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The Annual Conference of Economic Forum of Entrepreneurship & International Business
ACEFEIB

The 10th Annual Conference of the Economic Forum of Entrepreneurship & International Business

February 1st, 2024

Online Conference Via Zoom

2024

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February 1st, 2024

An online meeting

Conference Proceeding

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research_forum@eco-ena.ca

2024

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Editors

Ghada Gomaa A. Mohamed

gmohamed@eco-ena.ca

Morrison Handley-Schachler

morrisonhandley@aol.com

Daniel May

dmay@harper-adams.ac.uk

Thomas Henschel

henschel@htw-berlin.de

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(ACEFEIB)

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February 1st, 2024

An online meeting

Conference Chairs

Ghada Mohamed, Handley-Schachler, Danial May, and Thomas Henschel

Conference Organizer

Ghada Gomaa A. Mohamed
ECO-ENA, Inc.®, Canada
gmohamed@eco-ena.ca

Sponsored by:

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Conference Reporting

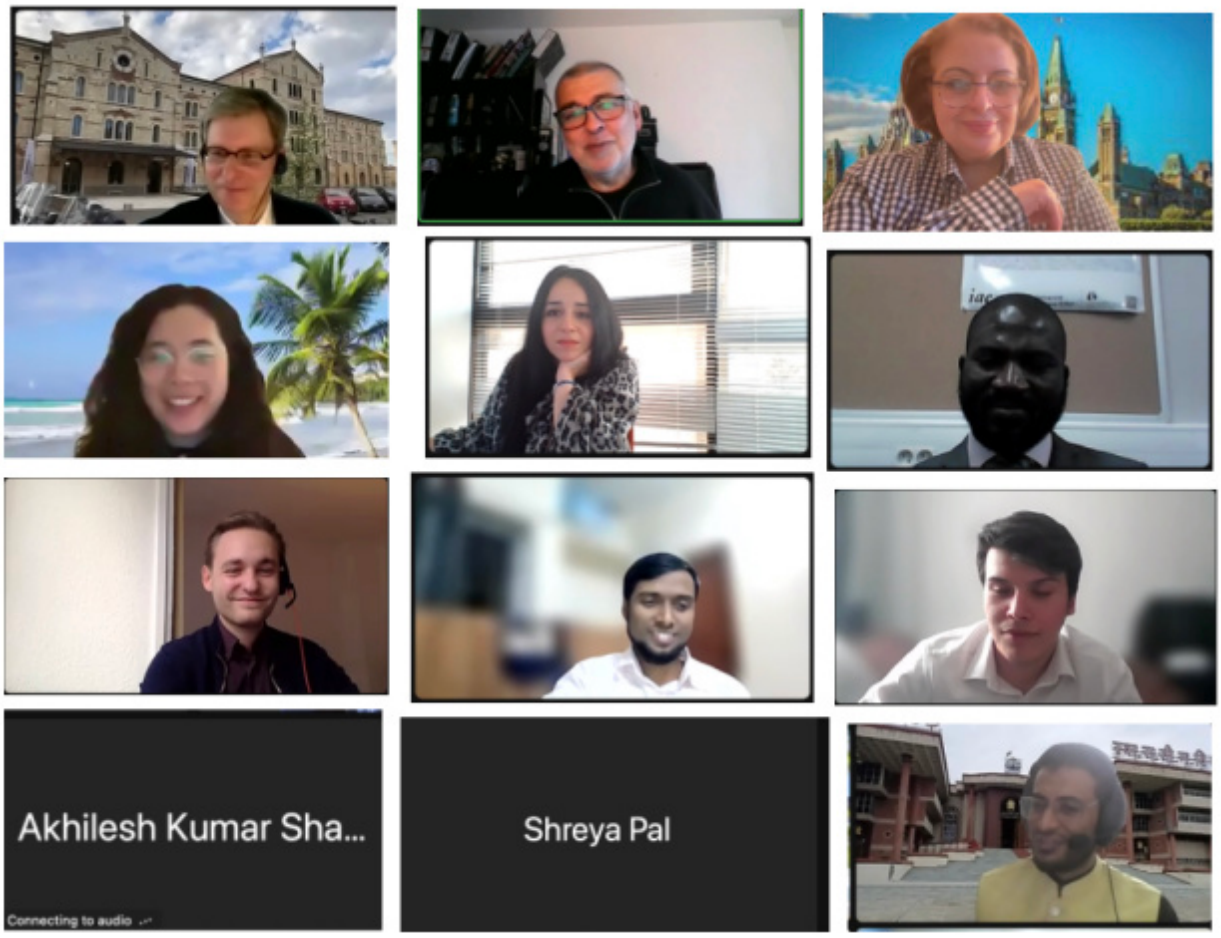
Conference Chairs.

Professors,

Thomas Henschel, Daniel May, and Ghada Mohamed

Scientific Committee.

Morrison Handley-Schachler, Thomas Henschel, Daniel May, and Ghada Mohamed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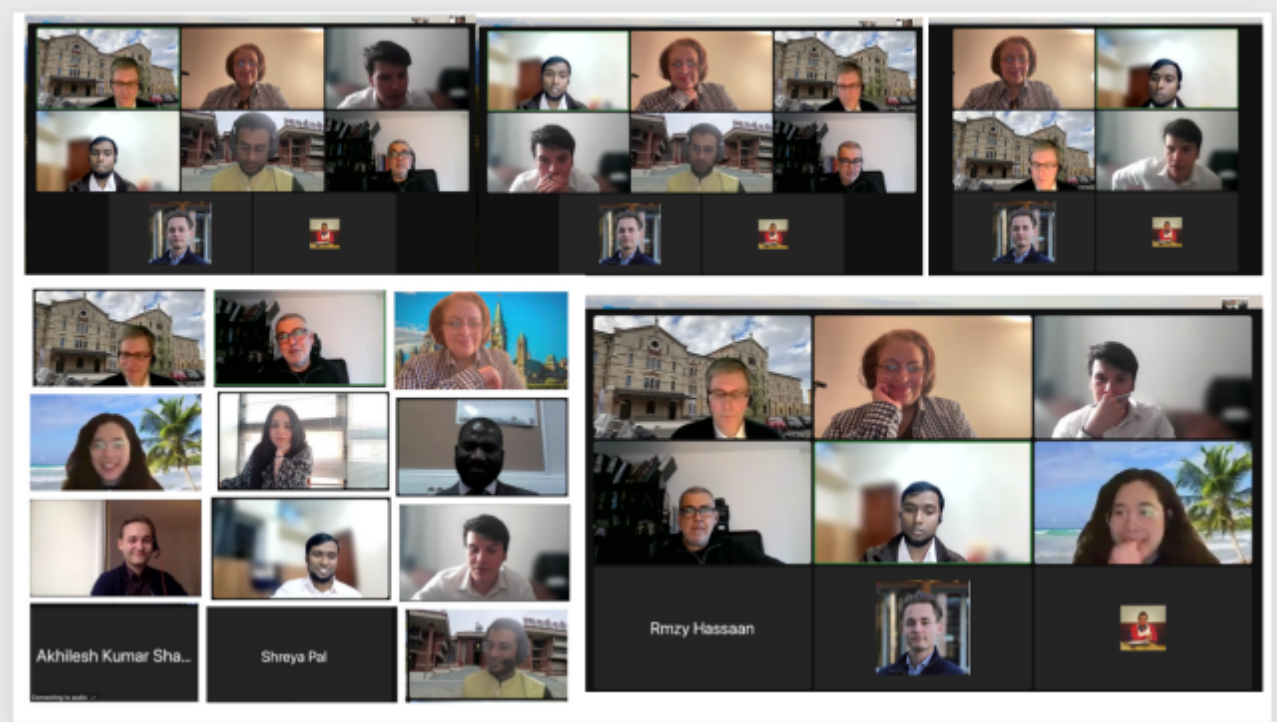
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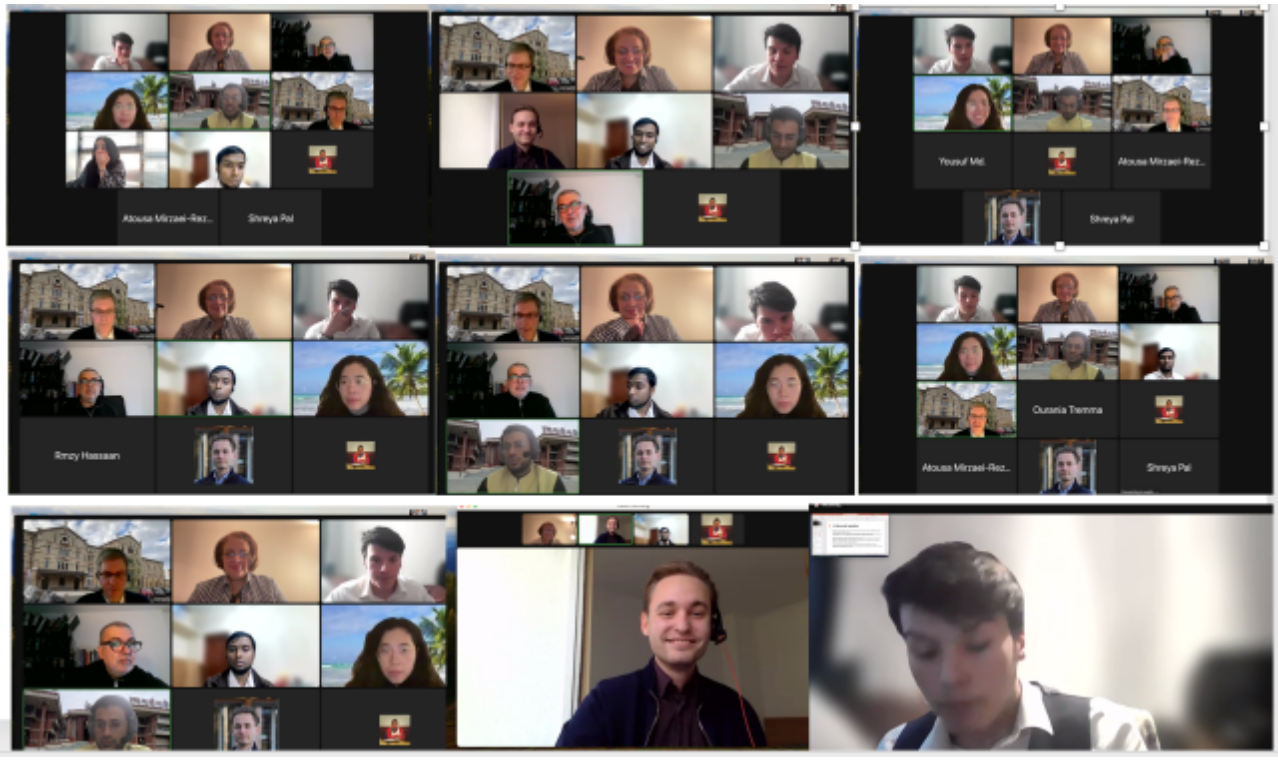
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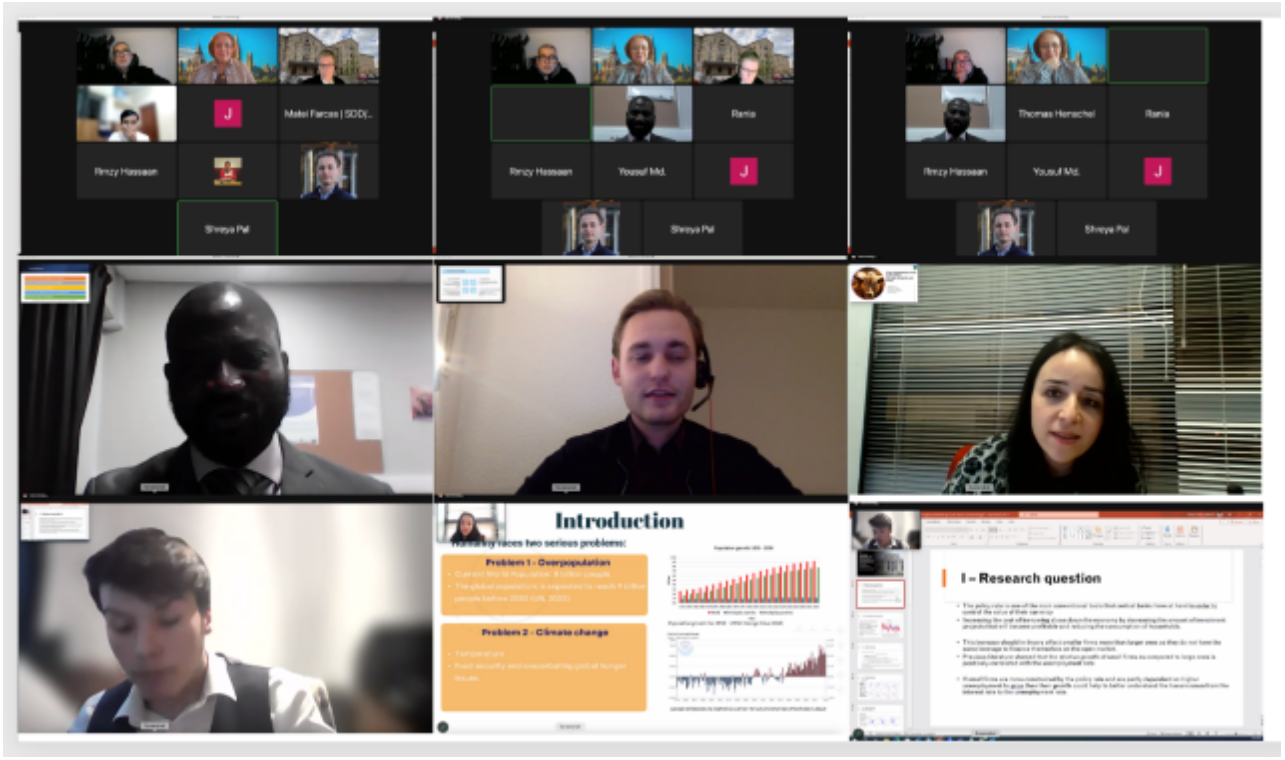
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Youssif Md.
Thomas Henschel
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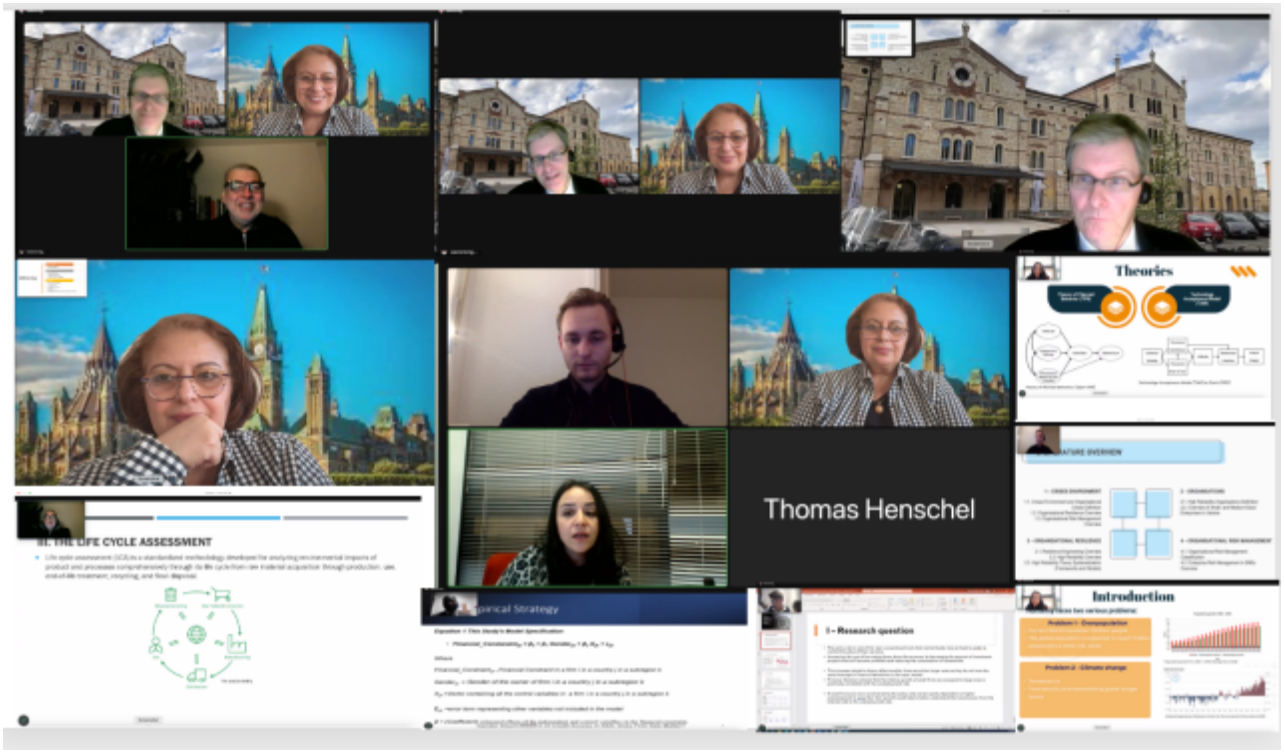
Problem 2 - Climate change
I – Research question


Theories
Thomas Henschel
II. THE LIFE CYCLE ASSESSMENT
Introduction
I – Research question

Speakers and Presenters

The duration of each presentation: 30 minutes

Mr. Yakubu Musah Seidu >>>
Researcher, TU Berg Akademie Freiberg, Germany

Paper: "Gender Discrimination in the credit Market; Does Firm size matter "

Mr. Matei Farcas >>>

Freelance Researcher, Université Gustave Eiffel, France

Paper: "THE RELATION BETWEEN THE POLICY INTEREST RATE AND UNEMPLOYMENT, DOES THE GROWTH OF SMALL FIRMS PLAY A MEDITATING ROLE?"

Ms. Shreya Pal Mandal >>>
Research Scholar, Dept. of Humanities and Social Science, India

Paper: "How economic globalization affects the ecological footprint in India? A novel dynamic ARDL simulations"

co-authored with Muhammed Ashiq Villanthenkodat.

Prof. Dr. Md. Abul Kalam Azad* & *Mr. MD. Yousuf
Islamic University of Technology, Bangladesh

Paper: "Are Women Gold-dust for Asian Banks? Examining the impact of Gender Diversity on Asian Banks' Performance and Risk"

co-authored with others

Mr. Ramzi Abdullah Ahmed Hassan
PhD Candidate, Swami Ramanand Teerth Marathwada University
Nanded City, INDIA

Paper: "Dutch Disease and the Future of the GCC Economies"

Mr. Mykyta Saveliev >>>

PhD Candidate, University of Portsmouth, UK

Paper: "Entreprise Risk Management in Small-and Medium-Sized Entreprises (SMEs) in Ukraine: Utilizing High Reliability Theory (HRT) to Improve Resilience to Crises"

Ms. Jie Li >>>

PhD Candidate, Germany/ China

Paper: "A Comparative Analysis of Intellectual Communication Challenges Faced by Property Management Professionals in Different Countries - Examples from Germany and China"

Dr. Charalampos Eleftheriadis1, Dr. Ourania Tremma2, and Dr. Daniel May*3

1 Perrotis College, Greece and Cardiff Metropolitan University – Wales.
2 University College Dublin, School of Agriculture and Food Science, Belfield, Dublin, Ireland.
3Food, Land and Agribusiness Management Department, Harper Adams University, UK

Paper: "Factors affecting Greek farmers' willingness to adopt precision agriculture".

Dr. Tianmeng Liu, Dr. Ourania Tremma2, and Dr. Pamela Theofanous2

1. The Pennsylvania State University, Master of Accounting Program, United States.

2. University College Dublin, School of Agriculture and Food Science, Belfield, Dublin, Ireland.

Paper: "Price relations between the international beef markets of EU and China"

Dr. Daniel May 1 and Dr. Eric Siqueiros1 >>>

1. Harper Adams University, Department for Land, Farm and Agricultural Management, United Kingdom

Paper: "The Ukraine War Impact on the Environment in Agriculture: Using Economic Network Analysis and the Life Cycle Analysis"

Dr. Akhilesh Kumar Sharma

Institute for Studies in Industrial Development, India

Paper: "Understanding Firm's Transition, Entry, and Exit Across Size, Sectors, and Age in India".

Timetable:
The conference starts at 6:30 am - Edmonton, Alberta time.
The first presentation starts at 7:00 am - Edmonton, Alberta time.
The duration each presentation: 30 minutes including the discussion".
After the conference - each paper will go for another peer-reviewed process for the final publication.

Presenters.
1. Prof. Dr. Md. Abul Kalam Azad, Bangladesh - *Mr. MD Yousuf; co-author will present the paper.*
2. Ms. Shreya Pal Mandal, India
3. Ms. Je Li, China
4. Mr. Ramzi Abdullah Ahmed Hassan, India
5. Dr. Akhilesh Kumar Sharma, India
6. Mr. Yakubu Musah Seidu, Germany
7. Mr. Matei Farcas, France
8. Mr. Mykyta Saveliev, Germany
9. Dr. Charalampos Eleftheriadis, Dr. Ourania Tremma, and Dr. Daniel May, UK
10. Dr. Tianmeng Liu, Dr. Ourania Tremma, and Dr. Pamela Theofanous, UK
11. Dr. Daniel May and Dr. Eric Siqueiros, UK

Zoom Meeting

https://us06web.zoom.us/j/82704603136?pwd=gVpSbFzVkrqaIoCZsthzZPUoVnb5ea.1

Topic

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@ ECO-ENA: Economics & ECO-Engineering Associate, Inc., Canada

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Time

Feb 1, 2024, 06:00 AM Edmonton

Meeting ID

827 0460 3136

Security checked Passcode 700289

Date: Thursday February 1st, 2024, Starting from 6:30 am Edmonton, Alberta, Canada. - *Consider your time zone.*

The central meeting will be run from Edmonton, Alberta, Canada.

Conference E-Proceedings

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Selected Papers

***Peer-reviewed – Selected for the* Journal of International Business and Economic Affairs**

2024

Tahmid, Tahani, Sadia Binte Shafiq, Md. Yousuf, Peter Wanke, Md. Abul Kalam Azad. (2024). Are Women Gold-dust for Asian Banks? Examining the Impact of Gender Diversity on Asian Banks' Performance and Risk. *Journal of International Business and Economic Affairs*, 1(1), 6–26. https://epe.lac-bac.gc.ca/100/201/300/jrn_intl_business_econ_aff/index.html

Seidu, Yakubu Musah. (2024). Gender Discrimination in the Credit Market of Sub-Sahara Africa; Does Firm Size Matter? *Journal of International Business and Economic Affairs*, 1(1), 27-52. https://epe.lac-bac.gc.ca/100/201/300/jrn_intl_business_econ_aff/index.html

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Are Women Gold-dust for Asian Banks? Examining the Impact of Gender Diversity on Asian Banks' Performance and Risk

Tahani TAHMID
Business Statistics, University of South Carolina, Columbia, SC 29208, **United States**, Email: ttahmid@email.sc.edu
Sadia Binte SHAFIQ
Department of Business and Technology Management, Islamic University of Technology, Gazipur 1704, Bangladesh, Email: sadia@iut-dhaka.edu
Md. YOUSUF
Deputy Director, Chief Economist's Unit, Bangladesh Bank, Head Office, BANGLADESH, Email: md.yousuf@bb.org.bd
Peter WANKE
Business Analytics and Economics Research Unit - COPPEAD Graduate Business School, **Brazil**, Email: peter@coppead.ufrj.br
Md. Abul Kalam AZAD (corresponding author)
Department of Business and Technology Management, Islamic University of Technology, Gazipur, BANGLADESH, Email: kalam@iut-dhaka.edu

Abstract

Gender diversity on board has been an important topic of discussion since the beginning. The question remains how gender diversity can affect bank performance and risk. Only a few studies have examined this in Asian context. This study examines the impact of board gender diversity on bank performance and risk in context of Asian banks. This study comprises a 15-year panel data set consisting of the year 2008 to 2022 of 180 listed banks operating in 28 countries in Asia. For bank performance, ROA and ROE has been used as dependent variables and for bank risk, Z-score for ROA and ROE has been calculated to be used as dependent variable. Contrary to most findings our result suggests that gender diversity on bank board has a negative effect on Asian banks' profitability and it positively affects banks' Z-score. The results of this study can be helpful to managers and policymakers of Asian banks in fruitfully utilizing the advantages that gender diversity on boards has to offer, while also acknowledging its limitations and taking them into account for future reforms.

Keywords: Gender diversity; bank performance; bank risk; Asian banks.

1. Introduction

The increasing awareness on gender equality being an economic issue, the participation of women in economic activities has become a significant topic (Del Prete & Stefani, 2015). The global financial crisis has made the concept of gender diversity in the boards of banks more critical (Del Prete & Stefani, 2015). Whether increased gender diversity on bank boards would have curbed the risk and prevented major collapses has been a burning question for economists and analysts (Van Staveren, 2014). Research on gender diversity on boards has extended recently to provide some analysis of the effect of gender quota laws implemented in several countries (Ferrari, Ferraro, Profeta, & Pronzato, 2018). However, results on the influence of gender diversity on bank performance and risk have not always been definitive (Fernandes, Farinha, Martins, & Mateus, 2018). The reason behind this is the confidentiality of bank data, and women still being a minority on bank boards (Del Prete & Stefani, 2015). Thus the interest in emphasizing on the banking system is high due to its unique role as a regulated system (Adams & Mehran, 2003) and the consequences of (self) selection into management and professional occupations, which can impact economic performance and risk taking (Adams & Ragunathan, 2017).

Bank performance determines bank value. Therefore, optimizing value is the goal of all banks. And banks that have a good performance record should be able to reduce risk (Innayah, Pratama, & Tubastuvi, 2021). There are several arguments concerning the role of board gender diversity in bank performance and risk. On one hand gender diversity in board removes groupthink, enables better understanding, monitoring and ensuring creative and holistic solutions (Branson, 2011; Brennan & McCafferty, 1997; Fairfax, 2005). On the other hand, more diversity in boards might reduce cohesiveness, leading to distrust and communication gap (Ghosh, 2017). However, in traditional male-dominated societies percentage of women at the top level of decision-making is still low specially in Asian developing countries(Ghosh, 2017; Sanan, 2016). In this context, the impact of gender diversity on board on bank performance and risk which has inconsistent results in a global context becomes an important research question (Ghosh, 2017).

This study aims to analyze the empirical impact of board gender diversity on bank performance and risk and contribute to this area of research in context of Asian banks. Bank performance and risk are crucial components that must be properly evaluated owing to the long-term repercussions for shareholders and stakeholders (Othmani, 2021).As the question of how gender diversity in bank boards can affect both performance and risk has received little attention especially for developing countries, it is an important motivation for our study (Del Prete & Stefani, 2015; Othmani, 2021). Furthermore, regulatory improvements in the US and other developed countries appear to increase women's participation on corporate boards (Adams & Ferreira, 2009; Srivastav & Hagendorff, 2016), but proof from developing countries is less evident (Othmani, 2021).

Our study comprises a 15-year panel data set from the year 2008 to 2022 of 180 listed banks operating in 28 countries. For bank performance, we used ROA and ROE as dependent variables and for bank risk, we calculated Zscore for ROA and ROE to be used as dependent variable. The independent variable is the percentage of female on board which we used as a measure of gender diversity.

We also calculated the BLAU index and the Shannon index for robust result. Control variables used in the study are board size, independence and bank size. The study has based on panel data estimation with a fixed effect GLS (generalized least squares) model. Our result indicates that gender diversity negatively affects Asian banks' profitability while it positively affects banks' Z-score. The reason might be that women are found to have less experience in managing employees (Fischer et al.,1993) and the situation is more evident in Asian banks due to still existing discrimination in education and opportunity for women (Franzke et al., 2022). The remainder of the study is organized as follows: section 2 provides a theoretical framework and a literature review; section 3 explains research methodology; and section 4 describes findings and analysis. Finally, section 5 summarizes with conclusion and implications.

2. Literature review and hypothesis

Gender diversity and bank performance

The literature on the effect of gender diversity on bank performance is new and scarce. However, the economic crisis has raised interest in exploring the relationship between gender diversity and bank performance (Del Prete & Stefani, 2015). To illustrate the relation between board gender diversity and bank performance several theories have been identified (Brahma, Nwafor, & Boateng, 2020)

Agency theory is mostly applied by researchers to analyze the relationship of board characteristics with firm value. According to agency theory, women on boards may strengthen regulatory system over managers and directors since board gender diversity promotes board independence (Carter, D'Souza, Simkins, & Simpson, 2010). Thus research has been conducted more in recent years on board characteristics such as gender diversity and its impact on firm performance(Conyon & He, 2017; Pathan & Faff, 2013). For example, Carter, Simkins, and Simpson (2003), Adams and Ferreira (2009) and Adams, Gray, and Nowland (2011) used agency theory to investigate the relationship between board gender diversity and firm value and discovered a positive relationship between them. Adams and Ferreira (2009) and Adams et al. (2011) found superior supervising qualities among women directors because they think critically. Moreover, they found that gender diversity in board promotes management responsibility like enhancing CEO accountability and board meetings attendance. Thus female directors by increasing board oversight serve the duty of independent directors (Adams & Ferreira, 2009). Similarly, Jurkus, Park, and Woodard (2011) found that board gender diversity decreases agency costs in weaker economies with limited external control.

First, there are several beneficial effects of gender diversity. According to Conyon and He (2017) gender diversity in board have two major benefits over all-male board. These are- greater decision quality and cognitive variety. Women directors bring distinct knowledge, ideas, experiences, capabilities, and networks to the board (Hillman, Shropshire, & Cannella Jr, 2007; Miller & del Carmen Triana, 2009). They enrich board by seeking information from other members of board, evaluating alternative ideas, and giving a variety of perspectives (Post & Byron, 2015). Moreover they may contribute skills, expertise, and networks to improve board oversight (Campbell & Vera, 2010; Conyon & He, 2017).Thus firms with increased gender diversity are benefitted by their women directors.

Gender diversity can also prevent the propensity for people in groups to make choices based on agreement rather than critically evaluating opposing ideas or opinions which is 'groupthink' (Janis, 1972).Existing literature has linked board gender diversity to increased corporate innovation (Miller & del Carmen Triana, 2009), greater company competence to employ firm resources and investments (Miller, Triana, & Trzebiatowski, 2013), better marketplace and stakeholder awareness (Carter et al., 2003), more appropriate board strategic control (Nielsen & Huse, 2010), and stricter monitoring (Carter et al., 2003). However, research about the relationship between board gender diversity and performance in the banking sector is limited, leaving room for further inquiry. Pathan and Faff (2013) using a sample of US banks discovered that board gender diversity elevates bank performance. Moreover, García-Meca, García-Sánchez, and Martínez-Ferrero (2015) discovered that gender diversity increases bank performance in a sample of 159 banks in nine countries from 2004 to 2010.

The second viewpoint is about the disadvantages of board gender diversity for firm performance (Adams & Ferreira, 2009; Pucheta-Martínez, Bel-Oms, & Olcina-Sempere, 2018). With increasing diversity in board, a firm's board of directors may become too distinct, resulting in a loss of coherence, communication, and togetherness (Othmani, 2021). Team disputes can occur between board members hampering decision-making. Board diversity may also encourage social classification inside boards, which can be detrimental to the performance of the board (Othmani, 2021). According to Li and Hambrick (2005), demographic diversity can lead to adverse in-group versus out-group stereotypes, which can disrupt board decision-making processes. Diversity may lead to unintentional tokenism and hiring of unqualified individuals (Larcker & Tayan, 2011; Torchia, Calabrò, & Huse, 2011). Lastly, the barriers women face in education and training within male-dominated societies, such as in Asia, hinder women's development and the realization of their potential (Shoma, 2019). Consequently, gender diversity within firms can have a negative impact rather than a positive one.

Many research demonstrates that gender diversity and financial success have a negative or neutral relationship (Adams & Ferreira, 2009; Ahern & Dittmar, 2012; Boubaker, Dang, & Nguyen, 2014; Darmadi, 2013) According to Adams and Ferreira (2009) and Ahern and Dittmar (2012) firms perform poorly as gender diversity increases. For banking sector Sajjad and Rashid (2015) found a negative relationship between board gender diversity and performance in case of Pakistani banks. Tampakoudis et al., (2022) found a negative and significant relationship between the presence of female directors and shareholder value. However Nguyen, Hagendorff, and Eshraghi (2015) and Liang, Xu, and Jiraporn (2013) found no significant relationship between them.

The debate above does not provide enough information to make a judgment about the relationship of board gender diversity with bank’s performance and risk. As a result, we believe the advantages of gender diversity in bank boards exceed the drawbacks, and we offer the following hypothesis:

H1: Gender diversity on board has a positive impact on bank performance.

Gender diversity and bank risk

The effect of gender diversity on the risk-taking tendency of a board is an empirical question (Mohsni, Otchere, & Shahriar, 2021). On one hand, more idiosyncratic decisions will be made by board members with similar preferences, motivations, and viewpoints since they will face fewer criticism within the board. As a result, such board diversity may result in less variable outcomes (Bernile, Bhagwat, & Yonker, 2018). On the other hand, disagreements and disturbance in the board's decision making process may be intensified by diversity, making it harder to establish consent and resulting in unpredictable consequences (Arrow, 2012).

According to behavioral finance, gender difference is one such character which influence an individual's risk preference (Fisher & Yao, 2017; Lee-Hwei Khaw & Liao, 2018). These findings suggest that men are more likely to take risks and are confident. Women on the other hand are thought to be more emotional and cautious than men (Lee-Hwei Khaw & Liao, 2018).As a result, women tend to avoid risks when financial and investment decisions are to be taken (Lam, 2015). However, in the corporate settings, the empirical findings concerning women's decisions in investments are not completely validated (Othmani, 2021). The findings do not support the widely held belief that women are risk averse in comparison to men. Firms which have gender diversity in its upper management are thought to be less risky. In boardrooms, heterogeneity may bring varying perspectives and problem-solving methods, which can lead to better decisions (Othmani, 2021).

The resource dependence theory states that participation of women increases directorial resources with better evaluations, particularly in stressful conditions (Abou-El-Sood, 2019; Pucheta-Martínez et al., 2018) They offer wide range of solutions, market analysis, and risk mitigation strategies (Chan, Koh, & Abd Karim, 2016). Again from an agency-theory perspective managers take fewer risky decisions to protect their undiversified human resources (Poletti-Hughes & Briano-Turrent, 2019). Shareholders, on the other hand, have a higher risk tolerance in order to increase their profits (Jensen & Meckling, 1976). As a result, bank boards are likely to support risk taking in an effort to harmonize the shareholder's and agent's risk preferences. Nonetheless, in complicated situation, agency theory has flaws that make it unsuitable as a framework. It cannot give a clear understanding of the relationship between board gender diversity and risk-taking.

The negative relationship between gender diversity and firms' risk was found by Perryman, Fernando, and Tripathy (2016), Bernile et al. (2018), Lee-Hwei Khaw and Liao (2018), and by Palvia, Vähämaa, and Vähämaa (2015) in the banking sector for a sample of US commercial banks, Gulamhussen and Santa (2015) for a sample of 461 large banks from OECD countries, and Skała and Weill (2018) for Polish cooperative banks.

On the other hand, gender diversity can have a positive impact on the risk of a firm. Poletti-Hughes and Briano-Turrent (2019) reported that gender diversity raises firm's risk because women make risker strategic decisions. They claim that women on bank boards may improve financial performance by making riskier strategic decisions. Women are able to make riskier decisions owing to their education and expertise in risk management. Adams and Funk (2012) also found such a positive relationship.

The few and ambiguous findings about the impact of board gender diversity on bank risk inspire us to study this relationship in the context of a developing country. As a result, we propose that women's behavior to avoid risk is the most observed, and we propose the following hypothesis:
H2: Gender diversity on board has a negative effect on Asian banks' risk

3. Methodology

3.1 Sample selection and Data Sources

The aim of this study is to analyze the impact of gender diversity on bank performance and risk in context of Asian countries. Our study comprises a 15-year panel data set consisting of the year 2008 to 2022 of 180 listed banks operating in 28 countries

3.2 Variables Measurement:

We have used the following dependent, independent and control variables in accordance to the works of Abou-El-Sood (2019); Bernile et al. (2018);García-Meca et al. (2015); Poletti-Hughes and Briano-Turrent (2019)

Dependent Variables

Firm performance: Bank performance and bank risk are the dependent variables in this study.
To determine bank performance ROA and ROE have been used. We used Net Income After Taxes divided by Total Assets Reported to compute ROA which indicates how efficiently a bank uses its assets to create revenue. And to compute ROE we used Net Income After Taxes divided by Total Equity which is the measurement of financial return to shareholders.

Firm risk: To analyze bank risk, Z-score has been used as a measure of insolvency risk. The possibility of bank failure is inversely related to default risk (Chan et al., 2016; John, De Masi, & Paci, 2016). Lower Z-score values suggest a higher likelihood of bank failure (insolvency risk), and vice versa. Z-Score measurements are represented by ZROA and ZROE and are based on ROA or ROE. ZROA is calculated as

$$Z\_ROA = (ROA + KA)/\ ROA\_sd$$

where KA is the capital-asset ratio (equity to assets) and ROA_sd is the standard deviation of ROA, computed for the full period 2008–2022. Similarly, we computed Z_ROE.

Independent Variables

As our primary measure of gender diversity, we have used the percentage of women directors on bank boards. To ensure the result's robustness; we have also used two other measures. These indexed measures of diversification correspond to the Blau (1977) Index (GD2) and the Shannon (1948) Index (GD3). The Blau Index is calculated as $GD2 = 1 - P_i^2$, where P_i is the proportion of directors in each of the $n = 2$ gender groups. The $GD2$ variable has a range of values between 0 and 0.5, where 0 indicates no gender diversity (i.e., there is only male or female members on the board), whilst 0.5 indicates an equal percentage of both male and female members on the board. The second indexed measure of gender diversity is based upon the Shannon Index, computed as $GD3 = \left|\sum_{i=1}^{n} LnPi^{Pi}\right|$. This metric uses the same inputs as the Blau Index $(GD2)$. Hence, when there is no gender diversity, $GD3$ variable takes a value of 0 and when there is an equal proportion of each gender group, it takes a value of 0.693. By construction, when $P_i = 0$, this index assumes that $GD3 = 0$.

The $GD2$ and $GD3$ variables are highly correlated. However, due to its logarithmic transformation Abad, Lucas-Pérez, Minguez-Vera, and Yagüe (2017), $GD3$ is more sensitive to little variations than $GD2$ in terms of gender diversity when compared to their standard deviations.

As a result, we consider both measures to be complementary rather than alternative indicators of board gender diversity, and we utilize both in our analyses.

Control Variables: To avoid model misinterpretation, we have used several control variables such as board size, board independence and bank size. A number of regression model is constructed where these control variables are used separately to understand their effect on value and performance of firm.

To calculate board size (BSIZE), the natural logarithm of the number of board directors has been taken. According to some research, large boards improve firm performance (and minimize risk) through improving board supervision and advising whereas others demonstrate that large boards increase coordination and communication expenses. (Adams & Mehran, 2012; Boubaker et al., 2014).They have a detrimental impact on bank performance (Gulamhussen & Santa, 2015; Liang et al., 2013; Pathan & Faff, 2013) while also having a favorable impact on risk (Abou-El-Sood, 2019). In case of board independence, some literature claim that the participation of independent directors gives additional resources, abilities, and expertise that can help boards function more effectively (García-Meca et al., 2015; Liu, 2018). Other literatures, however, claim that they lack the requisite understanding of firm-specific information, particularly in the banking sector (Liang et al., 2013; Pathan & Faff, 2013)

Table 1: List of dependent and independent variables

Variables (Acronym)	Name of Variables	Measurement	Expected impact	Source
ROA	Return on Asset	Net Income After Taxes/ Total Assets Reported	Positive	(Othmani, 2021)
ROE	Return on Equity	Net Income After Taxes / Total Equity	Positive	(Othmani, 2021)
ZROA	Z score based on ROA	(Return on Asset + Capital Asset Ratio)/ standard deviation of ROA	Negative	(Othmani, 2021)
ZROE	Z score based on ROE	(Return on Equity + Capital Asset Ratio)/ standard deviation of ROE	Negative	(Othmani, 2021)
Percentage of female on board	Measure of gender diversity	Percentage of female member on board		
BLAU Index	Proxy of gender diversity	$GD2 = 1 - P_i^2$		
Shannon Index	Proxy of gender diversity	$GD3 = \left\lvert \sum_{i=1}^{n} LnPi^{Pi} \right\rvert$.		
Boardsize	Size of board	ln(CGBoardSize)	Positive	(Othmani, 2021)
BoardIndep	Board independence	Percentage of independent members	Positive	
Size	Bank size	Calculated by aggregating governance variables such as voice and accountability, political stability, government performance, etc.	Positive	(Othmani, 2021)

3.3 Measurement model

This study is based on panel data estimation with fixed effect GLS (generalized least squares) model. In our econometric model, there are several limitations of the unobserved heterogeneity problem which measures the time-invariant variables of each firm (Gormley & Matsa, 2014). Also, the endogeneity problem arises because of the causality relationship between some independent variables (Baltagi, Egger, & Pfaffermayr, 2013; Roberts & Whited, 2013; Wintoki, Linck, & Netter, 2012).

The generalized least square approach is used to evaluate our model. The panel needs a random effects approach after executing the Hausman test. We rejected the absence of firm specific impact as a preliminary estimate, which suggests that ordinary least squared (OLS) calculations are inconsistent, and FE and RE estimations are more appropriate. The STATA command xtgls fits panel-data linear models using feasible generalized least squares for the random effects model. This xtgls command checks for autocorrelation and cross-sectional correlation within panels.

$$Y_{itc} = \beta_0 + \beta_1 \text{GenderDiversity} + \beta_2 \text{GD2} + \beta_3 \text{GD3} + \sum_{j=1}^{j} \gamma_j FLV_{itc} + \varepsilon_{it}$$

Here Y represents proxies for firm performance and risk. FLV is the vector of J = 3 control, firm-level variables corresponding to board size, board independence and bank size and eit is the stochastic error term.

4. Analysis

4.1. Univariate analysis

Table 2 displays basic descriptive statistics (mean, maximum, mean and standard deviation) of all variables used in the study. Mean ROA and ROE value are 1% and 10% respectively. This is an indication of poor financial performance in case of Asian Banks. In case of risk, ZROA ranges from -1.076 to 88.92 with a mean of 1.153 and ZROE ranges from -19.384 to 70.272 with a mean of 0.362. This indicates that bank risk is more prominent than performance. In terms of representation of women on bank boards we find that the mean is 0.082 with a maximum of 46.2. Regarding the two other alternative measures of gender diversity, the Blau index and Shannon index have average values of only 0.132 and 0.216 respectively, which are much lower than the 0.50 and 0.693 indexes that are considered balanced representation of gender diversity.

Lastly considering board features, the mean board size is 2.415, while the mean board independence is 0.345.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	6346	0.010	0.009	-0.029	0.049
ROE	6351	0.101	0.082	-0.372	0.321
z ROA	6476	1.153	1.389	-1.076	88.921
z ROE	6476	0.362	1.013	-19.384	70.272
AnalyticBoardFemale	1122	0.082	0.098	0.000	0.462
BLAU INDEX	1122	0.132	0.144	0.000	0.497
SHANNON INDEX	1122	0.216	0.223	0.000	0.690
% of independent board members	1090	0.345	0.221	0.000	1.000
ln(CGBoardSize)	1162	2.415	0.355	0.000	3.332
ln(TotalAssetsReported)	6477	22.864	1.915	14.403	28.887

Table 3 displays the correlation between study's main variables. It has been found that there's low correlations between independent variables except those that measure the same thing, such as the proxies for gender diversity (female on board, Blau index, Shannon index). Both ROA and ROE are seen to have a significant positive correlation with almost all of the independent variables. However, ROA has a significant negative correlation with board size and bank size and ROE has insignificant negative relation with board size. In case of bank risk ZROE has significant positive correlation with almost all the independent variables. But discrepancy has been observed in correlation between ZROA and the independent variables.

Table 3: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ROA	1.00									
(2) ROE	0.78*	1.00								
(3) z_ROA	0.45*	0.06*	1.00							
(4) z_ROE	0.78*	0.71*	0.27*	1.00						
(5) AnalyticBoardF~e	0.09*	0.21*	-0.01	0.10*	1.00					
(6) BLAU INDEX	0.10*	0.21*	0.00	0.11*	0.99*	1.00				
(7)SHANNON INDEX	0.10*	0.22*	0.00	0.11*	0.97*	0.99*	1.00			
(8) Board independence	0.27*	0.23*	0.23*	0.09*	0.16*	0.17*	0.18*	1.00		
(9) Board size	-0.12*	-0.02	-0.11*	0.11*	0.29*	0.32*	0.34*	-0.11*	1.00	
(10) Bank size	-0.08*	0.11*	-0.28*	-0.05*	0.12*	0.14*	0.15*	-0.08*	0.27*	1.00

*** *p<0.01*, ** *p<0.05*, * *p<0.1*

Table 4 displays the regression analysis for bank performance. It can be seen that the three measures of board gender diversity are statistically insignificant and negatively related to ROA. However, in case of ROE negatively significant relationship can be found in all three cases. This indicates that gender diversity in bank board negatively affects its performance. The potential explanation for this anomaly might be that the barriers women face in education and training within male-dominated societies, such as in Asia, hinder women's development and the realization of their potential. Consequently, gender diversity within firms can have a negative impact rather than a positive one. Another reason might be the over monitoring that occurs as a result of increased gender diversity in board (Adams & Mehran, 2012). Moreover, with increased gender diversity, conflict increases which in turn may hamper decision making resulting in lower performance(Richard, Barnett, Dwyer, & Chadwick, 2004; Treichler, 1995). This rejects our hypothesis H1. Thus our study supports the findings of Liang et al. (2013), Nguyen et al. (2015), and Sajjad and Rashid (2015) disapproving the findings of Palvia et al. (2015), Post, Rahman, and Rubow (2011), García-Meca et al. (2015).

Analysis of bank performance with other board features also give valuable insights. Board size has negative insignificant relation with banks' performance for both ROA and ROE. This suggests that banks having larger board have lower performance. This finding is consistent with those of Liang et al. (2013), Pathan and Faff (2013) Liang et al. (2013), Gulamhussen and Santa (2015). In case of

board independence, positive significant relation has been found with bank performance consistently. This is because board independence promotes better decision making which improves firm performance (Carter et al., 2010). Moreover, we found a positive significant relation of bank size with both ROA and ROE. It is also to be noted that the regression coefficients are very small.

Table 4: Regression analysis for bank performance

VARIABLES	(1) ROA1	(2) ROA2	(3) ROA3	(4) ROE1	(5) ROE2	(6) ROE3
AnalyticBoardFemale	-0.0011			-0.0286**		
	(0.0012)			(0.0135)		
% of independent board members	0.0040***	0.0037***	0.0036***	0.0214***	0.0209***	0.0207***
	(0.0006)	(0.0006)	(0.0006)	(0.0061)	(0.0061)	(0.0061)
Board size	-0.0001	-0.0001	-0.0001	-0.0048	-0.0046	-0.0045
	(0.0004)	(0.0004)	(0.0004)	(0.0040)	(0.0040)	(0.0040)
Bank size	-0.0010***	-0.0010***	-0.0010***	0.0031*	0.0031*	0.0031*
	(0.0001)	(0.0001)	(0.0001)	(0.0016)	(0.0016)	(0.0016)
BLAU INDEX		-0.0009			-0.0192**	
		(0.0008)			(0.0092)	
SHANNON INDEX			-0.0007			-0.0118**
			(0.0005)			(0.0060)
Constant	0.0344***	0.0343***	0.0342***	0.0411	0.0418	0.0425
	(0.0030)	(0.0030)	(0.0031)	(0.0389)	(0.0393)	(0.0396)
Observations	1,036	1,036	1,036	1,035	1,035	1,035
Number of Iden	127	127	127	127	127	127
Ind. FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
These are preliminary results

Table 5 displays the findings of the relationship between gender diversity and bank risk. The result shows that participation of women on Asian bank boards is positively related to Z-score. This implies that with increased gender diversity insolvency risk of Asian banks increases. Thus, our hypothesis H2 is not verified. The reason behind this may be that women board members have higher ability to make riskier decisions in order to improve financial performance. So, women board members are greater risk takers in case of Asian banks. However, the same statistically significant result is not found in case of ZROE. Moreover, the results are not robust and consistent. These finding are in line with the findings of Poletti-Hughes and Briano-Turrent (2019) and Gulamhussen and Santa (2015) but not in line with those of Chan et al. (2016) and Lau and Murnighan (1998).

Table 5: Regression analysis for bank risk

VARIABLES	(1) ZROA1	(2) ZROA2	(3) ZROA3	(4) ZROE1	(5) ZROE2	(6) ZROE3
AnalyticBoardFemale	0.1281**			-0.0017		
	(0.0632)			(0.0436)		
% of independent board members	0.0991***	0.1005***	0.1019***	0.0786***	0.0769***	0.0752***
	(0.0287)	(0.0287)	(0.0288)	(0.0183)	(0.0185)	(0.0187)
ln(CGBoardSize)	0.0404**	0.0398**	0.0393**	0.0654***	0.0641***	0.0627***
	(0.0169)	(0.0169)	(0.0169)	(0.0148)	(0.0148)	(0.0149)
ln(TotalAssetsReported)	-0.1450***	-0.1450***	-0.1447***	-0.0236***	-0.0234***	-0.0232***
	(0.0074)	(0.0074)	(0.0074)	(0.0037)	(0.0038)	(0.0039)
BLAU INDEX		0.0726*			0.0017	
		(0.0432)			(0.0299)	
SHANNON INDEX			0.0325			0.0032
			(0.0273)			(0.0194)
Constant	4.4751***	4.4769***	4.4745***	0.7833***	0.7818***	0.7806***
	(0.1863)	(0.1864)	(0.1865)	(0.0886)	(0.0906)	(0.0927)
Observations	1,039	1,039	1,039	1,039	1,039	1,039
Number of Iden	127	127	127	127	127	127
Ind. FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
These are preliminary results

Regarding other board characteristics like board independence, board size and bank size, a positive significant relationship has been found in all cases. Independent directors act in cooperation with stakeholders in seeking risk for higher returns. And with the increase in size, risk also increases. These findings are supported by Chan et al. (2016) and Pathan (2009).

5. Conclusion and Implication

The purpose of this study is to investigate the impact of gender diversity on banks' performance and risk in case of Asian banks. Considering the limitation of study on this topic, particularly in the context of Asian bank, it has been an intriguing research topic to pursue. Our study comprises a 15-year panel data set from the year 2008 to 2022 of 180 listed banks operating in 28 Asian countries. We used ROA and ROE as dependent variables for bank performance, and we calculated Zscore for ROA and ROE to be used as dependent variable for bank risk. The independent variable was mainly percentage of female on board which we used as a measure of gender diversity. We also calculated BLAU index and Shannon index for robust result. Control variables used in the study are board size, independence, and bank size. The study has been based on panel data estimation with fixed effect GLS (generalized least squares) model.

According to our findings, gender diversity has a negative impact on Asian bank profitability. But it has a positive impact on banks' Zscore. However, the findings are not robust when it comes to several measures of gender diversity with bank performance and risk.

Although most studies reveal a positive relation between board gender diversity and firm performance, this relationship is not robust to any of our methods of resolving the endogeneity of gender diversity. It implies that the actual relationship between gender diversity and bank performance is more complicated. As our findings are not robust, we conclude that gender diversity has a negative or neutral relationship with bank performance. This finding is consistent with Adams and Ferreira (2009), Ahern and Dittmar (2012), Boubaker et al. (2014) and Ali, Ng, and Kulik (2014).However, the reason for such negative effect might be the fact that in the context of Asian society, women are particularly disadvantaged concerning education and training. This theoretical perspective aligns with the assertion that male-controlled organizations and societies impose structural barriers that obstruct women from accessing power, opportunities, and resources, including education, finance, networks, business experience, management training, and property rights (Carter & Williams, 2003; Fischer et al., 1993; Tong, 2007). Moreover, women's limited experience in firm settings and their involvement in business may help elucidate the observed negative effect of gender diversity with bank performance. This might also be because of over-monitoring or lack of appropriate skills of the female members of board, contradicting the human capital and resource dependency theories *(Adams & Mehran, 2012)* .

The non-linear U-shaped relationship between gender diversity on boards and different measures of bank performance may be another possible explanation for the inconclusive results (Owen & Temesvary, 2018). Participation of female members becomes favorable after reaching a certain level of gender diversity.

There are certain limitations in this study. First, there are just a few publicly traded Asian banks. Second, the majority of our dependent variables for bank performance and risk are accounting metrics (ROA, ROE, and Zscore). We did not take into consideration the quota system prevalent in different countries nor the cultural diversity. Moreover, this study's results were unable to provide a robust and conclusive finding. Despite these limitations, the study's contribution to the literature on gender diversity on boards is not compromised. These limitations may present research possibilities in the future. In future studies, we may employ additional measurements of these factors, such as market-based ones, to improve our knowledge of the relationship between gender diversity and bank performance and risk. Future studies will also focus on analyzing the role of gender diversity on board processes, such as meetings, and decision makings, as well as gender diversity on top management teams. We may also evaluate more specific components of other board characteristics such as board members' age, expertise, qualifications, and educational backgrounds.

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Gender Discrimination in the Credit market of Sub-Sahara Africa; Does Firm Size Matter?

Yakubu Musah Seidu
DAAD - German Academic Exchange Service
yakubumusah31@gmail.com

Abstract

Sub-Sahara Africa (SSA) remains the most difficult region in the world to do business according to the World Bank's 2019 and 2020 "Doing Business" report (The World Bank, 2023). Access to credit has been identified as one of the major bottlenecks for firms in the region, particularly for female-owned firms. Access to credit is crucial for economic growth and poverty reduction. With the intent of adding to the existing literature and to determine whether firm size influences credit access as well as providing policy-relevant interventions. This work established the existence of a gender gap in access to credit in Sub-Sahara Africa. The result showed that female-led small firms, medium firms, and large firms are 9.7, 10, and 9.6 percentage points respectively more likely to face financial constraints compared to male-led firms in SSA at a 1% significant level, it also found that female-owned small firms are 23 percentage points more likely to have credit constraints compared to medium and large firms in in the subregion. Furthermore, the financial transparency of the firm and foreign ownership of the firm reduces the chances of a firm facing credit constraints. At a 1% significance level, being a foreign-owned firm reduces the likelihood of having financial constraints by 20, 23, and 20 percentage points for small, medium, and large firms respectively. It is therefore recommended that women owned firms are targeted and provided with financial education programs aimed at boosting women's financial knowledge and abilities. This can assist and empower them to make more informed financial decisions and more effectively utilize financial services. Policies and programs that improve women's access to credit, such as access to auditing firms (auditing consultancy firms), collateral substitutes, or microfinance efforts, can assist them overcome the barriers to getting loans for entrepreneurial purposes.

***KEYWORDS*: Financial Constraints, Gender Discrimination, Firm Size, SSA**

INTRODUCTION

Sub-Sahara Africa (SSA) remains the most difficult region in the world to do business according to the World Bank's 2019 and 2020 "Doing Business" report (The World Bank, 2023). Access to credit has been identified as one of the major bottlenecks for firms in the region, especially for female-owned firms. Access to credit is critical for economic growth and poverty reduction. Therefore, issues of gender discrimination in credit markets must be addressed, because they can perpetuate gender inequality and hinder women's economic empowerment (Hansen & Rand, 2014).

Several studies have documented the existence of gender discrimination in credit markets in SSA. For example, a study by Klasen and Lamanna (2009) found that women in Burkina Faso, Ghana, and Senegal face higher interest rates and collateral requirements than men when applying for credit. Similarly, a study by Udry (1996) (Udry, 1996) found that women in Ghana face significant barriers to accessing credit, including discriminatory lending practices by banks and lack of collateral. Another study by Oduro et al. (2017) found that women in Ghana are less likely to receive credit than men, even when they meet the same credit requirements. However, previous studies have focused on gender discrimination in the setting of specific countries within developing countries rather than examining the environment of the entire region. (Klasen & Lamanna, 2009)

The study by Asiedu *et al* (2013), which used data from the World Bank's Enterprises Survey (WBES), may be an exception to this trend. Asiedu *et al* (2013) established the existence of a gender gap in access to finance among firms across SSA. According to these studies, gender discrimination in credit markets is a prevalent and systemic issue in SSA. The authors did not, however, investigate whether firm size played a role in gender discrimination among developing countries or the context of different developing-world locations. According to the evaluation of the literature, there is a dearth of studies on whether firm size matters in gender discrimination in credit access in Sub-Saharan Africa. To address this shortcoming, this study investigates whether firm size matters in gender discrimination in credit access in Sub-Saharan Africa. The relevance is that this study focuses on the type of firms most affected by gender discrimination in access to credit to fully understand which type of firms are most affected by this credit squeeze.

This study draws a sample from the report of the WBESs between 2006 to 2011 and was made up of 63, 170 firms from 90 developing countries. A probit regression was used to analyze the sample. The result indicated that there was a gender gap in access to credit and firm size was negatively correlated with financial constraints. Also, financial transparency enhances access to credit, and foreign-owned firms faced much lower credit access constraints.

The rest of this work is structured as follows, a review of literature is followed by data and methodology, then the empirical strategy is presented followed by the results. The conclusions and recommendations are then presented flowed by limitations of this study.

Literature Review

A preponderance of the literature has established the existence of gendered credit discrimination in sub-Saharan Africa. Most of these papers used data from specific countries with a few focusing on specific sectors. Asiedu *et al* (2013) was an exception, they focused on the subregion at large but again their focus was not different. Although different dependant variables were used by different authors in the literature, since the dependant variable was always dichotomous, probit regression was the go-to method used by almost all authors.

I explore a couple of the literature and what they found here. Bokpin & Issahaku, (2019) found gender discrimination in Sub Sahara Africa to be a significant problem that hinders women's economic empowerment and contributes to gender inequality. Ferrant & Kolev, (2016) found that it often results in unfavourable credit terms for women and sometimes being excluded from assessing credit altogether.

In the SSA subregion, disparities in access to credit between the different genders are pervasive, with women facing significant hurdles in gaining access to financial resources including credit. In a 2018 World Bank report on financial inclusion, only 34% of women in West Africa have access to formal financial services compared to 45% of men. This disparity in financial access is even steeper in some countries. For example, in Nigeria, only 27% of women have access to formal financial services compared to 40% of men (Bokpin & Issahaku, 2019). The fact that access to credit is a critical hurdle for women entrepreneurs in the region was also highlighted in the African Development Bank's Gender Marker report (Mbah, 2020).

According to the African Development Bank report, only 16% of women-owned ventures have access to credit compared to 25% in the case of men (AfDB, 2012). The adverse impact of these credit squeeze on the economic welfare of women, their families, and society can be far-reaching.

Their inability to access credit to facilitate and expand their enterprises limits their economic opportunities and household income. This reinforces inequality between the genders and may lead to poverty in women-headed households. This has hindered economic growth and development at the macro level in the region (Ferrant & Kolev, 2016).

The results of a study by Asiedu and Freeman (2018) indicated that women face significant obstacles in gaining access to credit and those who manage to gain credit face higher interest rates and shorter repayment periods compared to their male counterparts. Limiting the ability of women to invest and grow their businesses and therefore limiting economic growth (Asiedu & Freeman, 2018). A similar study in Ghana by Bokpin and Issahaku (2019) found discrimination against women entrepreneurs by financial institutions. It showed that for the same level of creditworthiness, financial institutions are more likely to approve loan applications of males than females, limiting the ability of women to invest and grow their businesses (Bokpin & Issahaku, 2019). In Nigeria, Ogunleye & Adebisi (2018) also found discrimination against women entrepreneurs, requiring them to provide higher collateral than their male counterparts and paying higher interest rates. This inhibits the ability of women to access credit leading to slower economic growth (Ogunleye & Adebisi, 2019).

The impact of gender-based discriminatory practices on women and women-owned firms in SSA has been explored by several studies. A study by Amin and Mattoo (2016) found that discriminatory lending practices have negatively affected women's economic empowerment as it limits their ability to start and/or expand their businesses. This results mainly from the significant barriers women face trying to access credit, including discriminatory lending practices, limited access to collateral, and socio-cultural biases. A similar study by Kabeer and Mahmud (2004) found that women are profoundly hindered in their ability to invest in Education and healthcare because of their inability to access credit.

This issue of the gender gap in the credit market of SSA is complex and has a hydra-headed root cause. Most of the time women are inhibited by social and cultural norms that limit their access to educational and economic opportunities. This limits their ability to provide collateral or forms of identification needed to access credit. Sometimes some of these social norms are codified into legal and regulatory frameworks that place impediments in the path of women entrepreneurs (Mbah, 2020).

Data and Methodology

The data for this work came from the work of Asiedu *et al* (2013). The data was compiled mainly from the World Bank's Enterprises Surveys (WEBS) and the World Development Indicators (WDIs). The World Bank Enterprise Survey is a firm-level survey of the private sector of a country's economy.

The surveys cover a wide range of themes in the business environment, such as access to finance, corruption, infrastructure, competitiveness, and performance measurements. The WBES data is unique because the depth of the questionnaire and the number of countries and territories.

This study draws a sample from the report of the WBESs between 2006 to 2011 and was made up of 63, 170 firms with at least 5 employees from 90 developing countries (25 from SSA, 22 from Latin America and the Caribbean, 30 and 10 from Central Asia and East Asia & Pacific respectively).

Empirical Strategy

For this study's empirical model, the researcher employed probit regression because the study's dependent variable is binary/dummy. The model can be specified as follows:

$$\textbf{Financial\_Constraint}_{ijk} = \beta_0 + \beta_1 \textbf{Gender}_{ijk} + \beta_2 \mathbf{X}_{ijk} + \varepsilon_{ijk}$$

In Error! Reference source not found. Error! Reference source not found., this model specification is explained as follows:
Financial Constraint in a firm *i* in a country *j* in a subregion *k* represents the dependent variable, which is a binary variable indicating the presence or absence of financial constraint. Financial_contraints take the values "1" if the firm has a financial constraint and "0" if the firm has no financial constraint in accessing credit.

Gender is the binary independent variable representing the gender of the manager of the firm *i* in country *j* in region *k*. Gender takes the value "1" if the manager of the firm is female and "0" if the manager is male.

X*ijk* is a vector carrying all the control variables for firm *i* in a country *j* and region *k.* X encompasses firm Size which is a categorical control variable that captures the size of the firms. Firm sizes were grouped into three categories (Small, Medium, and Large). Ownership is a binary control variable indicating foreign ownership of the firm. Ownership takes the value of "1" if Foreigners have a stake in the firm and "0" if all stakes are held by domestic owners. Inflation is a numeric control variable reflecting the level of inflation in country *i* in region *k.* Financial Transparency is a binary control variable indicating whether the financial statement of the firm for the previous year was audited by external auditors and take the value "1" if the firm's financial statement in the previous year was audited by external auditors and "0" if the firm's financial statement in the previous year was not audited by external auditors. CPI Inflation is the consumer price index inflation in country *j*. SSA represents sub-Saharan Africana countries and takes the value of "1" if the country is a sub-Saharan African country and "0" otherwise. The β (beta) coefficients represent the estimated effects of the independent and control variables on the financial constraint. The ε (error) term represents the error term or unobserved factors affecting the financial constraint that is not accounted for in the model such as socio-cultural norms, financial literacy, and access to information among others.

Results and Analysis

On financial constraints, both the robust regression and the marginal effects regression showed the same results see Table 1 below. The regressions showed that female ownership of a firm has a positive correlation with financial constraints and statistically significant coefficient at 1 % significant level. This demonstrates that female-owned firms are more likely to encounter financial constraints than their male-owned counterparts in SSA. The result showed that female-led small firms, medium firms, and large firms are 9.7, 10, and 9.6 percentage points respectively more likely to face financial constraints compared to male-led firms in SSA at a 1% significant level.

Out of curiosity, a regression was run for the whole sample of developing countries. the coefficient for Financial Constraints (the main variable of interest) was statistically insignificant for all countries in the sample. So, the data was desegregated into regions and the probits regression was rerun and this provided different results for the different regions. The coefficients for financial constraints were only significant at 10% for Latin America and the Caribbean (LAC) and not

significant for East Asia and the Pacific (EAP) and Central Asia (CA). Therefore, a study based on the pooled data could produce deceptive conclusions. Based on this data, the gender gap in financial constraints can only be proven for SSA (Since other regions were not part of the objective of this work it was not pursued beyond this point).

A plethora of factors could account for the existence of a gender gap in access to finance in SSA. These include sociocultural norms and traditional gender roles resulting in gender differences in endowment and unequal access to assets and collateral needed to access credit. Gender bias in financial institutions is also another possible reason for the gender gap in financial constraints. Unequal education levels and therefore unequal financial literacy among men and women could also be another factor that could limit the ability of women in accessing credit, increasing their financial constraints.

On firm size, the tabulated results also showed that at a 1% significance level, firm size does indeed matter as female-owned small firms are 23 percentage points more likely to have credit constraints compared to medium firms and large firms in SSA. Medium firms on the other hand are 11% less likely to face financial constraints compared to small and large firms. Furthermore, large firms are 33 percentage points less likely to face financial constraints. (See Table 1 below). This was expected because large firms could take advantage of economies of scale making them more profitable than their small counterparts. Furthermore, large firms are more likely to have experts working on their financial documentation and positioning, making them appear more creditworthy and more attractive to financial institutions. They are also more likely to have more valuable assets which they can leverage as collateral for getting credit. The expectation was that the gender gap in access to financing will reduce as firm size increased. And the results proved same.

On ownership of the firm, it was found that local (indigenous) or domestic firms also face a much higher difficulty in accessing credit compared to foreign-owned firms which are less likely to be constrained. At a 1% significance level, being a foreign-owned firm reduces the likelihood of having financial constraints by 20, 23, and 20 percentage points for small, medium, and large firms respectively (see Table 1 below). This could be the result of the fact that foreigners will only invest in firms that have a reputation for profitability and transparency in financial accounting. These are also the qualities that make a firm more credit-worthy and therefore more attractive for financial institutions to want to do business with. Foreign-owned firms may come with managerial expertise, more advanced technologies, and specific industry knowledge, making them more productive and more competitive, reducing their perceived credit risk. Multinational firms can also tap into the financial resources of their parent company, thus reducing their likelihood of having financial

constraints.

For financial transparency, it was realized that financial transparency or having an audited financial statement reduces the likelihood of having financial constraints by a whopping 43, 48, and 46 percentage points for small medium, and large firms respectively at a 1% significance level (see Table 1 below). Intuitively, audited financial statements are some of the main documents used to access the creditworthiness of a credit applicant by financial institutions. Audited statements provide a thorough summary of the firm's financial performance, assisting lenders in determining the firm's ability to repay loans and meet financial obligations. The dependability and integrity of audited financial accounts can boost a company's credit rating and increase its prospects of obtaining loans in favourable conditions. It is therefore not surprising that this variable (financial transparency) has such a high negative coefficient on financial constraints.

Inflation, as expected, Inflation, according to the results (see Table 1 below) increases financial constraints by roughly 3 percentage points for all firm sizes. As higher inflation rates may cause interest rates and borrowing costs to rise, thus reducing lending activity and increasing financial constraints of firms.

Table 1 Gender Discrimination in Credit Access in Sub-Saharan Africa: Does Firm Size Matter?

Dependent Variable = Access to Credit (Financial Constraint)			
VARIABLES	(1) Probit Small firms	(2) Probit Medium Firms	(3) Probit Large Firms
Gender (Ownership by gender) = 1, Female	0.0965***	0.100***	0.0960***
	(0.0316)	(0.0316)	(0.0316)
Type of ownership of firm = 1, Foreign Ownership	-0.199***	-0.229***	-0.201***
	(0.0391)	(0.0387)	(0.0391)
Small Firm size = 1, Small firm size	0.225***		
	(0.0327)		
Financial Transparency = 1, Audited Financial statement	-0.426***	-0.482***	-0.458***
	(0.0309)	(0.0296)	(0.0297)
Inflation (CPI)	0.0316***	0.0310***	0.0316***
	(0.00372)	(0.00371)	(0.00371)
Medium Firm size = 1, Medium firm size		-0.105***	
		(0.0342)	
Large Firm size = 1, Lage firm size			-0.328***
			(0.0532)
Constant	-0.0591	0.153***	0.135***
	(0.0487)	(0.0394)	(0.0392)
Observations	8,197	8,197	8,197
ssa FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Conclusions and recommendations

The analysis reveals a significant gender gap in credit constraints across all firm sizes in Sub-Saharan Africa (SSA), aligning with previous research (Asiedu et al., 2013). Female-owned firms face greater financial constraints, hindering their access to credit and impeding business expansion. Contributing factors include socio-cultural norms, limited financial literacy, legal and regulatory barriers, and institutional biases (Bokpin & Issahaku, 2019).

This gender disparity aligns with theories such as the gendered division of labour theory, highlighting how traditional roles limit women's economic opportunities. Capital theory emphasizes the importance of financial resources, showing women in SSA face barriers like limited savings and higher interest rates. Institutional theory underlines the impact of social and cultural norms on financial access, suggesting legal and regulatory frameworks may be insufficient (Treas & Tai, 2016; Richter, 1989; Scott & Crompton, 2006; Petri, 2020; Jepperson & Meyer, 2021; Dheeraj, 2023).

Firm size influences credit access, with larger firms benefiting from economies of scale and financial transparency. Audited financial statements enhance creditworthiness, supporting the capital theory. Foreign-owned firms face fewer constraints, aligning with the reputation and transparency factors affecting creditworthiness (Asiedu and Freeman, 2018; Berguiga & Adair, 2022; Zimmerman & Carter, 2013; Cole et al., 2013).

Higher inflation rates exacerbate financial constraints, reflecting market uncertainty.

The gender gap's implications are significant, limiting women's business growth, profitability, and access to markets and networks. Job creation and innovation potential from women-owned firms are hindered, impacting overall regional economic development (Ferrant & Kolev, 2016).

It is therefore recommended that women should be targeted with financial literacy education and access to consultancy firms that will enhance their financial transparency and the therefore reduce their credit constraint. Credit guarantees could also be provided to enable women expand their enterprises which will also reduce their credit constraints.

Limitations

The study's definition of female ownership (Number of women in management) may overestimate its influence, and the focus on SSA limits external applicability to other regions.

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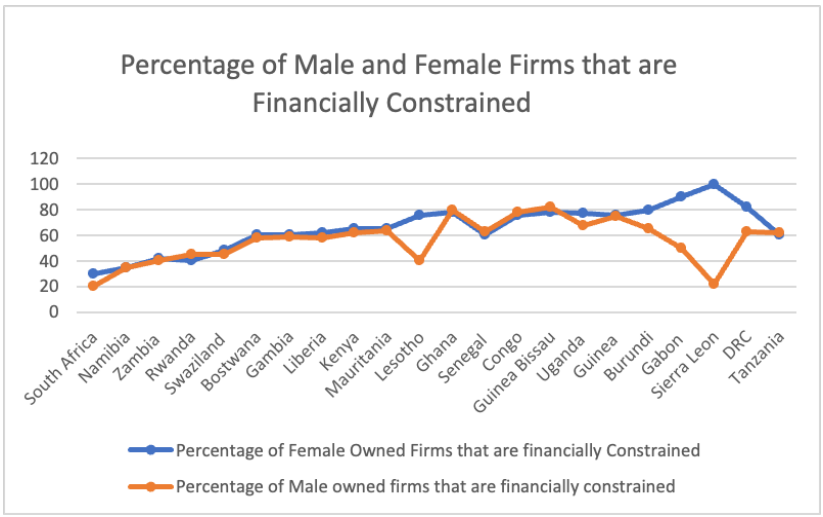
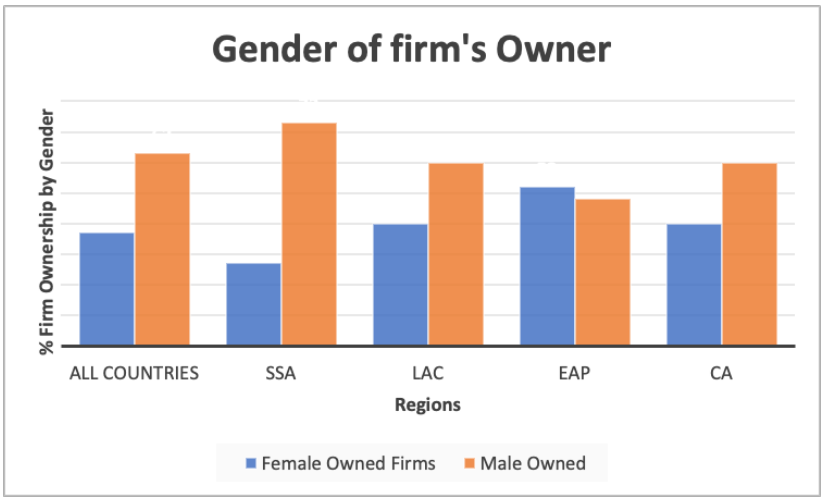
10.0 APPENDICES

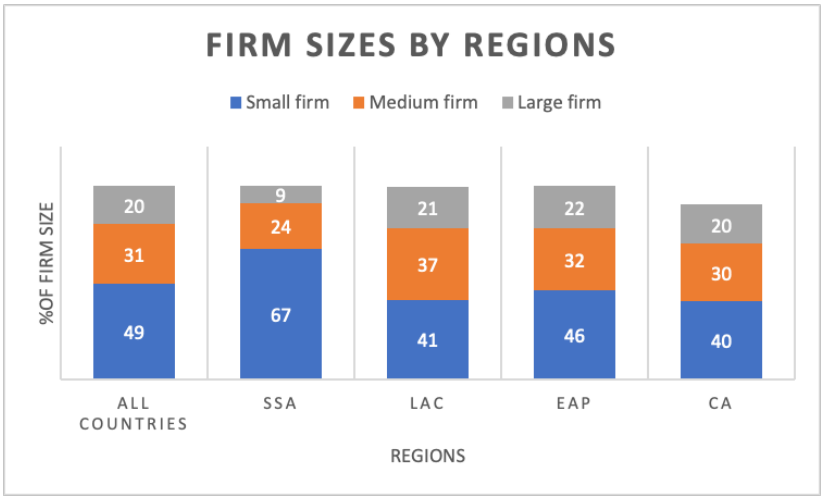
Appendices 1: Figure 1 Distribution of female-owned firms across SSA Countries



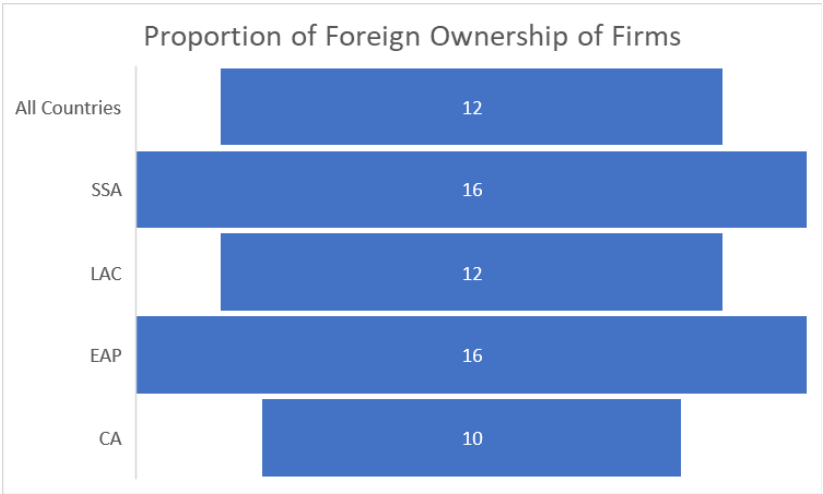
Appendices 2: Figure 2 Gender of Firm's Owner



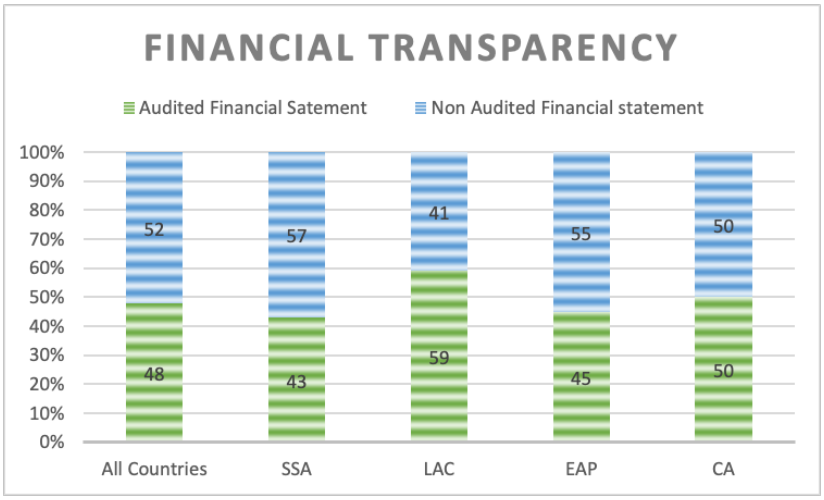
Appendices 3: Figure 3 Firm Sizes



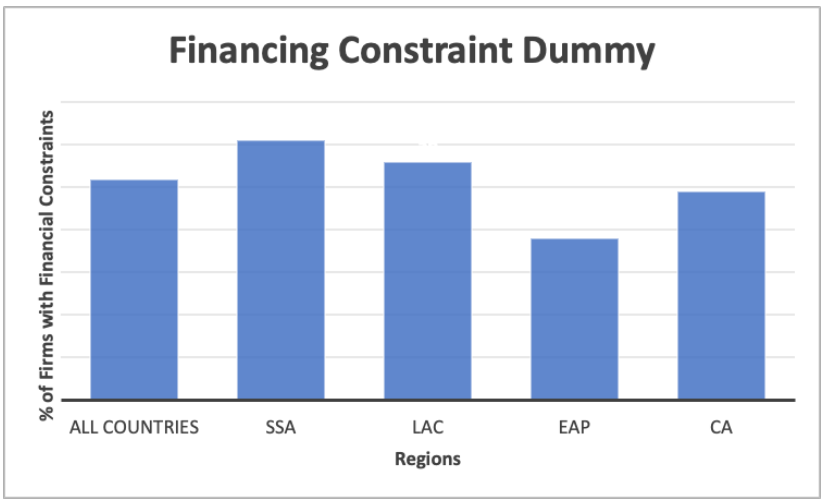
Appendices 4: Figure 4 Foreign Ownership of Firms (%)



Appendices 5: Figure 5 Financial Transparency of Firms



Appendices 6: Figure 12 Financial Constraints of Firms



Appendices 7: Table 2 Tabulation of Financial_Contraints_dummy across regions

Access to Credits	Freq.	Percent	Cum.
No Financial Constraints	28639	47.85	47.85
Financial Constraints	31217	52.15	100.00
Total	59856	100.00	

Appendices 8: Table 3 Tabulation of Ownership_by_Gender

Gender Participation in Top Management	Freq.	Percent	Cum.
Male	36088	64.45	64.45
Female	19909	35.55	100.00
Total	55997	100.00	

Appendices 9: Table 4 Tabulation of Type_of_Ownership

Type of ownership of the firm	Freq.	Percent	Cum.
Domestic Ownership	54663	87.76	87.76
Foreign Ownership	7626	12.24	100.00
Total	62289	100.00	

Appendices 10: Table 5 Tabulation of Financial_Contraints_dummy Ownership_by_Gender

	Gender Participation in Top Management		
Access to Credits	Male	Female	Total
No Financial Constraints	16779	9344	26123
Financial Constraints	17048	9778	26826
Total	33827	19122	52949

Appendices 11: Table 6 Tabulation of Firmsize_Small

Small Firm size	Freq.	Percent	Cum.
Medium or Large size	26077	51.24	51.24
Small firm size	24813	48.76	100.00
Total	50890	100.00	

Appendices 12: Table 7 Tabulation of Firmsize_Medium

Medium Firm size	Freq.	Percent	Cum.
Small or Large size	34870	68.52	68.52
Medium firm size	16020	31.48	100.00
Total	50890	100.00	

Appendices 13: Table 8 Tabulation of Firmsize_Large

Large Firm size	Freq.	Percent	: Cum.
Medium or Small size	40833	80.24	80.24
Lage firm size	10057	19.76	100.00
Total	50890	100.00	

Appendices 14: Table 9 Tabulation of Financial_Transparency

Financial Transparency	Freq.	Percent	Cum.
Non-audited Financial statement	31538	50.76	50.76
Audited Financial statement	30596	49.24	100.00
Total	62134	100.00	

Appendices 15: Table 10 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
CPI Inflation	62287	7.323	4.059	1.706	27.12

Appendices 16: Table 11 Tabulation of ssa

Sub-Sahara Africa	Freq.	Percent	Cum.
Other regions	47894	75.82	75.82
Sub-Sahara African Countries	15276	24.18	100.00
Total	63170	100.00	

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