., Myers, J. N., Myers, L. A., & Omer, T. C. (2015). Company reputation and the cost of equity capital. *Review of Accounting Studies*, 20, 42-81.
- Cheng, C. A., Collins, D., & Huang, H. H. (2006). Shareholder rights, financial disclosure and the cost of equity capital. *Review of Quantitative Finance and Accounting*, 27, 175-204.
- David, F. D., & Olorunfemi, S. (2010). Capital structure and corporate performance in Nigerian Petroleum industry: Panel data analysis. *Journal of Mathematics and Statistics*, 6(2), 168- 173.
- Déjean, F., & Martinez, I. (2009). Environmental disclosure and the cost of equity: the French case. *Accounting in Europe*, 6(1), 57-80.
- Donaldson, G. (1961). *Corporate Debt Capacity: A Study of Corporate Debt Policy and Determination of Corporate Debt Capacity*, Beard Books. Washington DC.
- Easton, P. D. (2004). PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital. *The Accounting Review*, 79(1), 73-95.

- Enekwe, C. I., Agu, C. I., & Eziedo, K. N. (2014). The effect of financial leverage on financial performance: Evidence of quoted pharmaceutical companies in Nigeria. *IOSR Journal of Economics and Finance*, 5(3), 17-25.
- Exley, C. & Smith, A. (2006). The cost of capital for financial firms. *British Actuarial Journal*, 12(1), 229-283.
- Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *The Quarterly Journal of Economics*, 118(1), 107-156.
- Gupta, K., Krishnamurti, C., & Tourani-Rad, A. (2010). *Corporate governance and cost of equity: Do financial development and legal origin matter?* (Doctoral dissertation, Financial Management Association).
- Hail, L., & Leuz, C. (2006). International differences in the cost of equity capital: Do legal institutions and securities regulation matter?. *Journal of Accounting Research*, 44(3), 485-531.
- Harrison, R., Scheela, W., Lai, P. C., & Vivekarajah, S. (2018). Beyond institutional voids and the middle-income trap: The emerging business angel market in Malaysia. *Asia Pacific Journal of Management*, 35, 965-991.
- Hussain, H. I., Ghani, E. K., & Razimi, M. S. A. (2019). Systematic risk and determinants of cost of capital: An empirical analysis of selected case studies. *Journal of Security & Sustainability Issues*, 9(1), 295-307.
- Ibrahim, M., & Ibrahim A. (2015). The effect of SMEs' cost of capital on their financial performance in Nigeria. *Journal of Finance and Accounting*, 3(1), 8-11.
- Khanna, T. and Palepu, K. (2000). Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups. *The Journal of Finance*, 55, 867-891.
- Khanna, T., & Palepu, K. (1997). Why focused strategies. *Harvard business review*, 75(4), 41-51.
- Lambert, R. A., Leuz, C., & Verrecchia, R. E. (2007). Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research*, 45, 385-420.
- Lin, T. J., Chen, Y. P., & Tsai, H. F. (2017). The relationship among information asymmetry, dividend policy and ownership structure. *Finance Research Letters*, 20, 1-12.
- Manos, R. (2003). Dividend policy and agency theory: Evidence from Indian firms. *South Asia Economic Journal*, 4(2), 275-300.
- Masulis, R. W., Pham, P. K., & Zein, J. (2011). Family business groups around the world: Costs and benefits of pyramids. *Review of Financial Studies*, 24(11), 3556-3600.
- Mazzotta, R., & Veltri, S. (2014). The relationship between corporate governance and the cost of equity capital. Evidence from the Italian stock exchange. *Journal of Management & Governance*, 18(2), 419-448.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13, 187-221.
- Omran, M., & Pointon, J. (2004). The determinants of the cost of capital by industry within an emerging economy: Evidence from Egypt. *International Journal of Business*, 9(3), 237-258.
- Pham, P. K., Suchard, J.-A., & Zein, J. (2012). Corporate governance and the cost of capital: Evidence from Australian companies. *Journal of Applied Corporate Finance*, 24(3), 84-93.
- Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1113-1155.
- Poshakwale, S., & Courtis, J. K. (2005). Disclosure level and cost of equity capital: Evidence from the banking industry. *Managerial and Decision Economics*, 26(7), 431-444.
- Pouraghajan, A., Tabari, N. A. Y., Ramezani, A., Mansourinia, E., Emamgholipour, M., & Majd, P. (2012). Relationship between cost of capital and accounting criteria of corporate performance evaluation: Evidence from Tehran Stock Exchange. *World Applied Sciences Journal*, 20(5), 666-673.

- Raimo, N., Vitolla, F., Marrone, A., & Rubino, M. (2020). The role of ownership structure in integrated reporting policies. *Business Strategy and the Environment*, 29(6), 2238-2250.
- Richardson, A. J., & Welker, M. (2001). Social disclosure, financial disclosure and the cost of equity capital. *Accounting, Organizations and Society*, 26(7-8), 597-616.
- Sarkar, J., & Sarkar, S. (2008). Debt and corporate governance in emerging economies: Evidence from India. *Economics of Transition and Institutional Change*, 16(2), 293-334
- Schwarz, D. (2018). The ability of listed companies to optimize their capital structure, shape their distribution policy and fight hostile takeovers by repurchasing their own shares. *Entrepreneurship and Sustainability Issues*, 6(2), 636-648.
- Teti, E., Dell'Acqua, A., Etrò, L., & Resmini, F. (2016). Corporate governance and cost of equity: empirical evidence from Latin American companies. *Corporate Governance: The International Journal of Business in Society*, 16(5), 831-848.
- Tran, D. H. (2014). Multiple corporate governance attributes and the cost of capital: Evidence from Germany. *The British Accounting Review*, 46(2), 179-197.
- Wu, S. W., Lin, F., & Wu, C. M. (2014). Corporate social responsibility and cost of capital: An empirical study of the Taiwan stock market. *Emerging Markets Finance and Trade*, 50(sup1), 107-120.
- Zhao, J. J., & Qi, J. (2009, September). The empirical analysis of dividend distribution of listed companies based agency theory. In *2009 International Conference on Management and Service Science* (pp. 1-4). IEEE.
- Zhu, F. (2014). Corporate governance and the cost of capital: An international study. *International Review of Finance*, 14(3), 393-429.

The Performance of ESG ETFs in the U.S.

Gerasimos G. Rompotis^{1*}

¹*Department of Economics, National and Kapodistrian University of Athens, Greece.*

Abstract: Research Question: ESG ETFs may serve noble purposes of investors. However, do they help them gain material financial returns? This paper seeks to answer this question by examining the performance and performance persistence of the ESG equity ETFs in the U.S. **Motivation:** This study has been motivated by the strong interest in ESG investments, and particularly in ESG ETFs. This interest is evidenced by the billions of dollars which are invested in relevant financial products worldwide. **Idea:** A common belief among many investors is that ESG investing requires a level of sacrifice in terms of financial returns. In this study, we examine the idea of the “waived” financial returns is the case for ESG ETFs. **Data:** The sample includes 61 ESG equity ETFs traded in the United States. The study period spans from 1/1/2019 to 31/12/2021. **Method/Tools:** Performance and performance persistence is examined with standard methodology, which includes the single-factor market model, the Fama-French-Carhart six-factor model and risk-adjusted metrics, such as the Sharpe and Treynor ratios. **Findings:** The findings show that, in raw return terms, the average ESG ETF outperforms the S&P 500 Index, even though there are several funds in the sample which do not do so. Moreover, about 16% of the examined ESG ETFs (10 out of 61 ETFs) offer positive and significant alphas. The average term of these significantly positive alphas is 7 bps and are obtained via the multi-factor performance regression model but not via the single-factor model. With respect to persistence, daily returns display a reverting behavior. This pattern applies to weekly returns too, but with less statistical significance. **Contributions:** Sustainable investing with mutual funds has drawn significant interest by researchers. However, ESG ETFs are under-researched. We aim at fulfilling this gap in the literature. In addition, the results obtained are quite encouraging to investors. In some cases, ESG ETFs in the U.S. are found to outperform the market index in some cases. This finding implies that, from a financial perspective, ESG investing is not an a priori lost cause, as it is frequently considered to be.

Keywords: ETFs, ESG, performance, performance persistence.

JEL Classification: G11

1. Introduction

The environmental, social and governance aspects (ESG) of investments have attracted major interest within the investing community worldwide over the last two decades, as well as with the financial literature. For instance, Hamilton *et al.* (1993) find that there are not significant

* Corresponding author: Gerasimos G. Rompotis. Tel.: +30-2107277000.

Email: geras3238@yahoo.gr

Received 24 Jan 2023; Final revised 10 May 2023; Accepted 15 Sep 2023; Available online 30 Sep 2023.

To link to this article: https://www.mfa.com.my/cmrv31_i2_a5/

© Malaysian Finance Association, 2023. This work is licensed under the terms of the Creative Commons Attribution (CC BY) (<http://creativecommons.org/licenses/by/4.0/>).

differences in returns between socially responsible funds and traditional funds. DiBartolomeo and Kurtz (1996) report that the Domini Social Index slightly outperformed the S&P 500 Index over the period May 1990 to September 1993. However, the authors conclude that this outperformance is not significant. Statman (2000) finds some evidence that SR funds in the U.S. outperform their conventional peers. However, this performance advantage of SR funds is not significant in statistical terms. In Europe, Kreander *et al.* (2005) examine the performance of 60 ethical funds from the UK, Sweden, Germany and the Netherlands over 1995-2001 and find that there is no difference between ethical and non-ethical funds. Halbritter and Dorfleitner (2015) show that there is no significant difference in performance between firms with high and low ESG ratings. Dolvin *et al.* (2019) find that the risk-adjusted return of funds with high sustainability scores approximate the corresponding returns of funds without such high scores. In the same context, Chang *et al.* (2020) show that the correlation between sustainability and fund returns is very low.

The increased interest in ESG investing has become an international reality and is expected to get bigger in the years to come. According to Bloomberg Intelligence (BI), ESG assets are going to exceed \$53 trillion by 2025, or more than a third of the projected total assets under management during that period. BI also highlights that Europe holds half of the global ESG assets but the U.S. is now increasing its share in the international ESG investment business. The next boost is expected to come from Japan.¹

The Exchange Traded Funds (ETFs) market has responded to this interest by launching tens of funds to serve several causes and purposes. As a result, in the United States there are ESG ETFs that invest in stocks of the local, developed and emerging markets, bond and green bond ESG ETFs, fossil-free ETFs, low-carbon and climate transition ETFs, clean energy, smart grid and cleantech ETFs, as well as several other classes of ESG ETFs.²

The objectives of investors applying ESG criteria in their investing decisions are classified in three main categories. The first one is values-based investing, which tries to align ethical, religious, environmental, social or other values of investors with industries and companies that apply the same values. In values-based investing, financial returns are not top priority for investors. The second category concerns impact investing, which seeks opportunities to create a positive social or environmental impact, frequently at expense to financial performance. The third category includes ESG integration, which tries to build a sustainable portfolio with the view of boosting risk-adjusted returns in the long-run by identifying financial risks and opportunities relating to ESG issues.

The performance of ESG equity ETFs in the U.S. is examined in this study over the period 1/1/2019 - 31/12/2021 with standard methodology found in the literature. In the first step, raw returns are computed. Then, the single-factor market model is used to assess whether ESG ETFs produce any significant alpha over the S&P 500 Index. Multifactor regression analysis of ETFs' performance is conducted too. Next, risk-adjusted return metrics are computed, including the Sharpe, Treynor, Sortino and Information ratios. Finally, the persistence in raw returns of ESG ETFs is assessed.

The empirical findings reveal that the ESG ETFs in the sample achieved positive average raw returns and significant cumulative returns during the period under study. Moreover, several ETFs in the sample present superior cumulative raw returns in comparison to the S&P 500 Index but they are slightly riskier than the market index. Going further, the multi-factor performance regression model produces positive and statistically significant alphas over the S&P 500 Index for one sixth of the examined funds. This model also indicates that the Fama and French (2015) factors can explain the performance of ESG ETFs, to a lower or a higher

¹ Refer to <https://etfdb.com/multi-asset-channel/capture-the-global-esg-expansion-with-this-etf/>.

² Refer to <https://sustainfi.com/esg-fund-list/> for a complete list of U.S. ESG ETFs categories and funds in each category.

degree. Furthermore, with the exception of Information ratio, the risk-adjusted returns of ESG ETFs are found to be positive over the study period. Finally, on the question of persistence, the results show that the daily raw returns of ESG ETFs are negatively related to their one-lagged returns. This is also the case for weekly returns, even though the statistical significance of the relevant regression slopes is lower than that of daily returns. On the contrary, there is no significant relationship among monthly returns.

This study has been motivated by the strong general interest in ESG investments, and particularly in ESG ETFs. It contributes to the ESG literature in several ways. To the best of our knowledge, even though sustainable investing with mutual funds has drawn significant interest by researchers, ESG ETFs are under-researched. Thus, we aim at fulfilling this relative gap in literature. Moreover, this study uses a comprehensive set of ESG ETFs traded on the U.S. stock market, given the limited number of such products relative to more traditional ETF types. Furthermore, the research methodology applied, even being standard in the literature, gives us the opportunity to assess performance from several angles. Finally, the results obtained are quite encouraging to investors, and not only those who are concerned about the ESG aspects of their choices. In particular, ESG ETFs in the US are found to outperform the market index in some cases. This finding implies that, from a financial perspective, ESG investing is not an a priori lost cause, as it is frequently considered to be. Finally, we believe that the reverting behavior observed in daily and weekly raw returns could be exploitable, especially by short-run traders. To our view, this is a significant contribution to the relevant literature.

The remainder of this paper is structured as follows: Section 2 provides the literature review. Section 3 develops the research methodology applied in our study and describes the sample used. Empirical findings are discussed in Section 4 and conclusions are offered in Section 5.

2. Literature Review

The literature on ESG ETFs is not that voluminous. Most of the relevant studies deal with the performance of ESG ETFs. In this respect, Marozva (2014) compares the return of ETFs listed in the Johannesburg Stock Exchange to the return of the JSE SRI Index during 2004-2014. The author finds that there are no significant return differences between ETFs and the index during periods of economic growth. However, the JSE SRI Index significantly underperformed ETFs during periods of recession.

In the same context, Meziani (2014) applies a series of typical performance metrics to all of the current ESG ETFs to measure whether they offer potential to satisfy a classical risk-return assessment of their performance. The results documented are mixed. Although the annual growth and risk-adjusted returns of ESG ETFs relative to the market are notable, the same cannot be said about their performance in terms of the risk taken to achieve these returns and with respect to the important systematic risk they contribute. Meziani (2020) re-investigates ESG ETFs and indicates that, despite the weak start of these funds, they are now beginning to show some improvement in their performance as their risk-adjusted return is now better than it used to be during their first years in the business. They are also doing better in terms of alpha.

The performance of water ETFs is the subject of the study by Rompotis (2016). The performance of ETFs is examined against the performance of the tracking indexes, the S&P 500 Index and the market portfolio built by Fama and French. The findings show that, regardless of the benchmark used, water ETFs cannot offer investors significant above-market returns. On the contrary, in several cases, negative and significant alphas are estimated. These negative alphas are comparable to the fees charged by the funds.

The return and risk of ESG ETFs is also assessed by Kanuri (2020) over a period spanning from February 2005 to July 2019. The author compares ESG ETFs to investable proxies for U.S. and global equity markets. The results show that even though ESG ETFs outperformed the market indexes in some periods, indexes outperformed ESG ETFs during the entire study period.

Going further, Plagge and Grim (2020) assess the performance of investable ESG equity index funds, active mutual funds and ETFs with a U.S. investment focus over a period of fifteen years (2004-2018). The majority of funds in any of the examined ESG categories does not produce statistically significant positive or negative alphas. Overall, return and risk differences of ESG mutual funds and ETFs can be significant but they are mainly driven by fund-specific criteria rather than by a homogeneous ESG factor.

Milonas *et al.* (2022) study the returns of 80 European and 64 U.S. funds and attempt to identify whether those funds that invest in companies ESG principles differ from conventional funds in terms of performance. The alpha, Sharpe ratio, Treynor ratio, and excess daily returns are used as various measures of performance. The five-factor Fama-French model is also applied to distinguish possible different influences of explanatory variables on ESG and non-ESG funds. The empirical findings do not reveal any statistically significant difference between ESG and non-ESG funds although the former have slightly higher returns than the latter.

Finally, Rompotis (2022a) examines the performance of 49 ESG ETFs in the UK. Raw and risk-adjusted returns are estimated with standard methodology including the single-factor market model, the Fama and French (2015) six-factor model, and the Sharpe and Treynor ratios. On average, no significant alpha is achieved by ESG ETFs in the UK. In addition, there are not differences in Sharpe and Treynor ratios between ETFs and their benchmarks. However, some empirical evidence obtained indicates that ESG ETFs outperform the FTSE 100 Index, which stands as a proxy for the UK stock market.

In another context, Rodríguez and Romero (2019) assess the diversification value of socially responsible (SRI) ETFs with a global exposure, in comparison to more traditional peers. By estimating orthogonal returns, that is, returns of a market free from the influence from other markets, and applying a two-factor model to infer the exposure to international markets of SRI ETFs, they find that the international diversification value of SRI ETFs is significantly higher than that of the corresponding conventional ETFs.

Rompotis (2022b) examines whether a high ESG rating induces investors to allocate more money in an ETF. The findings indicate that the level of assets is not affected by the ESG rating whatsoever, but it is affected by factors such as the historical performance, the expense ratio and the age of each fund. Furthermore, the relationship between the performance of an ETF and its ESG rating is assessed by assuming an ETF with a high ESG rating should present high returns too. The results do not confirm this hypothesis.

In a quite different subject, Rompotis (2023b) investigates whether the U.S.-traded ESG ETFs are involved in “greenwashing” tactics. Greenwashing implies that a “green” company or a fund needs to make consumers and investors believe that they are doing more to protect the environment than they actually do. Twenty-four ESG ETFs are examined with data from the inception of each fund up to June 30, 2022. The correlations of ETFs with the S&P 500 Index are calculated, as well as corresponding betas. Then, the portion of the S&P 500 companies with severe or high Morningstar ESG risk scores included in each ESG ETF’s holdings is calculated. The findings reveal a high correlation of ESG ETFs with the S&P 500 Index for the majority of ETFs in the sample. In addition, 25% of the examined ETFs invest a significant portion of their assets in S&P 500 companies with high or severe ESG risk. The latter finding could be indicative of greenwashing behavior on behalf of ESG ETFs.

3. Methodology

In this section, we develop the methodology used in our empirical analysis of ESG ETFs' performance. First, we compute the raw returns of ETFs. A single-factor and a multi-factor regression analysis of ETFs' performance follows. Then, the risk-adjusted return of ETFs is calculated. Finally, the persistence in raw returns is evaluated. The methodology employed in our analysis is standard in the studies of financial literature dealing with the performance and performance persistence of mutual funds, ETFs and other similar products. For instance, the multi-factor analysis of performance is found Fama and French (2015). Milonas *et al.* (2022) have used a five-factor model to assess the performance of comparative ESG and non-ESG European funds. They also use Sharpe and Treynor ratios to evaluate the risk-adjusted return of the European funds. Goldreyer *et al.* (1999) also measure the performance of a U.S. sample of SR and conventional mutual funds using the Jensen's alpha, the Sharpe Ratio and the Treynor ratio. Rompotis (2023a) uses a one-lagged model to evaluate performance persistence.

3.1 Raw Returns

We compute the raw return of ESG ETFs in percentage terms over the period 2019-2021 with daily data found on www.nasdaq.com. Return is calculated with formula (1):

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

where $R_{i,t}$ refers to the percentage daily return of the i th ETF on the trade day t and $P_{i,t}$ refers to the close trade price of the ETF on day t .³ Formula (1) is also used for the calculation of market performance. We use the S&P 500 Index as a proxy for the market. In addition, formula (1) is used for the calculation of total (or cumulative) return of ETFs and market over the entire period under study. Finally, the risk of ETFs and the market index is calculated as the standard deviation in daily returns.

3.2 Single-Factor Performance Analysis

The first model used to examine the performance of ESG ETFs is the following:

$$R_i - R_f = \alpha_i + \beta_i (R_m - R_f) + \varepsilon_i \quad (2)$$

where R_i denotes the daily return of ESG ETFs, R_m represents the return of the S&P 500 Index and R_f is the risk-free rate expressed by the one-month US Treasury bill rate.

Alpha represents the above-market return that can be achieved by an ETF. If ETFs can achieve above-market returns, alpha estimates will be positive and statistically significant. Beta measures the part of risk that cannot be mitigated by diversification techniques and indicates the systematic risk of ESG ETFs.

3.3 Multifactor Performance Analysis

We evaluate the exposure of ESG ETFs to certain market factors with the Fama and French (2015) five-factor model, in which we add the momentum factor of Carhart (1997). The model is shown in equation (3):

$$R_i - R_f = \alpha_i + \beta_{1,i} (R_m - R_f) + \beta_{2,i} SMB + \beta_{3,i} HML + \beta_{4,i} RMW + \beta_{5,i} CMA + \beta_{6,i} MOM + \varepsilon_i \quad (3)$$

³ We have also calculated the absolute returns with dividend-adjusted price data. These returns do not differ from the dividend-free returns. For simplicity purposes, we only report the latter returns.

where R_i , R_m and R_f are defined as above. SMB (Small Minus Big) is the average return on nine small cap portfolios minus the average return on nine big cap portfolios. HML (High Minus Low) is the average return on two value portfolios (in book-to-market equity terms) minus the average return on two growth portfolios. RMW (Robust Minus Weak) is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios. CMA (Conservative Minus Aggressive) is the average return on two conservative portfolios minus the average return on two aggressive portfolios. MOM is the average of the returns on two (big and small) high prior return portfolios minus the average of the returns on two low prior return portfolios.⁴

In the Fama and French model, the size effect implies that small cap companies outperform large firms. The book-to-market equity ratio effect captured by the HML factor implies that the average returns on stocks with a high book-value to market-value equity ratio must be greater than the returns on stocks with a low book-value to market-value equity ratio.

The Conservative Minus Aggressive and Robust Minus Weak factors correspond to the Fama and French (2015) investment and operating profitability factors. Past investment is viewed as a proxy for the expected future investment and suggest that CMA implies a negative relationship between the expected investment and the expected internal rate of return. Based on the findings of Fama and French (2015), a negative loading is expected for the RMW factor, that is, the excess return of ESG ETFs must be affected by the profitability factor in a negative fashion.

Finally, the existence of a momentum in asset prices is considered a, difficult to explain, anomaly because, according to the efficient capital markets theory, an increase in the price of an asset cannot indicate a further increase in future prices. An explanation to this anomaly offered by behavioralists is that investors are not rational and that they underreact to the release of new information, thus, failing to reflect new information into stock prices.

3.4 Risk-Adjusted Returns

We employ standard risk-adjusted return measures to rate the performance of ESG ETFs. The first evaluation method used is the Sharpe ratio shown in formula (4):

$$S_i = \frac{R_i - R_f}{\sigma_i} \quad (4)$$

where R_i and R_f are defined as above and σ_i is the standard deviation of ETF excess return, that is ETF return minus the risk-free rate. The Sharpe ratio is used to determine how well an ETF compensates its investors for the per unit risk they take. The higher the Sharpe ratio, the better the performance of the ETF.

The second risk-adjusted return estimated concerns the Treynor ratio shown in formula (5):

$$T_i = \frac{R_i - R_f}{\beta_i} \quad (5)$$

where R_i and R_f are defined as above and β_i is the systematic risk of ESG ETFs. Two versions of the Treynor ratio are considered. The first one includes the betas deriving from the

⁴ The historical daily data of risk-free rate, Fama and French three factors, robust minus weak factor and conservative minus aggressive factor and momentum factor are available on the website of Kenneth French on http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

performance regression model (2). The second uses the betas obtained from the six-factor model (3). Similar to the Sharpe ratio, the higher the Treynor ratio, the better the performance of ETFs.

The third method used is the Sortino ratio depicted in formula (6):

$$Sor_i = \frac{R_i - R_f}{\sigma_{i,d}} \quad (6)$$

where R_i and R_f are defined as above and $\sigma_{i,d}$ is the standard deviation of ESG ETFs' negative excess returns. The Sortino ratio differentiates between good and bad volatility in the Sharpe ratio. This differentiation of upward and downward volatility allows risk-adjusted returns to provide a performance measure of ETFs without penalizing them for upward price changes. Similar to the Sharpe and Treynor ratios, the higher the Sortino ratio, the better the performance of ESG ETFs.

The last risk-adjusted return metric used in the Information ratio (IR) shown in formula (7):

$$IR_i = \frac{R_i - R_m}{TE_i} \quad (7)$$

where R_i is defined as above, R_m is the return of the S&P 500 Index, and TE_i is tracking error, that is, the standard deviation in return differences between the ESG ETFs and the market index. The IR is used as a measure of an ESG ETF's excess return against the market return. Thus, positive IRs will indicate that the respective ESG ETFs outperform the market.

3.5 Performance Persistence

The persistence in raw returns of ESG ETFs is assessed via the following regression model (8):

$$R_i = \lambda_0 + \lambda_1 R_{i-1} + u \quad (8)$$

where R_i is defined as above. Persistence in returns will be assessed by the slope of the model. Statistically significant slopes approximating unity will indicate a high degree of performance persistence.

3.6 The Sample

The sample includes 61 equity ESG ETFs traded on the U.S. market. The number of ESG ETFs in the US nowadays is bigger than the number of funds included in our sample (86 ESG ETFs according to <https://sustainfi.com/esg-fund-list/>). However, we focus solely on equity ESG ETFs and, thus, we exclude bond and other non-equity ETFs. In addition, many launches of ESG ETFs took place in the U.S. over the last two years. In our analysis, we needed sufficient return data to apply substantive testing on performance. Thus, we decided that a period spanning from 1/1/2019 to 31/12/2021 is decent enough for the purposes of our analysis. No other selection criterion has been applied. As a result, our sample is limited to these 61 ESG ETFs.

Table 1 presents the profiles of ESG ETFs, which include their ticker, name, inception date, age as of 31/12/2021 (in years), expense ratio, average daily volume over the period 1/1/2019-31/12/2021, average trading frequency, as the fraction of the days with no zero volume to the entire to total trade days over the period 1/1/2019-31/12/2021, average intraday

volatility, computed as (Daily Highest Price-Daily Lowest Price)/Daily Close Price, and assets under management as of 31/12/2021.⁵

The average age of ESG ETFs approximates eight years while the oldest ETF in the sample is about 17 years old. Overall, age indicates that this section of the ETF market is relatively young. This fact might have implications for the management and performance of these funds.

The average expense ratio of ESG ETFs is equal to 43 basis points (bps). The minimum expense ratio is 9 bps, which is comparable to the expense ratios of several popular traditional ETFs. The maximum expense record in the sample is 79 bps, which is comparable to the expense ratios of actively managed ETFs.

When it comes to trading activity, the average daily volume in Table 1 amounts to 156th shares. It is notable that the range between the minimum and maximum volumes in the sample is huge. If we focus on the median term of volumes, we can see that the daily trading activity for most of ESG ETFs in the sample does not exceed 26 th. shares per day. This is not a might trading activity relative to the popular traditional ETF products.

The average trading frequency is high at 99.6%. This indicates that, on average, ESG ETFs present only a few days of zero trading activity. The minimum trading frequency in the sample just exceeds 88%. Therefore, there are ESG ETFs whose trading activity is lower than the average term in the sample. Lower trading activity might imply liquidity issues for the corresponding ESG ETFs.

With respect to intraday volatility, the respective average term in Table 1 is 1.25. The median term is lower at 1.13. These low measures indicate that the period under study has been a rather smooth era for the ESG ETF market.

Finally, in regard to assets, Table 1 shows that the average ESG ETF in the sample managed about \$1.6 billion at the end of 2021. The largest equity ESG ETF is the iShares ESG Aware MSCI USA ETF (ESGU), with assets exceeding \$25 billion. On the other hand, the bottom record of assets in the sample is just \$28 million. Overall, the rather small figure of assets, compared to the hundreds of billions managed by several successful traditional ETFs, may be the result of the fact that ESG investing became a trend in the U.S. only recently.

4. Empirical Results

4.1 Raw Returns

The descriptive statistics of returns are provided in Table 2. The table presents the average daily return, the median daily return, the standard deviation of returns, and the minimum and maximum returns of ESG ETFs. The cumulative return of each ETF over the period 2019-2021 is also presented along with the average daily and the cumulative excess return of each ETF against the S&P 500 Index, as well as the excess risk relative to the market index.

The average daily return of ESG ETFs is 10 bps, while all of them present positive average daily returns. Moreover, the average cumulative return in the sample over the study period is very high at 99%, whereas all ESG ETFs achieved positive cumulative returns. These returns seem to be quite satisfactory. In comparison to the S&P 500 Index, the average daily excess of ESG ETFs is not different from zero. However, at the cumulative level, the results indicate that the average equity ESG ETFs outperformed the market index by 910 bps over the period 2019-2021.

This interesting finding shows that investors can have ESG ETF choices that can actually beat the market, at least at the raw return level. However, we should point out that, based on the slightly negative median cumulative excess return, there are ESG ETFs that fall short

⁵ Tickers, names, inception dates, expense ratios and assets under management have been found on www.etfdb.com. Volumes have been found on www.nasdaq.com.

when compared to the market index. Consequently, the inference about the outperformance of ESG ETFs against the S&P 500 Index does not apply to all ETFs in the sample. In fact, there are 30 ETFs in the sample which achieved negative excess returns over the S&P 500 Index during the study period.

The average risk estimate of ESG ETFs is 1.62, which is not that high. Moreover, Table 2 reports an average excess risk relative to market risk of 20 bps. In addition, 36 ETFs present risk that is higher than that of the market and 21 ETFs present the opposite. The risk of the rest 4 ETFs is equal to that of the market index. Overall, the measures of excess risk, combined with the positive excess cumulative returns, indicate that the outperformance of ESG ETFs comes with a cost in terms of the increased risk taken.

The main conclusion that can be reached by analyzing raw returns and risks is that, on average, ESG ETFs can beat the market, even though there are many funds in the sample that cannot do so. On the other hand, it seems that the total risk of these ETFs is slightly higher than the market risk. This increased risk assumed by investors can be justified in the cases that ESG ETFs outperform the market index.

4.2 Single-Factor Performance Analysis

The results of the single-factor performance regression analysis are reported in Table 3. The table includes the alpha and beta estimates along with t-tests on the statistical significance of estimates and R-squared on the explanatory power of the model.

The average alpha estimate of ESG ETFs is slightly positive amounting to 1 bps. However, the majority of individual alphas are statistically insignificant, while there are just two significantly positive alphas and one significant alpha which is negative. On the one hand, these results show that ESG ETFs in the U.S. cannot produce any material alpha relative to market performance. On the other hand, the insignificant alphas also indicate that the performance of ETFs is quite aligned to the performance of the S&P 500 Index.

In regard to the systematic risk of ESG ETFs, Table 3 reports an average beta which is lower but approximates unity. Furthermore, about 67% of beta coefficients are lower than unity. These results may indicate a conservatism of ESG ETFs relative to the market index. However, these results might be viewed as if the ESG ETFs in the sample invest in stocks and markets which are not absolutely comparable to the S&P 500 Index.

4.3 Multifactor Performance Analysis

The results of the six-factor performance regression model (3) are provided in Table 4. The table includes the alpha coefficients along with the estimates of the explanatory variables of the model. T-tests on the statistical significance of estimates are offered too along with R-squared on the sufficiency of the model to explain the performance of ESG ETFs in the sample.

The results concerning the above-market return of ESG ETFs are slightly different to those obtained via the single-factor model. The average alpha is slightly positive at 2 bps, with the majority of individual alpha estimates being insignificant. However, there are ten cases in which ESG ETFs offer positive and significant alphas. The average term of these significantly positive alphas is 7 bps. Based on these results, we may infer that the performance of ESG ETFs is, at least, in line with market performance but ESG ETFs beating the market can be found too.

The estimates of systematic risk are essentially equal to those obtained from the single-factor performance regression model. The average beta is equal to 0.93 (it was 0.95 in the single-factor market model above). In addition, the average difference in betas between the single- and the multi-factor models is 0.02 (not reported in Table 4).

The results on size factor reveal a positive relationship between the performance of ESG ETFs with this factor. There is only one SMB estimate which is significantly negative, while, with just five exceptions, all other estimates are positive and significant at 10% or better. This positive correlation between ESG ETFs' return and size factor may be the result of ESG ETFs being small-cap portfolios themselves. As the size factor of Fama & French implies that small-cap entities perform better than the larger ones, our results seem to verify this assumption.

In regard to the relationship between ESG ETFs' performance and the value factor, 21 and 17 significantly positive and negative HML estimates, respectively are found in Table 4. This variation in significant estimates shows that there is not a consistent relationship between performance and the value factor. This relationship seems to be fund specific.

On the impact on ETF performance by the Robust Minus Weak factor, the results reveal a negative effect for 38 ETFs in the sample and a positive relationship in 5 cases. The rest RMW estimates are insignificant. The negative sign for the majority of the significant estimates in the sample is in line with our expectations about a negative relationship between the performance of ESG ETFs and the RMW factor.

When it comes to the Conservative Minus Aggressive (CMA) factor, the results indicate a negative effect for 31 ETFs in the sample and a positive relationship in 7 cases. Overall, the results partially verify our assumption about a negative relationship between performance and the CMA factor, as suggested by Fama and French (2015).

Finally, when it comes to the impact on the performance of ESG ETFs by the market momentum factor, the empirical findings show that this relationship is not that strong. More specifically, 13 MOM estimates are positive and significant and 4 are significantly negative. The rest of the estimates are not statistically significant at any acceptable level. Based on these findings, we cannot make a solid inference about the impact of market momentum on returns achieved by ESG ETFs over the period 2019-2021. At best, the relationship between performance and the momentum factor is fund specific.

4.4 Risk-Adjusted Returns

The estimates of risk-adjusted returns are provided in Table 5. The table reports the five alternative types of risk-adjusted returns computed, that is the Sharpe ratio, Treynor ratio I and II, based on the betas from the single-factor and the six-factor performance regression models, respectively, Sortino ratio and Information ratio.

All the individual estimates of Sharpe, Treynor and Sortino ratios are positive. The average Sharpe ratio is 6 bps. The average Treynor ratios I and II are both equal to 10 bps. The average Sortino ratio is 7 bps. Moreover, no significant variation is observed among the sample's single Sharpe, Treynor and Sortino ratios. Overall, these results indicate that the return achieved by ESG ETFs, at least, compensate investors for the risk they take by investing in them.

The estimates of Information ratio deviate from the previous four types of risk-adjusted return. The average term of the sample is slightly negative at -1 bps. In addition, 37 single information ratios are negative, three are equal to zero and 21 are positive. The negative ratios indicate that the corresponding ETFs underperform the S&P 500 Index. The opposite is the case for the positive information ratios.

Overall, the analysis of risk-adjusted returns reveals that, at least, the ESG ETFs can produce positive adjusted to risk returns, while there is a significant number of cases where these funds can beat the market. These findings are essentially in line with the analysis of raw returns and alphas in the previous sections.

4.5 Performance Persistence

The outcomes of the time-series regression model (8) on the persistence in raw returns of ESG ETFs are provided in Table 6. The table includes the estimates of the model's constant and slope along with t-tests on their statistical significance. R-squared on the explanatory power of the model are reported too.

Panel A in Table 6 reports the results on daily returns. All constants are positive and most of them are statistically significant at 10% or better. These figures show that the returns of ESG ETFs are, obviously, not fully explained by their lagged returns. With respect to the slopes of the model, the average estimate is negative at -0.17. This number implies that after a positive return on day t , a negative return follows on day $t+1$, and vice versa. Moreover, all the individual slopes in the sample are negative, while only 10 out of 61 estimates are statistically insignificant. Overall, the regression results on daily returns accentuate that lagged returns can bear an impact on concurrent returns. This impact is negative and could possibly be exploited by short-term traders.

In addition to the persistence in daily returns, we wanted to examine whether the negative relationship among daily returns just established applies to longer investment windows, that is, over weekly and monthly return periods. In doing so, we run model (8) again with weekly and monthly returns. The results of these regressions are provided in Panels B and C in Table 6.

In the case of weekly returns, all the constant coefficients are positive, with 38 of them being significant at 10% or better. Furthermore, with just seven exceptions, the rest single slopes are negative. However, only nine of these negative slopes are significant in statistical terms. In comparison to the results on daily returns, we may conclude that a negative correlation also exists among concurrent and lagged weekly returns. However, this correlation is less significant in statistical terms. Despite the weaker statistical significance of the results, the negative relationship among weekly returns could also be exploitable by investors with very short-term investment horizons.

When it comes to monthly returns, the results deviate significantly from those on daily and weekly returns. In particular, less than half of constants (i.e. 27 out of 61) are significantly positive, with the rest being positive but insignificant. Going further, the slopes are either negative or positive but only one of them is statistically significant. Based on these results, we cannot establish a relationship (of any sign) among the monthly returns of ESG ETFs.

5. Conclusion

This study is an expansion to our previous work on ESG ETFs. It offers new empirical insights on the performance of ESG ETFs traded in the U.S. Standard research issues are examined for a sample of 61 equity ESG ETFs over the three-year period 2019-2021. The issues investigated concern the performance of these funds and their ability to beat the market. The performance persistence is evaluated too.

The results obtained are very interesting. The various return measures employed indicate that the performance of ESG ETFs in the U.S. is comparable to that of the S&P 500 Index. In addition, there is a sufficient number of cases in which ESG ETFs can beat the market index. The latter is verified by the several performance measures assessed, such as raw returns, alphas and risk-adjusted returns. On the other hand, ESG ETFs are found to be slightly riskier than the market in total risk terms. Our results are comparable to the results of Mezziani (2020) and Kanuri (2020) in the case of ESF ETFs.

The main inference drawn from the analysis of performance is that ESG investing is not a lost cause in financial terms, as it is frequently believed to be. Therefore, our results defy the common belief in the industry that in order for an investor to be responsible from an ESG perspective, they need to suffer financial sacrifices. However, based on our results about the

risk of ESG ETFs and its comparison to market risk, we should keep in mind that outperformance, if any, is not for free. On the contrary, there is a cost to be paid in terms of the increased risk that must be taken by those investing in ESG ETFs relative to market risk.

Finally, as far as performance persistence is concerned, the results accentuate a negative relationship among the concurrent and one-lagged returns of ESG ETFs. This pattern applies to daily and weekly returns, but not to monthly returns. Profitable investment strategies could possibly be built on the basis of this negative correlation among the daily and weekly returns of ESG ETFs, especially by traders with very short investment horizons.

Apart from the performance of ESG ETFs traded in the European or Asian markets, future research could examine the possible greenwashing tactics of ESG ETFs with data from the European market, which is the leader as far as ESG investing is concerned. Studies that would address the opportunities and challenges of physical climate risks in terms of both mitigation and adaptation in the ETF or mutual fund market should be welcome too.

References

- Carhart, M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 52(1), 57-82.
- Chang, C. E., Krueger, T. M., & Witte, H. D. (2020). Relative importance of sustainability measures and costs in mutual fund selection. *Journal of Wealth Management*, 23(1), 32-46.
- DiBartolomeo, D., & Kurtz, L. (1996). Socially screened portfolios: An attribution analysis of relative performance. *Journal of Investing*, 5(3), 35-41.
- Dolvin, S., Fulkerson, J., & Krukover, A. (2019). Do “good guys” finish last? The relationship between Morningstar sustainability ratings and mutual fund performance. *Journal of Investing*, 28(2), 77-91.
- Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116, 1-22.
- Goldreyer, E. F. Ahmed, P., & Diltz, J. D., (1999), The performance of socially responsible mutual funds: incorporating sociopolitical information in portfolio selection. *Managerial Finance*, 25(1), 23-36.
- Halbritter, G., & Dorfleitner, G. (2015). The wages of social responsibility. Where are they? A critical review of ESG Investing. *Review of Financial Economics*, 26, 25-35.
- Hamilton, S., Jo, H., & Statman, M. (1993). Doing well while doing good? The investment performance of socially responsible mutual funds. *Financial Analysts Journal*, 49(6), 62-66.
- Kanuri, S. (2020). Risk and return characteristics of environmental, social, and governance (ESG) equity ETFs. *Journal of Index Investing*, 11(2), 66-75.
- Kreander, N., Gray, R. H., Power, D. M., & Sinclair., C. D. (2005). Evaluating the performance of ethical and non-ethical funds: A matched pair analysis. *Journal of Business Finance and Accounting*, 32, 1465-1493.
- Marozva, G. (2014). The performance of socially responsible investment funds and exchange-traded funds: Evidence from Johannesburg stock exchange. *Corporate Ownership and Control*, 11(4). 143-152.
- Meziani, A. S. (2014). Investing with environmental, social, and governance issues in mind: From the back to the fore of style investing. *Journal of Index Investing*, 23(3), 115-124.
- Meziani, A. S. (2020). It is still not easy being green for exchange-traded funds. *Journal of Index Investing*, 10(4), 6-23.
- Milonas, N. T., Rompotis, G. G., & Moutzouris, C. (2022). The performance of ESG funds vis-à-vis non-ESG funds. *Journal of Impact and ESG Investing*, 2(4), 96-115.
- Plagge, J. C., & Grim, D. M. (2020). Have investors paid a performance price? Examining the behavior of ESG equity funds. *Journal of Portfolio Management Ethical Investing*, 46(3), 123-140.
- Rodríguez, J., & Romero, H. (2019). Exchange-traded funds as an international diversification tool for socially responsible investors. *Journal of Wealth Management*, 22(3), 98-102.

- Rompotis, G. G. (2016). Evaluating a new hot trend: The case of water exchange-traded funds. *Journal of Index Investing*, 6(4), 103-128.
- Rompotis, G. G. (2022a). The ESG ETFs in the UK. *Journal of Asset Management*, 23, 114-129.
- Rompotis, G. G. (2022b). Environmental, social and governance responsibility, financial performance and assets: A Study of ETFs. *Research Papers in Economics and Finance*, 6(2), 23-49.
- Rompotis, G. G. (2023a). Performance and performance persistence of Europe-focused ETFs in the U.S.. *Journal of Beta Investment Strategies*, forthcoming.
- Rompotis, G. G. (2023b). Do ESG ETFs “greenwash”? Evidence from the U.S. market. *Journal of Impact and ESG Investing*, forthcoming.
- Statman, M. (2000). Socially responsible mutual funds. *Financial Analysts Journal*, 56(3), 30-39.

PAST MFA CONFERENCE

The MFA is proud to be the pioneer in organizing a national-level conference that specializes in finance. Since its inaugural workshop in 1999, the meeting of finance academicians and practitioners has developed to become an annual symposium and today, owing to the overwhelming response, the meeting is now known as an annual conference. The conference is hosted by local institutions of higher learning, both public and private, on rotational basis.

The conference is a great platform for academicians and practitioners to discuss and exchange ideas pertaining to issues related to finance. It also provides an avenue for researchers to share their findings on financial issues relevant to Malaysia. Selected papers from the conference are published in the Capital Market Review which is an official publication of Bursa Malaysia and Research Institute of Investment Analysts Malaysia (RIIAM).

Previous MFA Annual Conference:

1999: THE MALAYSIAN FINANCE ASSOCIATION 1ST ANNUAL WORKSHOP

Theme: The Inaugural MFA Workshop

Host: Universiti Kebangsaan Malaysia (UKM)

2000: THE MALAYSIAN FINANCE ASSOCIATION 2ND ANNUAL SYMPOSIUM

Theme: The Malaysian Financial Crisis and its Recovery

Host: Universiti Malaya (UM)

2001: THE MALAYSIAN FINANCE ASSOCIATION 3RD ANNUAL SYMPOSIUM

Theme: Malaysian Capital Markets: Challenges for the New Millennium

Host: Universiti Islam Antarabangsa Malaysia (UIAM)

2002: THE 4TH ANNUAL MALAYSIAN FINANCE ASSOCIATION SYMPOSIUM

Theme: Globalization and Malaysian Financial Market: Strategies for Sustainable Growth

Host: Universiti Sains Malaysia (USM)

2003: MALAYSIAN FINANCE ASSOCIATION'S (MFA'S) 5TH ANNUAL SYMPOSIUM

Theme: Competitiveness and Stability Financial Strategies in Malaysia

Host: Multimedia University (MMU)

2004: THE MALAYSIAN FINANCE ASSOCIATION 6TH ANNUAL SYMPOSIUM

Theme: Revitalising the Financial Market: The Tasks Ahead

Host: Universiti Utara Malaysia (UUM)

2005: THE MALAYSIAN FINANCE ASSOCIATION 7TH ANNUAL CONFERENCE

Theme: Consolidation and Prudent Financial Management: Roads to Malaysian Economic Prosperity

Host: Universiti Teknologi MARA (UiTM), Terengganu

2006: THE MALAYSIAN FINANCE ASSOCIATION 8TH ANNUAL CONFERENCE

Theme: Managing Finance for Global Business Growth

Host: Universiti Malaysia Sabah (UMS)

2007: THE MALAYSIAN FINANCE ASSOCIATION 9TH ANNUAL CONFERENCE

Theme: Positioning Malaysia as A Premier Financial Market

Host: Universiti Teknologi MARA (UiTM)

2008: THE MALAYSIAN FINANCE ASSOCIATION 10TH ANNUAL CONFERENCE

Theme: Strengthening Malaysia's Position as a Vibrant, Innovative and Competitive Financial Hub

Host: Faculty of Economics and Business, Universiti Malaysia Sarawak (UNIMAS)

2009: THE MALAYSIAN FINANCE ASSOCIATION 11TH ANNUAL CONFERENCE

Theme: Financial Markets, Governance and Growth: Issues & Challenges

Host: Faculty of Economics and Management and the Graduate School of Management, Universiti Putra Malaysia (UPM)

2010: THE MALAYSIAN FINANCE ASSOCIATION 12TH ANNUAL CONFERENCE

Theme: Re-Engineering the Financial System towards a Global Innovation Economy

Host: Taylor's University College

2011: THE MALAYSIAN FINANCE ASSOCIATION 13TH ANNUAL CONFERENCE

Theme: Financial Innovation & Transformation in the 21st Century World Conference

Host: UKM-Graduate School of Business, Universiti Kebangsaan Malaysia (UKM)

2012: THE 14TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Emerging Markets and Financial Resilience: Decoupling Growth from Turbulence

Host: Graduate School of Business (GSB), Universiti Sains Malaysia (USM)

2013: THE 15TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Financial Challenges and Economic Growth – The Way Forward

Host: Graduate Studies Department, INCEIF

2014: THE 16TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Financial Systems Re-Generation: MAPS, GAPS and TRAPS

Host: Universiti Malaya (UM)

2015: THE 17TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Financial Inclusion as A Means to Minimize Fragility

Host: Universiti Teknologi MARA (UiTM), Sabah

2016: THE 18TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Towards a Vibrant Social Finance for A Sustainable Banking and Financial System

Host: Universiti Sains Islam Malaysia (USIM)

2017: THE 19TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Challenges and New Directions amidst Global Financial Uncertainty

Host: Universiti Tunku Abdul Rahman (UTAR)

2018: THE 20TH MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Innovative Ecosystem for Financial Revolution

Host: Universiti Utara Malaysia (UUM)

2019: THE 21ST MALAYSIAN FINANCE ASSOCIATION CONFERENCE

Theme: Charting A New Course in Financial Innovation and Education

Host: Sunway University

2020: THE 22ND MALAYSIAN FINANCE ASSOCIATION CONFERENCE [VIRTUAL CONFERENCE]

Theme: Financial Sustainability During the Era of Covid-19 Pandemic

Host: Malaysian Finance Association (MFA)

2021: THE 23RD MALAYSIAN FINANCE ASSOCIATION INTERNATIONAL CONFERENCE [VIRTUAL CONFERENCE]

Theme: Sustainability of Business and Finance: Embracing the New Norms Amidst Covid-19

Host: Universiti Sains Malaysia (USM)

2022: THE 24TH MALAYSIAN FINANCE ASSOCIATION INTERNATIONAL CONFERENCE

Theme: Global Finance: Evolving and Impacting the Post Pandemic World

Host: Universiti Malaysia Sabah (UMS)

2023: THE 25TH MALAYSIAN FINANCE ASSOCIATION INTERNATIONAL CONFERENCE

Theme: Positioning the Financial System Towards a Sustainable Economy and Green Finance

Host: Taylor's University



MFA MEMBERSHIP FORM

Please write in CAPITAL letters and ✓ where required

Name: _____
 NRIC/Passport No: _____
 Nationality: _____
 Sex: Male Female
 Occupation: _____
 Position: _____
 Organization/Company name & Address: _____

Tel: _____ Fax: _____
 Email: _____

For Student Only

Institution: _____
 Address: _____
 Undergraduate Masters Phd
 Tel: _____ Fax: _____
 Email: _____

Membership Type of membership (Annual membership runs from Jan to Dec)

<input type="checkbox"/>	Ordinary Membership	RM100 per year
<input type="checkbox"/>	Associate Membership	RM100 per year
<input type="checkbox"/>	Life Membership	RM600

Office Use Only:
 Date received: _____
 Membership No: _____
 Cheque Money order Bank draft
 Prove of Payment (for Direct Payment)
 Approved by: _____

OBJECTIVES

The objectives of MFA are to stimulate public interest in finance related studies, to encourage the research and discussion of finance related issues with special reference to Malaysia, to issue Malaysian finance Journals and other publications with the prior approval of the relevant authorities, to promote and organize conferences, forums, dialogues and activities between private and public sectors on current finance issues of national and international concerns; and to undertake such management, economic, and other activities as the Association deems appropriate for the furtherance, promotion and execution of its aforesaid objectives.

MEMBERSHIP

Membership is open to academicians, professionals and students in the area of Finance, Banking, Economics, Insurance, Real Estate, Accounting and other finance related area.

There are three types of membership: Ordinary Membership, Associate Membership and Life Membership.

Ordinary Membership

The Ordinary Membership is open to all academicians and working person in the field of Accounting, Banking, Business Administration, Economics, Finance, Financial Engineering, Actuarial Science, Data Science, Insurance and other finance related area. Ordinary member is eligible to attend and vote at all general meetings of the Association.

Associate Membership

The Associate Membership is open to foreign professionals / scholars / postgraduates in the field of Finance, Banking, Economics, Insurance, Real Estate, Accounting and other finance related area. The associate members are entitle to all general meetings, but are not eligible to hold an office and to vote.

Life Membership

The Life Membership is open to Malaysian academicians, an extension of ordinary membership and entitles to all the rights and privileges of ordinary members.

Membership Fee

Ordinary member RM 100 per year
 Associate member RM 100 per year
 Life member RM 600

Payment can be remitted via bank draft, cheque, money order made payable to "PERSATUAN KEWANGAN MALAYSIA (BARU)" or direct payment to BANK MUAMALAT MALAYSIA BERHAD: 1205-0003606-71-1.

Please notify us your application by sending the application form and proof of payment to mgf@mfa.com.my.

Note: Ordinary and Associate Membership expires every 31 December each year.

Inquiries should be forwarded to :

SECRETARY,
 Malaysian Finance Association (MFA)
 c/o: Faculty of Business and Management (FBM)
 UNIVERSITI TEKNOLOGI MARA (UiTM)
 40450 Shah Alam Selangor MALAYSIA

For further information, please contact:

Tel : +603 7651 4197
 Email : mansorhi@incef.org
yahida@uttm.edu.my
 Website : <https://www.mfa.com.my/>

Contact Us

President

Malaysian Finance Association

c/o Prof. Dr. Mansor Ibrahim

Director of Research Management

Deputy President Academic & Dean

International Centre for Education in Islamic Finance (INCEIF)

Lorong Universiti A, Petaling Jaya

59100 Kuala Lumpur

Federal Territory of Kuala Lumpur, Malaysia

Tel: 603-76514197

Fax: 603-76514094

Email: mansorhi@inceif.org

Enquiries relating to Capital Markets Review (CMR) should be addressed to:

Chief Editor

Capital Markets Review

c/o Prof. Dr. Chee-Wooi Hooy

School of Management

Universiti Sains Malaysia

11800 Gelugor

Penang, Malaysia

Tel: 604-6533889

Fax: 604-6577448

Email: cwwhooy@usm.my

Capital Markets Review

IN PUBLICATION SINCE 1993

FOUNDING EDITORS

Mohd Salleh Majid, *KLSE*
Gek-Kim Qua, *KLSE*
S. Loganathan, *KLSE*
Bala Shanmugam, *RIIAM*

Kim-Lian Kok, *UM*
Hock-Lock Lee, *UM*
Mansor Md. Isa, *UM*
Soon-Kiam Ooi, *RIIAM*

CHIEF EDITORS & MANAGING EDITORS

2004 – 2011	Fauzias Mat Nor, <i>UKM</i>	- Soo-Wah Low, <i>UKM</i>
2012 – 2014	Obiyathulla Ismath Bacha, <i>INCEIF</i>	- Shamsher Mohamad, <i>INCEIF</i>
2015 – 2016	Obiyathulla Ismath Bacha, <i>INCEIF</i>	- Chee-Wooi Hooy, <i>USM</i>
2017 – 2021	Catherine Soke-Fun Ho, <i>UiTM</i>	- Chee-Wooi Hooy, <i>USM</i>
2022 – 2023	Chee-Wooi Hooy, <i>USM</i>	

INSTRUCTION FOR AUTHORS

1. The cover page should contain the title of the manuscript, the author(s) and their affiliation(s). Title should be typewritten in bold and in 14pt fonts. Author's name and affiliation should be typewritten in single spacing using 8pt fonts with affiliations typed in italics. All text on this page should be centre aligned. Contact of corresponding author and acknowledgement should be mentioned in the footnote in 8pt fonts with a symbol *. Author must provide complete correspondence information – Author's name, telephone number and email address.
2. Manuscripts may be written in either Bahasa Melayu or English. Only original and unpublished works will be considered. The first page of text shows the title of the manuscript with an abstract of about 300-350 words and a maximum of 6 keywords identifying the main topics of the manuscript. JEL classification numbers should be included after the keywords.
3. Structured Abstract (300-350 words)
Research Question: In one sentence, define the key features of the research question or problem statement. **Motivation:** In a few sentences, capture the core scholarly motivation for the study. If relevant, identify a 'puzzle' that this research aims to resolve. Identify up to 3 key papers upon which the research builds. What's new? Highlight where novelty exists in the study; how does it improve or build on existing literature? So what? Outline the primary reason why it is important to know the answer to your research question. **Idea:** Articulate the core idea behind the research – what specifically does the study do? If relevant: articulate the central hypothesis; highlight key independent variables and dependent variable(s). **Data:** Provide an overview of what data were collected/analysed/used in the study; including data source(s), time period, sample size and measurement tool(s). **Method/Tools:** Provide a brief summary of the empirical framework, research design and approach. **Findings:** Highlight the key takeaway points. Highlight any novel result – how do the findings agree/disagree with existing literature? What do the findings add? Highlight any important implications this research has for influence in real-world decisions/behaviour/activity. **Contributions:** Outline the primary contribution of this paper to the relevant research literature.
4. The paper starts after the JEL classification, with all pages numbered consecutively at the bottom right. Heading of main section (e.g. **1. Introduction**) and headings of subsections (e.g. **3.1 Data Sample**) should be typed in bold. Headings of subsequent subsections (e.g. *3.1.1 Data Source*) should be typed in italics.
5. Tables and figures should be embedded in the text. All tables and figures should be numbered consecutively with Arabic numerals, have a brief title, and be referred to in the text. The entire table should be presented in one page unless too long. Landscape table is acceptable. Vertical lines should not be used in the table. Explanatory notes should be placed at the bottom of the table. The word 'Notes' precedes the table notes. Tables and their respective titles should be aligned to the left. Figures and their respective titles should be aligned to the centre. All figures should be provided as high-quality printouts, suitable for reproduction.
6. The whole manuscript should be typewritten in single spacing using 10pt fonts, except for tables (maximum 9pt fonts), figures (maximum 9pt font), footnotes (8pt fonts), and explanatory notes for the tables (8pt fonts).
7. Responsibilities for the accuracy of bibliographic citations lie entirely with the authors. Submission to Capital Markets Review should follow the style guidelines described in the American Psychological Association (APA).
8. Capital Markets Review welcomes article submissions and does not charge a submission fee. Please email your manuscript to Professor Dr. Chee-Wooi Hooy, Chief Editor, Capital Markets Review: cmr@mfa.com.my (cc: cmr.mfa@gmail.com).

Published by:



Sponsored by:



The Capital Markets Review (CMR) was formerly published by the Kuala Lumpur Stock Exchange (now known as Bursa Malaysia) and the Research Institute of Investment Analysts Malaysia (RIIAM). Beginning 2004, the Malaysian Finance Association (MFA) has been given the privilege to take over the publication of CMR and MFA is now the official publisher of CMR.

Published twice a year in March and September, CMR contains papers in both English and Bahasa Melayu. CMR publishes double-blind refereed articles in various aspects of finance, including Asset Pricing, International Finance, Corporate Finance, Banking, Risk and Insurance, Market Microstructure and Islamic Banking and Finance. The journal welcomes empirical and theoretical contributions that have not been previously published.

CMR is listed and indexed in ABDC Journal Quality List, Research Papers in Economics (RePEc), and MyJurnal by Citation and Infometrics Centre (formerly known as Malaysia Citation Centre (MCC)).

Enquiries relating to CMR should be addressed to:

Chief Editor, Malaysian Finance Association

c/o Professor Dr. Chee-Wooi Hooy

School of Management

Universiti Sains Malaysia

11800 Penang

Malaysia

Tel: +604-6533889

Email: cmr@mfa.com.my

