“Topics in Financial Development and Financial Inclusion”

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A thesis submitted in total fulfilment of the requirements for the degree of Doctor of Philosophy

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December 2021

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **ii**

LIST OF TABLES ..... **v**

LIST OF FIGURES ..... **vii**

LIST OF ABBREVIATIONS ..... **viii**

DEDICATION ..... **x**

ABSTRACT ..... **xi**

STATEMENT OF AUTHORSHIP ..... **xii**

ACKNOWLEDGEMENTS ..... **xiii**

CHAPTER ONE: INTRODUCTION **1**

1.1 Background and Motivation 1

1.1.1 Financial Inclusion and CO_2 Emissions in Latin American and MENA Countries 2

1.1.2 Financial Development and Trade Openness in Oil-exporting Countries 5

1.1.3 Financial Liberalisation and Stock Markets in The MENA Region 7

1.2 Structure of the Thesis 8

1.3 Summary of Three Empirical Chapters 9

CHAPTER TWO: THE IMPACT OF FINANCIAL INCLUSION ON CO_2 EMISSIONS: EVIDENCE FROM LATIN AMERICAN AND MENA COUNTRIES 12

Abstract 12

2.1 Introduction 13

2.2 Literature Review 17

2.3 Methodology and Data Description 22

2.4 The Model Selection 26

2.5 Results and Discussions 27

2.5.1 Robustness Check 29

2.6 Conclusions and Policy Implications 31

CHAPTER THREE: FINANCIAL DEVELOPMENT AND TRADE OPENNESS: EVIDENCE FROM OIL-EXPORTING COUNTRIES **51**

Abstract 51

3.1 Introduction 52

3.2 Literature Review 55

3.3 Hypothesis Development 58

3.4 The Model and Dynamic GMM 60

3.4.1 The model 60
3.4.2 Dynamic GMM 61
3.5 Data and Descriptive Statistics 63
3.5.1 Sample Selection and Variable Definitions 63
3.5.2 Descriptive Statistics 66
3.6 Empirical Results 67
3.6.1 Additional Analysis 69
3.6.2 Regional Analysis 71
3.7 Concluding Remarks 73
CHAPTER FOUR: FINANCIAL LIBERALISATION AND STOCK MARKET DEVELOPMENT IN THE MENA REGION 91
Abstract 91
4.1 Introduction 92
4.2 Literature Review 95
4.2.1 Financial Liberalisation and Stock Market Development 95
4.2.2 Country Characteristics and Stock Market Development 98
4.3 Hypotheses Development 102
4.3.1 Financial Liberalisation and Stock Market Capitalisation 102
4.3.2 Financial Liberalisation and Stock Market Liquidity 103
4.3.3 Common Law versus Civil Law 104
4.3.4 High Education vs Low Education 106
4.3.5 High Trade vs Low Trade 107
4.3.6 High Political Stability vs Low Political Stability 108
4.3.7 Big Government vs Small Government 109
4.4 Econometrics Framework 112
4.4.1 Control variables 113
4.4.2 Data 118
4.4.3 Descriptive Statistics 118
4.5 Empirical Results 119
4.6 Conclusion 125
CHAPTER FIVE: CONCLUSION AND POLICY IMPLICATIONS 139
5.1 Summary of the Thesis 139
5.2 Policy Implications 140
5.3 Contribution 142
5.4 Future Research Directions 142

REFERENCES..144

LIST OF TABLES

CHAPTER TWO

Table 2.1 Percentage of people who have an account at a financial institution 36
Table 2.2 Key findings of the relationship between financial development and CO2 to emissions.....37
Table 2.3 Definitions of variables, data sources, and statistical descriptions.....39
Table 2.4 Mean values of variables by country 40
Table 2.5 Modified Wald test and autocorrelation test.....42
Table 2.6 Pesaran's (2004) CD test for cross-section independence in macro panel data 42
Table 2.7 Pesaran's simple panel unit root test in the presence of cross-section dependence in Latin America 43
Table 2.8 Pedroni panel cointegration test results between the variables in Latin America ...43
Table 2.9 The impact of financial inclusion on CO_2 emissions in Latin America 44
Table 2.10 The impact of financial inclusion on CO_2 emissions in the MENA region.....45
Table 2.11 The impact of financial inclusion on CO_2 emissions in Latin America (Robustness Check).....46
Table 2.12 The impact of financial inclusion on CO_2 emissions in the MENA region (Robustness Check) 48

CHAPTER THREE

Table 3.1 Key findings for the finance and trade relationship.....78
Table 3.2 Summary of variables and sign predictions.....80
Table 3.3 Summary statistics, whole sample ..... **Error! Bookmark not defined.**
Table 3.4 Correlations.....81
Table 3.5 Test of endogeneity.....81
Table 3.6 The link between financial development and trade openness.....82
Table 3.7 The link between finance and trade openness (Additional Analysis 1).....83
Table 3.8 The link between finance and trade openness (Additional Analysis 2).....84
Table 3.9 The link between finance and trade openness in GCCI countries 85
Table 3.10 The link between finance and trade openness in Asian countries 86
Table 3.11 The link between finance and trade openness in Latin American countries 87
Table 3.12 The link between finance and trade openness in African countries 88

CHAPTER FOUR

Table 4.1 Dates of stock market liberalisation.....126
Table 4.2 Descriptive Statistics, 1979-2017, 9 countries.....127
Table 4.3 Liberalisation and stock market development controlling for macroeconomic, banking, and institutional environment control variables over the period 1988-2017. 128
Table 4.4 The effect of origin of legislative system on the relationship between financial liberalisation and stock market development.....130
Table 4.5 The effect of education on the relationship between financial liberalisation and stock market development 131
Table 4.6 The effect of trade openness on the relationship between financial liberalisation and stock market development 132
Table 4.7 The effect of political stability on the relationship between financial liberalisation and stock market development.....133
Table 4.8 The effect of government size on the relationship between financial liberalisation and stock market development.....134
Table 4.9 Liberalisation and stock market development controlling for macroeconomic, banking, and institutional environment control variables over the period 1988-2007……135

LIST OF FIGURES

Figure 2.1 Latin American and MENA countries.....33

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AGRICULTURE	Agriculture, forestry, and fishing (% of GDP)
ARDL	Autoregressive Distributive Lag Model (ARDL)
ATM	Automated Teller Machine
BA	Banks assets relative (% of GDP)
BB	Bank branches
BM	Broad money relative (% of GDP)
BRICS	Five major emerging economies: Brazil, Russia, India, China, and South Africa.
CD test	General Diagnostic test for cross-sectional dependence in panel data
CONT	Control variables
CO_2	Carbon dioxide emissions per capita.
CPS	Credit given to the private sector (% of GDP)
CS-ARDL	Cross-Sectionally Augmented Autoregressive Distributed Lag
DC	Domestic credit (% of GDP)
DC^2	Square term of domestic credit
DWH	Durbin–Wu–Hausman test
EDU	Human capital index
ENERGY	Primary energy supply is defined as the amount of energy released by burning one tonne of crude oil.
EXP	Total exports (% of GDP)
FD	Financial development
FD^2	Square term of financial development
FDI	Foreign direct investment, net inflows (% of GDP)
FI	Financial institutions index
FIA	financial institution access index
FIE	Financial institution efficiency index
FMD	Financial market depth index
FM	Financial markets index
FMA	Financial market access index
FME	Financial market efficiency index
FRC	Finance Resource Curse
GCCI	Gulf Cooperation Countries (Bahrain, Kuwait, Oman, Qatar Saudi Arabia, and the United Arab Emirates) and Iran
GDP	Gross Domestic Product
GDPPC	Real GDP per capita.
GDPPCG	GDP per capita growth
GE	General government final consumption expenditure (% of GDP)
GFDD	Global Financial Development Database

GHG	Greenhouse Gas
GMM	General Method of Moments approach
G-20	World's top 20 economies
IMP	Total imports (% of GDP)
INDUSTRY	Industry (including construction), value added (% of GDP)
INF	Inflation, consumer prices (annual %)
INV	Gross fixed capital formation (% of GDP)
IPA	Innovations for Poverty Action
LL	Liquid liabilities (% of GDP)
LL^2	Square term of liquid
LHS	Left Hand Side
LIBST	dummy variable taking the value of 1 in the two years that follow the year of the official liberalisation date, otherwise 0
LIBMT	dummy variable taking the value of 1 in the third year after liberalisation and the two years afterwards, otherwise 0
LIBLT	dummy variable that takes the value of 1 in the sixth year post-liberalisation and all the years that follow; otherwise 0.
MC	Market capitalisation (% of GDP)
MENA	Middle Eastern and Northern African countries.
MMX	Min-Max normalisation technique
OECD	Organisation for Economic Co-operation and Development countries.
ODCB	Outstanding deposits from commercial banks (% of GDP)
OLCB	Outstanding loans from commercial banks (% of GDP)
PCA	Principal Component Analysis
POP	Total Population
PRIV	Private credit (% of GDP)
$PRIV^2$	Square term of private credit
PS	Political stability index
PSTR	Panel smooth transition autoregression model
PVAR	Panel Vector Autoregression
RHS	Right Hand Side
SAV	Gross domestic savings (% of GDP)
TO	Trade openness (total exports and total imports) (% of GDP)
TR	Turnover ratio
VT	Value traded (% of GDP)
WGI	Worldwide Governance Indicators

DEDICATION

I dedicate my thesis to my parents (Mohamad & Aycha) and my beloved wife, Israa, and to my kids Kareem and Latoya
for their immense support, patience, and encouragement
throughout my PhD journey.

ABSTRACT

This thesis consists of three empirical chapters that focus on the role of the finance industry in protecting the environment, how open countries are to free trade, and the development of the stock market. The first chapter examines the effect of financial inclusion on CO_2 emissions in Latin American and 21 Middle Eastern and North African (MENA)[1] countries. In contrast to the recent important work done by Renzhi and Back (2020), conducted for a large sample of countries from a mix of regions, this thesis presents a different perspective regarding the association between financial inclusion and CO_2 emissions. Our results indicate that: (1) financial inclusion has a linear significant positive effect on CO_2 emissions in selected Latin American countries; and (2) financial inclusion has no significant impact on CO_2 emissions in selected MENA countries. The second empirical chapter explores the nonlinear causal effect of financial development on trade openness using a large sample of oil-exporting countries. Results contend that financial development has a U-shaped relationship with trade openness. In the early stages of this kind of development, trade openness declines but after a certain threshold trade openness starts to grow. The third chapter investigates the causal impact of liberalisation of finance systems on stock market development in the MENA region. The results indicate that financial liberalisation has a significant positive effect on stock market development in the medium- and long-term. Moreover, this chapter contributes to the existing literature by showing that countries with common law traditions, high education levels, minimal trade openness, poor political stability, and small government systems in place stand to benefit more from liberalising their stock markets.

[1] MENA region consists of 19 countries including, Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Palestine and Yemen. Sudan and Turkey are sometimes also included in this region which makes the region of 21 countries. Our main intention is to include all MENA countries. However, based on data availability, the sample covers the following ten countries: Algeria, Israel, Jordan, Lebanon, Morocco, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates.

STATEMENT OF AUTHORSHIP

"Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis accepted for the award of any other degree or diploma.

No other person's work has been used without due acknowledgment in the main text of the thesis.

This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution."

Rabie Mohamad Said
December 2021

ACKNOWLEDGEMENTS

First and foremost, all praise goes to Allah for making possible the ability to be strong, retain good health being blessed to complete this thesis.

My deepest gratitude goes to my beloved parents for their prayers, love, and support throughout in my doctorate work. You all have always been pushed me to be the best that I can be. I am deeply thankful to my family members for their love, support, and sacrifice. Special thanks to my beloved wife Israa, who has been with me since I started my post-graduate journey and has encouraged me to achieve my goals.

Special appreciation goes to my principal supervisor Prof. M. Ishaq Bhatti, for his supervision and constant support. His invaluable help in the form of constructive comments and suggestions during the last stage of the thesis contributed to the success of this research. I paid special gratitude to my co-supervisor Dr Doureige Jurdi for his constant support, patience, expertise, and advice during my candidature. I am also thankful to my other supervisors/co-supervisors who helped during my candidature are Dr Julio Mancuso Tradenta Professor Joanna Poyago-Theotoky Dr Hayat Khan and Dr Judy Taylor . Finally, I would like to thank with gratitude the Vice Chancellor and Graduate research office for last year fees waiver support which helped me to finish my thesis with Peace of mind and it made my entire PhD experience personal, thriving, and energetic.

Rabie Mohamad Said

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CHAPTER ONE: INTRODUCTION

1.1 Background and Motivation

The financial sector plays an important role in the functioning of the economy by working as the intermediary that funds governments and industries. This sector sits between savers and borrowers: it takes funds from savers (for example, through deposits) and lends them to who wish to borrow such as households, businesses, or governments. Given its key role in the economy, the financial sector performs and how it is characterised, are expected to affect many aspects of peoples' lives. Our main motivation is to investigate and contribute to the academic knowledge regarding some of these effects. After conducting preliminary research, and in consultation with my former and current supervisors, it was decided to write a thesis consisting of three empirical chapters. In the first chapter we investigate whether facilitating access of the general population to financial services, i.e., improving a country's level of financial inclusion, impacts on how people affect the natural environment. More specifically, we analyse the effect of financial inclusion on CO_2 emissions in two separate regions: Latin American and MENA countries. The second chapter explores the role of non-linearity in the finance-trade openness nexus using a large sample of oil-exporting countries. Our initial motivation was to examine the linear effect of finance on trade openness. However, recent evidence suggests that the marginal effect of trade openness decreases considerably with the size of the financial sector. In other words, the relationship between financial development and trade openness could be curvilinear. Our focus is to fill the gaps in knowledge regarding the non-linear relationship between financial development and trade openness in oil-exporting countries. The third chapter investigates the impact of financial liberalisation on stock market development in the MENA region. These chapters are summarised in the following subsections.

1.1.1 Financial Inclusion and CO_2 Emissions in Latin American and MENA Countries

In Chapter 2, we investigate how financial inclusion affects CO_2 emissions. In this chapter, "financial inclusion" means access to and effective use of a country's financial services by the general population. According to the World Bank (2018), financial inclusion consists of various elements including, for example, having access to a deposits account in a bank or other financial institution and having access to credit. Financial inclusion has been found to benefit society in several ways. First, it shifts payments from cash into accounts which makes it possible to engage in more efficient payments from governments or businesses to individuals – and from individuals to government or businesses (Demirgüç-Kunt & Singer, 2017). Second, access to the formal financial system and appropriate credit can potentially facilitate investments in education and business opportunities that could, in the long-term, improve economic growth and productivity (Demirgüç-Kunt & Singer, 2017).

Financial inclusion is on the rise worldwide. The 2017 Global Findex database reveals that 1.2 billion more adults now have a bank account since 2011, including 515 million since 2014.[2] Between 2014 and 2017, the share of adults with an account at a financial institution or through a mobile money service increased globally from 62 percent to 69 percent. In developing economies, however, the share rose from 54 percent to 63 percent. Nevertheless, women in developing economies remain 9 percentage points less likely than men to have a bank account. So, it is evident that the financial sector is not as inclusive as it could be. In addition to the large remaining share of the general adult population without access to financial services, clear inequalities arise within this population according to gender.

While in the last decades financial inclusion has been growing, which is expected to affect individuals' and organisations' economic decisions, we observe that Greenhouse Gas (GHG)

[2] For more information about this please see https://globalfindex.worldbank.org/node/2.

emissions have also been on the rise (Ritchie & Roser, 2020).[3] These two phenomena occurring in parallel trigger a very important question: is it possible to establish a causal link between the growth of financial inclusion and the economic decisions that lead to an increase in GHG emissions?

In theory, financial inclusion can have both negative and positive impacts on GHG emissions (in particular, CO_2 emissions). On the one hand, financial inclusion facilitates the access of companies and individuals to financial products, which are expected to make green technology investments more feasible (Le et al., 2020). Conversely, improved access to financial services can increase manufacturing and industrial activities that lead to more damaging CO_2 emissions (Zaidi et al., 2021).

Two recent studies in this area find evidence in support of a significant causal link between financial inclusion and CO_2 emissions. Le et al. (2020) show that financial inclusion has a linear positive impact on CO_2 emissions in Asia, while Renzhi and Baek (2020) suggest that the impact of financial inclusion on CO_2 emissions follows an inverted U-shaped relationship (non-linear). This form of relationship indicates that, during the initial stages of financial inclusion, CO_2 emissions increase, but after a certain threshold of financial inclusion, CO_2 emissions begin to fall.

This chapter focuses on studying this relationship in Latin America and the MENA regions, separately. Previous papers have combined different regions. However, as stated by Hasanov et al. (2018), policy recommendations in such panel studies cannot be equally applied for each panel member because different regions have their own economic history, trajectory, characteristics and functioning. In addition, it is important to investigate groups of countries with similar regional characteristics to derive more specific policy recommendation. Hence, investigating whether the results from previous studies can be used to inform policy initiatives

[3] According to Ritchie and Roser (2020), global CO_2 emissions from the burning of fossil fuels for energy and cement production in 2000 amounted to 28.47 billion tons. By 2010, that amount increased to 33.13 billion tons and then again to 36.44 billion tons by 2019.

across specific regions is an important task. The motivation to choose Latin America and MENA regions is explained as follows. First, Latin America and MENA have experienced important progress in financial inclusion, particularly through the expansion of payments, savings, and credit services for lower-income households and microenterprises (World Bank, 2018). Second, CO_2 emissions in both regions have been rising (World Bank, 2020). Third, Latin American and MENA countries are at a stage in their economic development in which they are trying to industrialise and modernise, including their financial sectors, which may have a crucial impact on CO_2 emissions in the years to come. Finally, MENA represents the second most polluted region in the world – after East South Asia – and the highest CO_2 producer per dollar of output (Omri et al., 2015).

Chapter 2 contributes to the literature in an important way. By focusing on Latin American and MENA nations, the study of the impact of financial inclusion on CO_2 emissions can concentrate on their regional context, making it more relevant for policy design in both regions. This work will contribute to our understanding of how relevant the policy implications of empirical global studies are, when compared to regionally focused research. In line with this, the results in Chapter 2 are significantly different to those reported by Renzhi and Baek (2020) in their global research. Our study also suggests that, in terms of the effect of financial inclusion on CO_2 emissions, policy implications are not the same for the Latin America and MENA regions. Our main results indicate that: (1) there is a significant positive impact of financial inclusion on CO_2 emissions in Latin America; and (2) there is no significant impact of CO_2 emissions in the MENA region.

1.1.2 Financial Development and Trade Openness in Oil-exporting Countries

According to Levine (2005), financial development involves improvements in the: (1) production of ex-ante information about possible investments, (2) monitoring of investments and implementation of corporate governance, (3) trading, diversification, and management of risk, (4) mobilisation and pooling of savings, and (5) exchange of goods and services. All of these financial functions may influence savings and investment decisions and hence economic growth. Financial development has grown significantly over the last few decades. For instance, banks' global share of domestic credit to the private sector (% of GDP) was approximately 73 percent in 2005. By 2016, that share rose to 87.05 percent and then further increased to 98.46 percent in 2020 (World Bank, 2020).

A theoretical study by Rajan and Zingales (2003) reveals a positive association between financial development and trade openness. Rajan and Zingales (2003) argue that trade openness greatly benefits financial markets' development as it weakens the incentives of incumbent interest groups or financial intermediaries to block financial market development in order to reduce entry and competition. Therefore, trade openness increases investment and banks' lending, thus improving financial market development. Moreover, Braun and Raddatz (2005) theoretically demonstrate that countries observe an improvement in the financial system when trade liberalisation reduces the power of groups most interested in blocking financial development.

To date, many empirical studies have investigated the causal link between financial development and trade openness including those in the Asia-Pacific region (Le et al., 2016), Africa (David et al., 2014; Sare et al., 2019), new member states of the European Union (Wajda-Lichy et al., 2020) and a combination of developed and developing countries (Beck 2002; Huang & Temple, 2005; Kim et al., 2010; Niroomand et al., 2014; Thuy & Trong, 2021). However, previous work examining the link between financial development and trade

openness has largely neglected a possible non-linearity in the relationship between the two variables.

A years ago, a study conducted by Gächter and Gkrintzalis (2017) discovered the finance–trade connection is non-linear in a large sample of countries. They suggested that financial development is positively linked to trade openness, but larger financial sectors do not support trade openness any longer when certain thresholds are exceeded. In contrast, Yakubu et al. (2018) find a U-shaped relationship between private credit and trade measures suggesting that financial sector development may be detrimental (helpful) to trade for economies with low (high) levels of private sector credit. One possible explanation for these different results is based on the characteristics of the countries included in the study.

The main objective of this study is to investigate the non-linear relationship between financial development and trade openness using a sample of 24 oil-exporting countries. First, to the best of our knowledge, this is the first study to investigate the non-linear impact of financial development on trade openness using a sample of oil-exporting countries. Second, this study further assesses whether the relationship between financial development and trade openness differs according to the region's oil production.

1.1.3 Financial Liberalisation and Stock Markets in The MENA Region

Stock market liberalisation refers to government policies designed to remove restrictions on foreign investors and allow them to participate in domestic equity markets. It has been revealed that stock market liberalisation results in rising equity prices (Bekaert & Harvey, 2000), a decline in the cost of capital (Stulz, 1999), and much improved liquidity of domestic stock markets (Fuchs-Schündeln & Funke, 2003; Jain-Chandra, 2002). Most countries in the MENA region started to liberalise their stock markets in the 1990s, far later than comparable regions such as Latin America and East Asia.

In Chapter 4, we revisit the effects of financial liberalisation on stock market development using a panel dataset of 9 MENA countries covering the period 1979-2017. In this chapter, we contribute to the literature by exploring how different country characteristics such as legal origin, level of education, trade openness, political stability, and government size affect stock market development in MENA countries experiencing financial liberalisation in our sample.

1.2 Structure of the Thesis

This thesis consists of three separate empirical chapters in addition to the general introduction and conclusion. Chapter 1 (Introduction) presents the background and motivation of the thesis, a summary discussion of the key empirical questions and the main findings. Chapter 2 examines separately the causal effect of financial inclusion on CO_2 emissions in Latin America and MENA regions. Chapter 3 investigates the non-linear impact of financial development on trade openness in oil-exporting countries. Chapter 4 re-examines the impact of financial liberalisation on stock market development in the MENA region. It also explores whether different country characteristics affect the association between financial liberalisation and stock market development in the region. Chapter 5 (Conclusion) summarises the findings and contributions of the three empirical essays.

1.3 Summary of Three Empirical Chapters

Chapter 2 examines separately the causal effect of financial inclusion on CO_2 emissions in Latin American and MENA countries. Financial inclusion has become a key development focus for the G-20 summits since 2010 and efforts to improve financial inclusion around the world have been significant, including those in Latin American and MENA countries. However, despite some progress, these regions lag behind not only with respect to high-income countries, but also with other regions that are similar in levels of development. For instance, based on World Bank data for 2014, the median values of financial inclusion in Latin America and MENA regions, measured as the percentage of adults who own an account in a formal financial institution, were 51.9 percent and 43.2 percent, respectively. In contrast, the corresponding median value in comparable regions was 60.3 percent, while high-income countries reached 97 percent in the same year (Rojas-Suarez, 2016). This gap in financial inclusion between regions suggests that Latin American and MENA countries have a chance to accelerate their improvements in this area in the coming years.

At the same time, CO_2 emissions in Latin America and MENA regions have also been on the rise. According to the World Bank (2020), CO_2 emissions per capita in Latin America were 2.5 metric tons in 2004, rising to 2.7 metric tons in 2010, and then reaching 2.8 metric tons by 2016. Similarly, by 2004, CO_2 emissions per capita in the MENA region were 4.5 metric tons, and by 2010 this had increased to 5.5 metric tons, reaching 5.8 metric tons by 2016. Hence, the following key question arises: can a causal link be established between the growth in financial inclusion and the growth of CO_2 emissions in Latin America and MENA regions?

To answer this question, we adopt the empirical model proposed by Renzhi and Back (2020) to examine separately the impact of financial inclusion on CO_2 emissions for 15 Latin American and 10 MENA countries over the period 2004–2018. For these estimations we employ the Generalised Least Squares (GLS) and dynamic General Method of Moments

(GMM) approaches, while controlling for energy supply, industry, and economic growth. Our results show that financial inclusion has a linear positive significant impact on CO_2 emissions in Latin America. In contrast, it has no significant impact on CO_2 emissions in the MENA region. The results are robust to different specifications and different estimation techniques.

Chapter 3 investigates whether there is a non-linear effect of financial development on trade openness in oil-exporting countries. Theory argues that interest groups and in particular certain industrial and financial businesses, frequently stand to lose from changes in financing systems (Rajan & Zingales, 2003). They suggest that when a country is open to trade and capital flows freely, it is more likely to deliver benefits to financial development because openness to both trade and finance breeds competition and threatens the profits of incumbents. Furthermore, the relative political power wielded by industries may wane when trading conditions change as well. Thus, trade openness has a favourable effect on financial development. Chapter 3 contends there is a U-shaped relationship between financial development and trade openness. It suggests that financial development initially contributes to the decline in trade openness, but trade openness starts to rise after a certain threshold of financial development is reached. Finally, the results further indicate that for Asian and African countries, the linear and squared terms of private credit and domestic credit exert significant negative and positive effects on trade openness. Private credit and domestic credit have a U-shaped relationship with trade openness. Contrarily, for GCCI [4] and Latin American countries, none of the proxies of financial development exerts a significant non-linear effect on trade openness.

In the late 1980s and early 1990s, several countries in the MENA region started to liberalise their economies, introducing concepts such as the stock market and stock exchange. The

[4] The abbreviation GCCI refers to Gulf Cooperation Countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) and Iran.

financial system in MENA became much more free market oriented by reducing and eliminating interest rate subsidies to priority sectors. Liquidity was managed through a more active use of reserve requirements and a more market-based allocation of refinancing. New banking laws were introduced to increase the autonomy of central banks and to introduce prudential regulations in line with international standards. Furthermore, stock market legislation and activities were refined (Achy, 2005). Chapter 4 shows that financial liberalisation has a significant positive impact on stock market development mainly over the medium and long terms. This outcome contrasts with the previous finding of Ben Naceur et al. (2008) who reveal that financial liberalisation has a significant negative impact on stock market development in the MENA region. Chapter 3 contributes to the literature by showing that countries with common law origins and traditions, high education levels, low trade openness, poor political stability, and small governments benefit more from liberalising their stock markets.

CHAPTER TWO: THE IMPACT OF FINANCIAL INCLUSION ON CO_2 EMISSIONS: EVIDENCE FROM LATIN AMERICAN AND MENA COUNTRIES

Abstract

In this chapter we analyse the causal link between financial inclusion and CO_2 emissions. Using a panel of 15 Latin American and 10 Middle Eastern and North African countries (MENA), we separately investigate how financial inclusion has impacted on CO_2 emissions in these two regions during the period 2004-2018. Financial inclusion is proxied by the number of ATMs per 100,000 adults, number of commercial bank branches per 100,000 adults, outstanding deposits from commercial banks (% of GDP) and outstanding loans from commercial banks (% of GDP). This is the first study to investigate this important issue using data for the specific analysis of Latin America and the MENA regions. After controlling for energy supply, industry value added (% of GDP), and economic growth, and addressing the potential endogeneity and cross-sectional dependence issues, the results of our estimations are significantly different from previous studies, and across our two regions of interests. While financial inclusion has a significant positive effect on CO_2 emissions in Latin American countries, it has no significant impact on CO_2 emissions in MENA countries. These results not only differ from previous studies such as Renzhi and Baek (2020) but also highlight the importance of analysing this issue separately across regions. It is evident that the policy implications may greatly differ.

JEL Classification: O16; O57; C33.

Keywords: Financial inclusion; CO_2 emissions; Panel data analysis; Latin America; MENA.

2.1 Introduction

Financial inclusion refers to the level of access and availability of formal financial services, such as bank deposits, credits, insurance, etc., to all participants in an economy. Improving access to finance and building inclusive financial systems that cater to the needs of a large segment of the population have become important policy objectives (World Bank, 2018). The rising interest in financial inclusion originates from a heightened awareness among policymakers of the benefits of having inclusive financial systems. International organisations have played an important role in this regard. For example, in 2005, the United Nations adopted the goal of building inclusive financial systems worldwide, and designated 2005 the International Year of Microcredit.[5]

The role of academics, with both, theoretical and empirical studies, has also been key in generating awareness of the benefits of increasing financial inclusion. Theoretical studies (see e.g., Aghion & Bolton, 1997; Galor & Zeira, 1993) have shown that financial market frictions preventing financial inclusion can: firstly, inhibit human and physical capital accumulation; and secondly, affect occupational choices, leading to persistent inequality "or" poverty traps. Recent empirical research has provided evidence of positive welfare outcomes emanating from firms' and individuals' having access to financial services. These studies reveal that access to credit products increases households' income and consumption (Duvendack & Mader, 2020; Karlan & Zinman, 2010), diminishes income inequality, hunger, and poverty (Le et al., 2019; Park & Mercado, 2018) and fosters businesses' investments and profitability (Karlan & Zinman, 2010). Moreover, other studies show that access to savings-related products increases savings (Ashraf et al., 2015; Morgan & Long, 2020; Shrestha & Nursamsu, 2021), empowers women (Ashraf et al., 2010), promotes productive investments and

[5] Microcredit is a finance tool that helps individuals and entrepreneurs get small loans in poor countries. For more information on this, please see the following link: https://www.yearofmicrocredit.org/

consumption (Ashraf et al., 2010; Dupas & Robinson, 2013) and spurs economic growth (Emara & El Said, 2021; Kim et al., 2018; Sethi & Acharya, 2018; Van et al., 2021).

Despite the general consensus regarding the positive economic impact of financial inclusion, the effect of financial inclusion on the natural environment is a controversial issue. On the one hand, financial inclusion may simply promote economic activities and the methods in which they make things, which could trigger more industrial pollution and environmental degradation (Jensen, 1996). As well, better access to financial services could make it possible for consumers to obtain cheap credit to purchase items such as automobiles, refrigerators, air conditioners, washing machines, and other appliances which demand a lot of energy, and are in fact, fossil fuel-based. This practice would simply increase energy consumption and damage the natural environment through the wastage or dumping of such materials (Jensen, 1996). Furthermore, Cumming et al. (2014) state that entrepreneurs' access to finance will encourage them to take risks, invest more, and contribute to economic growth, thereby increasing CO_2 emissions. According to Renzhi and Baek (2020), allowing households and small and medium-sized enterprises to have more access to financial services will result in more consumption, contributing to more CO_2 emissions.

On the other hand, financial inclusion might help poor communities to make affordable investments in cleaner technology and encourage the adoption of better environmental practices which reduce the effects of climate change (Belayeth Hussain et al., 2019). "Green loans", for example, provide farmers who may not have credit available to invest in clean energy technology such as solar technology, better-insulated houses, and eco-friendly seeds and fertilisers. Solar energy micro-grids are an example of a clean energy technology that can be linked to financial services in ways that are potentially beneficial to clients, service providers, and the environment. These grids are not only cost-effective for consumers but also

reduce carbon emissions by burning fewer fossil fuels (IPA, 2017).[6] Subsequently, access to financial services can help promote the use of clean technologies and acceptance of environmentally protective strategies, which curtail CO_2 emissions by burning fewer fossil fuels (Le et al., 2020). Since in theory both positive and negative impacts of financial inclusion on the natural environment are possible, the issue becomes an empirical question.

Since the 1990s, financial systems around the world, including those in Latin America and the MENA region, have improved in terms of credibility, security, depth, and diversity (Didier & Schmukler, 2013; Kar et al., 2011). The size of the banking sector has risen, stock markets have expanded, and derivative markets have grown and multiplied. Important progress has been made in financial inclusion, particularly through the expansion of payment, savings, and credit services for lower-income households and microenterprises. However, despite this progress, only 39.4 percent, 51.9 percent, and 55.1 percent of adults in Latin America had a bank account in 2011, 2014, and 2017, respectively. Meanwhile only 37.6 percent, 43.2 percent, and 47.5 percent of adults in the MENA region had a bank account in 2011, 2014, and 2017, respectively (see Table 2.1). These regions' level of account ownership not only lags with respect to high-income countries, but also when compared to similar countries in terms of economic development. For example, both regions lag behind the East Asia & Pacific countries (even after excluding high-income nations). Furthermore, the regions lag behind the rest of the world regarding the percentage of people who had a bank account (see Table 2.1).

[Insert Table 2.1]

Interestingly, CO_2 emissions per capita have grown in these regions too. For example, according to the World Bank (2020), CO_2 emissions per capita in Latin America were 2.5 metric tons in 2004. By 2010, that amount increased to 2.7 metric tons and then continued to

[6] https://www.poverty-action.org/sites/default/files/publications/Climate-Change-Financial-Inclusion_Final.pdf

rise to 2.8 metric tons by 2016. Similarly, by 2004, CO_2 emissions per capita in the MENA region were 4.5 metric tons, and by 2010 this had increased to 5.5 metric tons, reaching 5.8 metric tons by 2016. The main objective of this chapter is to investigate whether there exists a causal relationship between financial inclusion and CO_2 emissions in Latin American and MENA countries.

There are important policy implications that derive from this analysis. If the empirical evidence suggests that the growth of financial inclusion contributes to the reduction of CO_2 emissions, then financial inclusion can be used as an environmental tool. Without much change to their characteristics, strengthening policies to increase financial inclusion will lead to a less polluted natural environment. However, if the growth of financial inclusion increases CO_2 emissions, new strategies will need to be designed to protect the environment. These strategies may include changes towards more environmentally friendly instruments of financial inclusion, such us green loans, or policies that compensate for the increase in CO_2 emissions, if a more environmentally friendly financial inclusion was not feasible. These policy implications may differ significantly across regions. For example, different regions will vary in terms of their level of development, their culture, their financial sectors, the characteristics of the instruments that provide to their financial inclusion, their consumption and trade patterns, etc. Hence, research studies that are based on a large number of countries from region to region would be, in principle, uninformative in terms of policy implications at the regional or country levels. One important contribution of this study is to investigate, separately, the impact of financial inclusion on CO_2 emissions in Latin American and MENA countries. We expect to observe different results for these two regions, and as a consequence, the policy implications will also differ.

In this study we present the linear and non-linear effects of financial inclusion on CO_2 emissions by employing a GMM estimation to control for endogeneity and using GLS

estimation technique. In addition, since countries within both regions are closely connected by geographical location, trade, and financial integration, we address the potential issue of cross-sectional dependence by estimating the models using the robust standard errors proposed by Driscoll and Kraay (1998) for panel regressions with cross-sectional dependence. The rest of this chapter is structured as follows. In section 2.2 the literature review is presented. Section 2.3 explains the research methodology and how data was selected in the light of other studies. In section 2.4, we justify the choice of the model for this analysis, while section 2.5 concentrates on discussing results and the robust analysis. Section 2.6 is the final one and it contains the concluding remarks and policy implications.

2.2 Literature Review

Financial inclusion belongs to the broader literature of financial development, which has received considerable attention in recent years since the emergence of the endogenous growth theory. Financial inclusion is an important aspect of economic development, one that has received a great deal of public attention and research interest in the early 2000s, stemming from analyses that attributed poverty to people being financially excluded (Babajide et al., 2015; Le et al., 2019). In this section, it commences with a review of the broader literature on how financial development affects CO_2 emissions. Then, we discuss the recently emerging and more specific literature on what financial inclusion means for CO_2 emissions. The empirical literature can be divided into three main streams based on their results. The first stream reports that financial development has a negative effect on CO_2 emissions. Talukdar and Meisner (2001), for instance, examine the link between financial development and environmental performance using a random-effects model and data from 44 developing countries between 1987 and 1995. Results show that a significantly negative relationship emerging between financial development and the CO_2 emissions per capita. Using random effects model, Tamazian et al. (2009) investigate the impact of financial development on CO_2 emissions in BRICS. Their results demonstrate that financial development measured using

the ratio of deposit money bank assets to GDP, stock market value, foreign direct investment, capital account convertibility, financial liberalisation and financial openness decrease CO_2 emissions.

Similarly, Tamazian and Rao (2010) further employ random effects model and dynamic GMM to explore the influence of financial development on CO_2 emissions in 24 transitional economies. They find that financial development improves the state of the environment. In the case of Malaysia, Shahbaz et al. (2013) contend that financial development (domestic credit to the private sector relative to GDP) contributes to the reduction in CO_2 emissions. Dogan and Seker (2016) use the dynamic least squares method to investigate the impact of real income, financial development, and other factors on CO_2 emissions. They argue that financial development reduces problems for the environment. Furthermore, Kahouli (2017) points out that financial development (domestic credit to the private sector relative to GDP) is conducive to reducing energy consumption using a sample of six South Mediterranean countries: Algeria, Egypt, Israel, Lebanon, Morocco, and Tunisia. In another study, Shahbaz et al. (2018) employ bootstrapping bound testing to explore the impact of financial development, foreign direct investment, and energy innovation on CO_2 emissions in France. They provide evidence supporting the negative role of financial development (domestic credit to the private sector relative to GDP) on CO_2 emissions.

The second stream of empirical studies contends that financial development simply worsens CO_2 emissions. For example, Sadordky (2010) argues that a prosperous and efficient banking sector appears to encourage consumers' loan activities, which makes it easier for people to buy items like automobiles, houses, refrigerators, air conditioners, washing machines, etc., and then emit more CO_2 emissions. Boutabba (2014) examines the relationship between CO_2 emissions and financial development in India during the years 1971–2008. Using the autoregressive distributive lag model (ARDL), the results suggest that domestic credit to the private sector has a long-run positive impact on per capita CO_2 emissions, suggesting that

financial development increases environmental pollution and degradation. Similarly, using the ARDL approach, Shahbaz et al. (2015) examine the effect of financial development on CO_2 emissions in India and their findings show that CO_2 emissions increase in this scenario.

Similarly, Abbasi and Riaz (2016) explore the influence of financial development on CO_2 emissions in Pakistan from 1971 to 2011. Their study employs the ARDL approach to investigate the long-term relationship between CO_2 emissions and financial variables. Their findings suggest that the private sector indicator is statistically significant in explaining the evolution of carbon emissions. Paramati et al. (2017) use a panel data of 20 developed and developing countries to examine the impact of stock market growth on CO_2 emissions. Using the market capitalisation variable as a proxy of stock market development, the study finds that stock markets have a statistically significant and positive impact on CO_2 emissions. Furthermore, Xing et al. (2017) employ ARDL to examine the impact of financial development on CO_2 emissions in China and find that it reduces emissions.

Ali et al. (2019) analyse the dynamic association between financial development and CO_2 emissions in Nigeria, applying the autoregressive distributed lag bound testing technique for the years 1971–2010. The empirical result shows a long-run co-integration relationship between the 2 variables. The long-run estimation result reveals that the evolving financial sector has a positive and significant impact on CO_2 emissions. Acheampong (2019) employs the system Generalized Method of Moments (GMM) to explore the direct and indirect effect of financial development on CO_2 emissions for 46 sub-Saharan Africa countries during the period 2000–2015. Using several indicators of financial development, the study reveals that it is measured using broad money and domestic credit to the private sector relative to GDP increased CO_2 emissions. In the meantime, foreign direct investment and liquid liabilities have negligible effects on CO_2 emissions. Using a panel quantile regression, Khan et al. (2020) show that financial depth (domestic credit to the private sector to GDP) increases

carbon emissions in a sample of 192 countries from 1980 through to 2018. Utilising the cross-sectional autoregressive distributed lags (CS-ARDL) approach to evaluate panel time-series data over the period 1980–2016 for European Union member countries, Zeqiraj et al. (2020) demonstrate that stock market development significantly increases carbon intensity in both the short- and long-term scenarios. Aller et al. (2021), using the Bayesian Model Averaging method, investigate the impact of financial development, proxied by domestic credit to the private sector (% GDP) on CO_2 emissions in 92 countries. The empirical findings strongly suggest that financial development greatly impacts on CO_2 emissions.

The last stream of empirical studies reports financial development wields an insignificant impact on CO_2 emissions. In their research, Omri et al. (2015) use simultaneous-equation panel data models to examine its effect on CO_2 emissions in the MENA region. Their empirical findings reveal that financial development (credit to the private sector relative to GDP) does not influence CO_2 emissions. Elsewhere, Dogan and Turkekul (2016) utilise ARDL to examine the impact of financial development on CO_2 emissions in the United States. They do not detect any causal relationship between the two. Similarly, Jamel and Maktouf (2017) employ OLS estimation to investigate the impact of financial development on CO_2 emissions in a sample of 40 European countries. These authors find that financial development (domestic credit provided by banks to the private sector relative to GDP) has no impact on CO_2 emissions.

Examining Malaysia, Maji et al. (2017) indicate that financial development (domestic credit provided by banks to the private sector relative to GDP) has an insignificant impact on CO_2 emissions. Using a cross-country panel data from 21 transitional countries for the period 2006–2015 while considering different financial development indicators to assess the link between financial development and energy consumption, Yue et al. (2019) indicate there is no significant relationship between them. Further, Acheampong et al. (2020) examine the impact

of financial market development on carbon emissions intensity utilising the instrumental variable approach and a comprehensive panel dataset of a total of 83 countries for the period 1980–2015. Their empirical results show that the overall financial market development and its sub-measures such as financial market depth and efficiency reduce carbon emissions intensity in the developed and emerging market economies. However, an opposing outcome is found in the frontier financial economies. For standalone financial economies, results confirm that overall financial market development and its sub-indicators have no direct impact on carbon emissions intensity. Table 2.2 summarises the impact of financial development on CO_2 emissions. Overall, this review suggests the great variety of empirical models used in these studies has led to inconclusive results.

[Insert Table 2.2]

A large body of literature examines the causal effect of financial development on CO_2 emissions. Contrasting this, published studies exploring the role of financial inclusion in combating climate change are relatively scarce. While Le et al. (2020) point out that the empirical evidence between financial inclusion and CO_2 emissions is positive and linear in Asia, Renzhi and Baek (2020) discover that the association between financial inclusion and CO_2 emissions is non-linear (inverted U-shape) in a sample of 103 economies worldwide. Thus, research on financial inclusion and the environment is still in its infancy, and there is a need for further studies to provide a comprehensive understanding of how financial inclusion shapes CO_2 emissions. Finally, the scarcity of studies on this subject means that the issue of so many differences across regions has not been addressed. Although general cross-regional studies are relevant and informative, they cannot guide policy design for specific regions.

2.3 Methodology and Data Description

This study follows the empirical model of Renzhi and Baek (2020), to assess the effect of financial inclusion on CO_2 emissions in Latin America and MENA countries. CO_2 emissions per capita is a function of financial inclusion as shown in equation (1) which is written here:

$$ln\,co_2pc_{it} = \theta_1 + \beta_1 lnfi_{it} + \beta_2 lnfi^2{}_{it} + \beta_3 lnenergy_{it} + \beta_4 lnindustry + \beta_5 lngdppc_{it} + \eta i + \alpha_t + \varepsilon_{it} \quad (1)$$

where: $lnco_2pc$ is the natural logarithm of CO_2 emissions per capita; lnfi denotes the natural logarithm of financial inclusion; $lnfi^2$ is the square of financial inclusion; and lnenergy stands for the natural logarithm of energy. Energy is defined as the amount of energy released by burning one tonne of crude oil, while lnindustry denotes the natural logarithm of industry (including construction)-value added (% of GDP). The term lngdppc stands for the natural logarithm of GDP per capita. η represents time invariant country specific effect; α_t is time fixed effects; and ε_{it} denotes the stochastic error term.

In equation 2 presented below, we introduce the squared value of per capita GDP to test for the presence of a non-linear relationship between economic growth and CO_2 emissions. According to Levinson (2009), two main mechanisms underlie this hypothesis. First, during the early stages of economic development, a transition from agriculture to manufacturing and heavy industry is related to both higher incomes and more pollution per capita. Then, at a certain point the structure of the economy shifts toward light industry and services, and this change goes hand-in-hand with a decline in pollution. Second, when economies grow the adoption of technologies from more developed economies may replace dirty technologies with clean ones and reduce pollution per unit of output.

$$ln\,co_2pc_{it} = \theta_1 + \beta_1 lnfi_{it} + \beta_2 lnfi^2{}_{it} + \beta_3 lnenergy_{it} + \beta_4 lnindustry_{it} + \beta_5 lngdppc_{it} + \beta_6 lngdppc^2{}_{it} + \eta i + \alpha_t + \varepsilon_{it} \quad (2)$$

Our variables of interest are fi and fi^2. Thus, the relationship between financial inclusion and CO_2 emissions is an inverted U-shape if $\boldsymbol{\beta_1}$ is positive and statistically significant and $\boldsymbol{\beta_2}$ is negative and statistically significant. Otherwise, the relationship between financial inclusion and CO_2 emissions is U-shaped if $\boldsymbol{\beta_1}$ is negative and statistically significant and $\boldsymbol{\beta_2}$ is positive and statistically significant. The inverted U-shaped relationship would suggest that financial inclusion initially increases CO_2 emissions in the regions, but these emissions start to diminish after a certain threshold of financial inclusion. In contrast, if the relationship between financial inclusion and CO_2 emissions is U-shaped, it means that financial inclusion initially contributes to less CO_2 emissions. However, CO_2 emissions start to rise after a certain threshold of financial inclusion is reached.

We develop a composite Financial Inclusion Index (fi) that considers the following four aspects of financial inclusion: (1) number of ATMs per 10,000 adults, (2) number of commercial bank branches per 10,000 adults, (3) outstanding deposits from commercial banks (% of GDP), and (4) outstanding loans from commercial banks (% of GDP). Since these aspects are measured in different units and scales, they need to be normalised before converting them into the composite index fi (Le et al., 2020). Thus, a normalisation approach —z score is used. It is constructed as follows:

Z-score= $\frac{X_i - \bar{X}}{\alpha}$ where X_i denotes the raw score; $\bar{X}$ is the group average and α is the standard deviation. Subsequently, principal component analysis (PCA) is conducted on these normalised indicators.[7] The advantage of this method over others is that it is able to capture

[7]We also derive the min-max approach to produce a financial inclusion index (FI1). However, we find that FI1 is equivalent to FI (z score-approach). For this reason, we adopt one financial inclusion index (FI) in this chapter. Min-max normalisation is derived as follows:

mmx = $\frac{x_i - x_{min}}{x_{max} - x_{min}}$

where X_{min} = minimum data point and X_{max} = maximum data point.

most of the information from the original dataset which consists of four financial inclusion measures. At the same time, it can avoid potential multi-collinearity problem of including more than one proxy in a given equation.[8]

Based on data availability, we select 15 Latin American countries and 10 MENA countries covering the period 2004–2018. Table 2.3 summarises the variables and data sources. To show how the values of variables differ from country to country, mean values of all the variables for each nation are provided in Table 2.4.

[Insert Table 2.3]

[Insert Table 2.4]

Figure 2.1 presents the plots of financial inclusion index as measured by PCA and CO_2 emissions per capita across Latin American and MENA countries. As can be observed in the figure, the inclusion (fi) and natural logarithm of CO_2 emissions per capita ($lnco_2pc$) exhibit increasing trends in most Latin American and MENA countries during the period 2004-2018.

[Insert Figures 2.1]

Prior to estimation, several assumptions about the error process, i.e., heteroscedasticity and serial correlation are tested, respectively. First, we perform a modified Wald test to check for the existence of groupwise heteroskedasticity in the residuals of our fixed-effect regression. Using the null hypothesis, any variance in the error is the same for all individuals. According to the results reported in Table 2.5, we strongly reject the null hypothesis for any confidence level. So, a phenomenon of heteroscedasticity is present. Second, we run a Wald test to check whether autocorrelation exists in our data. The null hypothesis assumes there is no first-order autocorrelation. The results in Table 2.5 validate the presence of autocorrelation of the first order.

[8] Principal Component Analysis has traditionally been used to reduce a large set of correlated variables into a smaller set of uncorrelated variables, known as principal components (Ang & McKibbin, 2007; Stock & Watson, 2002).

[Insert Table 2.5]

Next, we check for the presence of cross-sectional dependence in our data. De Hoyos and Sarafidis (2006) note that the presence of cross-sectional dependence in cross-country panels may be due to unobserved common shocks that become part of the error terms. For this reason, if cross-sectional dependence is present in the data but is not taken into account in the analysis, it would lead to inconsistent standard errors of the estimated parameters (Driscoll & Kraay, 1998). We perform the Pesaran (2004) CD test.[9] The null hypothesis of the CD test is that the residuals are cross-sectionally uncorrelated. The results presented in Table 2.6 reveal a rejection of the null hypothesis (H0) of the test, which confirms the residuals are cross-sectionally uncorrelated. Hence, reported here is the presence of cross-sectional dependence in the data. For the purpose of a robustness check, we also use the Pesaran (2015) CD test to check for the presence of cross-sectional dependence problems. The null hypothesis is H0: errors are weakly cross-sectionally dependent. The results in Table 2.6 reject the null hypothesis (H0) and instead accept the alternative hypothesis that errors are not weakly cross-sectionally dependent.

[Insert Table 2.6]

In panel data analysis, the panel unit root test must be done first in order to identify the stationary properties of the relevant variables. The outcome of the panel unit root test of Pesaran (2003) is reported in Table 2.7. The results provide strong evidence that variables have a unit root in levels. Since the unit root hypothesis can be rejected for first differences, it is concluded that all series are integrated of the same order one (I (1)). These results indicate that the variables used in this study are stationary.

[Insert Table 2.7]

[9]We chose Pesaran's (2004) CD test because it is suitable for dealing with unbalanced panels.

Given that all our series are stationary and integrated of order 1, the next step is to test for the existence of cointegration between them. For this purpose, we implement the panel cointegration tests proposed by Pedroni (2004) whose null hypothesis is joint non-cointegration. Table 2.8 documents the results of the panel data cointegration tests devised by Pedroni. More specifically, we test for cointegration between the different variables included in equations 1 and 2. When all the equations are considered the conclusions of the test are quite straightforward. More specifically, we test for cointegration between the difference variables included in equations 1 and 2. The output in Table 2.8 reports the values of all test statistics with their respective P-values. All test statistics reject the null hypothesis of no cointegration in favour of the alternative hypothesis regarding the existence of a cointegrating relationship between the variables of the 2 equations.

[Insert Table 2.8]

2.4 The Model Selection

Dewan and Hussein (2001) have documented that panel data can be analysed by using the fixed effects or random effects model. Both models are consistent in the absence of a correlation between the explanatory variables and the disturbance term. However, if correlation is present then the random effects model is inconsistent and hence the fixed effects model is the preferred method. For this reason, we first run both the fixed and random effects models to choose a valid model based on the Hausman specification test (Hausman, 1978). The null hypothesis in Hausman specification implies that the random effects model yields consistent and efficient estimates. However, under the alternative, the fixed effects model is consistent while the random effects model is not. As shown in Table 2.9, the Hausman specification test for fixed versus random effects yields a P-value greater than 0.05, suggesting that random effects estimates are consistent and efficient. Second, we use the robust standard errors proposed by Driscoll and Kraay (1998) for panel regressions with cross-sectional dependence. Driscoll–Kraay standard errors are well calibrated when cross-

sectional dependence is present. Furthermore, ignoring cross-sectional correlation when estimating panel models can lead to severely biased statistical results. As such, this study employs the xtscc program presented in Hoechle (2007) which produces Driscoll and Kraay's (1998) standard errors for panel models. Finally, to address the potential reverse causality between financial inclusion and CO_2 per capita, dynamic panel GMM estimation is also employed (Arellano & Bond, 1991).

2.5 Results and Discussions

Table 2.9 reports the results concerning the impact of financial inclusion on CO_2 emissions in Latin America. It must be noted that Models 1–2 are based on equation (1) while Models 3–5 are based on equation (2). The results indicate that financial inclusion has a linear significant positive impact on CO_2 emissions in all models. On average, a 1 percent increase in the financial inclusion index can raise CO_2 emissions per capita by around 0.063 percentage points. This outcome suggests that during the investigation period with improved access to finance, citizens in Latin American countries could afford to buy more big-ticket items such as automobiles, refrigerators, and air-conditioners. However, their widespread and ubiquitous uses simply perpetuate the use of and reliance on energy from fossil fuels and bring about higher CO_2 emissions. These results provide evidence supporting Le et al. (2020) who suggest that the relationship between financial inclusion and CO_2 emissions is positive and linear in Asia. These results, however, do not support what Renzhi and Baek (2020) contend, which is that financial inclusion has an inverted U-shaped relationship with CO_2 emissions in a sample of 103 countries around the globe over the period 2004-2014.

The results further indicate that the coefficient of energy supply is positive and statistically significant at 1 percent in all specifications. In quantitative terms, the results imply that a 1 percent increase in energy supply can increase CO_2 emissions per capita by a percentage point of 0.7. This finding does agree with what Tamazian and Rao (2010) reported for a panel of 24 transition countries; Omri et al. (2015) for MENA countries; Sapkota and Bastola (2017) for

Latin America; Ali et al. (2019) for Nigeria; and Renzhi and Baek (2020) for a large sample of countries around the globe. As shown in Models 2, 4, and 5 of Table 2.9, the results reveal that industry-value had significant and negative influences on CO_2 emissions. On average, a 1 percent increase in industrialisation would decrease CO_2 emissions by 0.18 percentage points. This scenario does depend on instituting sustainable industrial value-added policies that promote resource-use efficiency, embracing clean and environmentally friendly technologies, and clean industrial processes to help mitigate climate change in Latin America. This outcome is in line with other studies (Asumadu-Sarkodie & Owusu, 2017; Dodman, 2009) which also indicate that industry and how it operates has a significant negative effect on CO_2 emissions.

As expected, the impact of per capita GDP (PGDP) has a positive and statistically significant impact on per capita CO_2 emissions at the 1 percent level in Models 1 and 2. The positive impacts of income on CO_2 emissions imply that as Latin American countries make economic progress, the level of CO_2 emissions worsens. A 1 percent increase in per capita GDP elevates CO_2 emissions by 0.84 percentage point, all else equal. This result corroborates the findings of: Halicioglu (2009) for Turkey; Wang et al. (2011) for China; Tamazian and Rao (2010) for the 24 transition economies; Omri et al. (2015) for the 12 MENA countries; Salahuddin et al. (2018) for Kuwait; Ali et al. (2019) for Nigeria; and Le at al. (2020) for countries in Asia. Finally, the results of Models 3-5 reported in Table 2.9 do not validate the existence of an inverted U-shaped relationship between economic growth and CO_2 emissions.

This finding is not in line with Renzhi and Baek (2020) who argue there is an inverted U-shaped relationship between economic growth and CO_2 emissions in a large sample of countries. Our result, however, supports the finding of Jardon et al. (2017) who reveal that there is no clear evidence of an inverted U-shaped relationship between economic growth and CO_2 emissions in Latin America over the period 1971-2011. Our results are consistent with the studies by: Farhani and Ozturk (2015) for Tunisia; Al-Mulali et al. (2015) for Vietnam; and Dogan and Turkekul (2016) for the USA. In these cases, there is no inverted U-shaped

relationship between income and pollution levels. Finally, as shown in Table 2.9, GMM estimation is valid using the Arellano-Bond and Sargan tests.

[Insert Table 2.9]

Table 2.10 reports the results for the impact of financial inclusion on CO_2 emissions in the MENA region. Models 1–2 are based on equation (1) while Models 3–5 are based on equation (2). The results indicate that financial inclusion wields no significant impact on CO_2 emissions, but they diverge from other research (e.g., Le et al., 2020; Renzhi & Baek, 2020). The results further reveal that the coefficient of energy supply is positive and statistically significant at the 1 percent level in all models. These results imply that a 1 percent increase in energy supply can raise CO_2 emissions per capita by 0.69 percentage points. It emerges that economic growth has a positive and statistically significant impact on per capita CO_2 emissions at 1 percent in Models 1 and 2. A 1 percent increase in per capita GDP increases the CO_2 emissions by 0.902 percentage points. Finally, as shown in Models 3 and 4 of Table 2.10, the coefficients of GDP per capita and its square term, respectively, have significant positive and negative effects CO_2 emissions. It means that the level of per capita CO_2 emissions initially increases with per capita GDP, until it reaches its stabilisation point; any increase in per capita GDP likely reduces the per capita CO_2 emissions This outcome is consistent with what Omri et al. (2015) reported; they reveal there is an inverted U-shaped relationship between economic growth and CO_2 emissions in the MENA region from 1990 to 2011.

[Insert Table 2.10]

2.5.1 Robustness Check

This robustness check involves adding a set of control variables identified in previous studies to impact CO_2 emissions. We control for the variable agriculture as a share of GDP because agricultural activities involve harvesting and deforestation. It is important to note that the

export of agricultural products can contribute significantly to CO_2 emissions (see e.g., Aller et al., 2021; Henders et al., 2015). We also include trade openness as a share of GDP since several impact studies indicate trade openness exerts a strong impact on CO_2 emissions (Acheampong, 2009; Acheampong et al., 2020). Finally, investment (gross fixed capital formation as a share of GDP) is included because employment of more capital in a production process generally consumes more energy, subsequently leading to more pollution (Sapkota & Bastoal, 2017). Results are reported in Table 2.11 (for Latin America) and Table 2.12 (for the MENA region). We find no changes to the main findings reported in Tables 2.9 and 2.10.

[Insert Table 2.11]

[Insert Table 2.12]

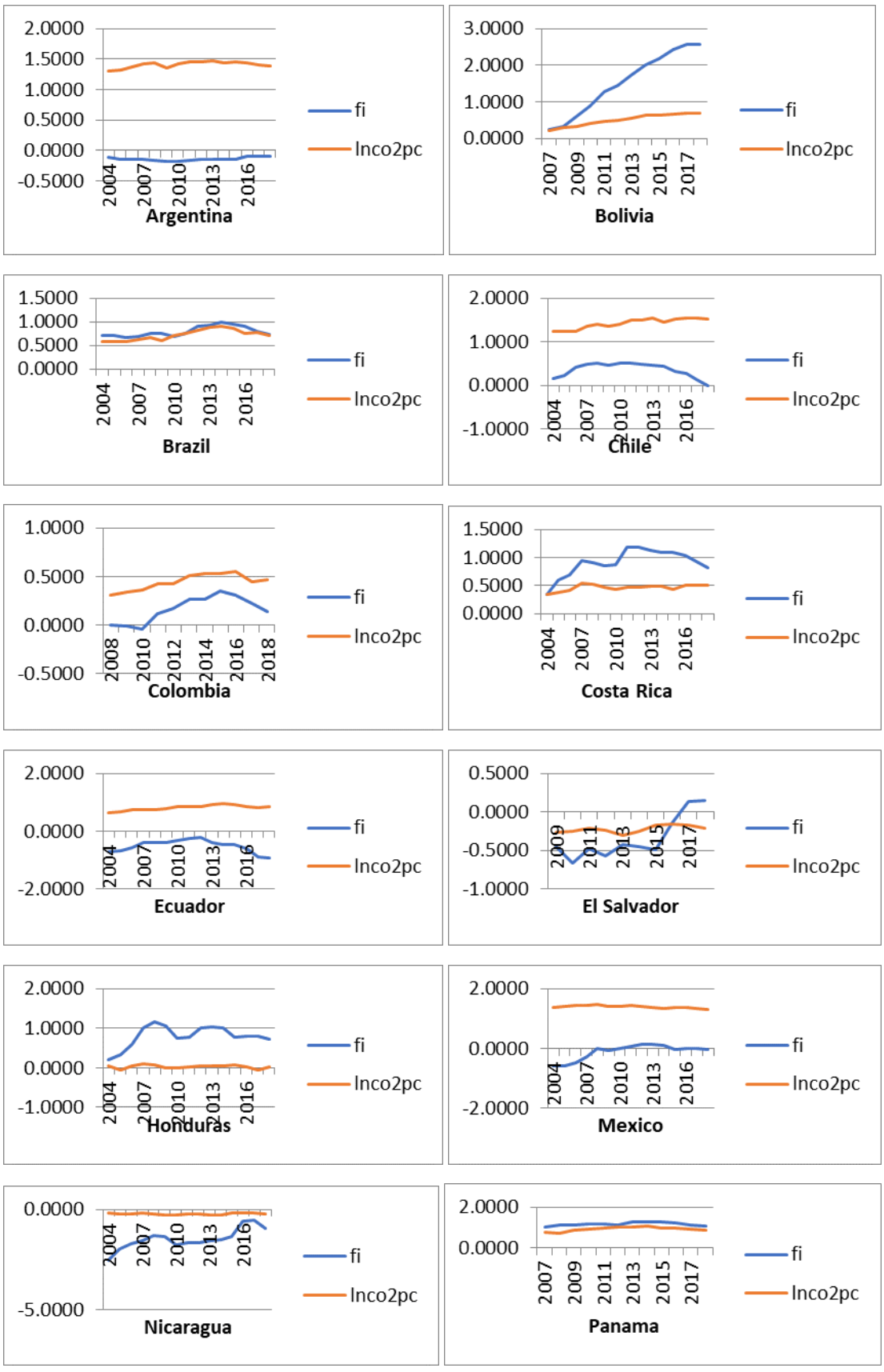
2.6 Conclusions and Policy Implications

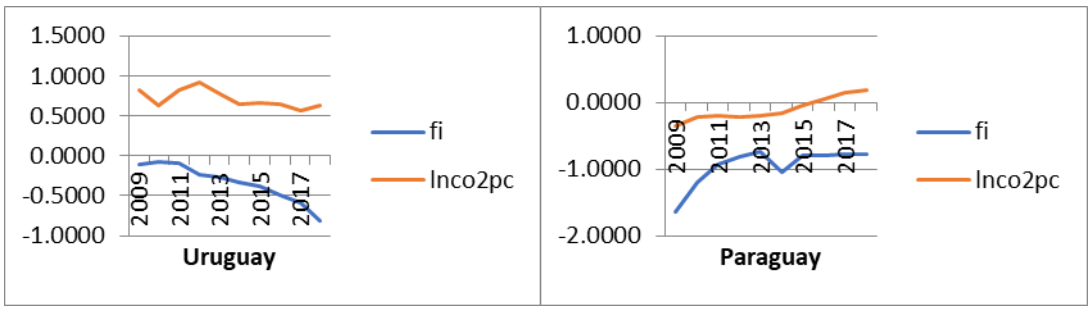
The need to formulate and enforce policies to alleviate global warming has brought about the need to understand what is driving the growth in CO_2 emissions. This study examines, separately, the impact of financial inclusion on CO_2 emissions in Latin American and MENA countries over the period 2004–2018, while controlling for known important determinants such as energy supply, industry activity, and economic growth variables. Results show that financial inclusion has a linear positive and significant impact on CO_2 emissions in Latin America. In contrast, it has no significant impact on CO_2 emissions in the MENA region. These results are not in line with a previous key study in this area, conducted by Renzhi and Baek in 2020 for a large number of countries from different regions. In this study, the authors find that the effect of financial inclusion on CO_2 emissions follows an inverted U-shaped relationship. These global results, although robust and interesting, may be misleading in terms of more regionally specific policy implications. One possible reason behind the difference in results between our regional study and the global study by Renzhi and Baek is that the characteristics of financial products that contribute to financial inclusion across regions may differ, and as a consequence, have different effects on GHG emissions.

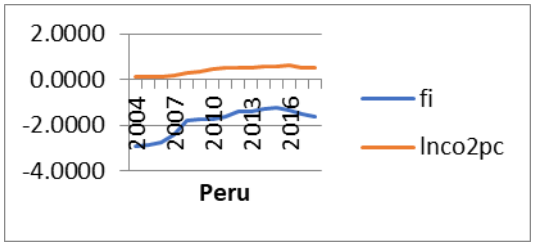
This study focuses on Latin America and MENA regions and arrives at different results regarding the relationship between financial inclusion and CO_2 emissions. Future work could explore the underlying factors that generate these differences. For example, whether they are mainly caused by differences in the structure of their financial sectors, their consumption and investment patterns, their share of ‘green’ loans to total loans, etc. Future research would be also able to provide further insight into this topic, provided the necessary data are available, by focusing on individual countries. This would allow policymakers to take into account each country’s individual characteristics in the design of country-specific policy actions. Furthermore, the broad definition of financial inclusion allows for measurement approaches that go beyond the proxy used in this study. Future research could explore the impact of

financial inclusion on the natural environment while varying the way financial inclusion is measured.

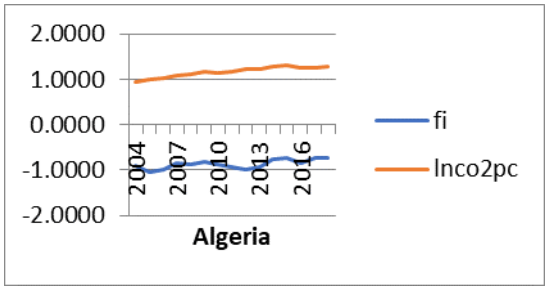
Figure 2.1 Latin American countries

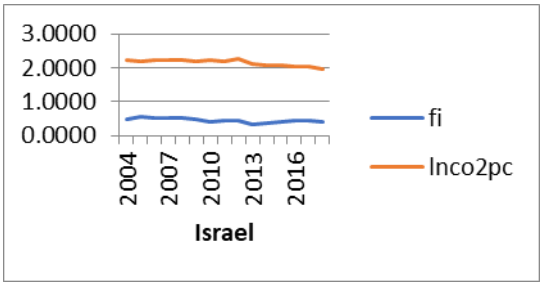


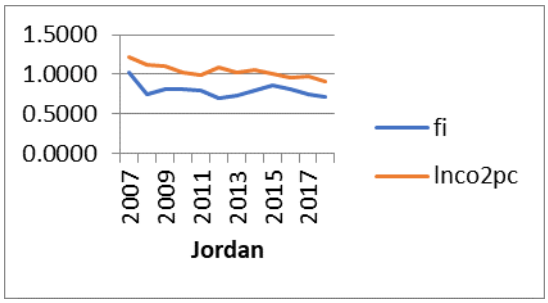

1.5000
1.0000
0.5000
0.0000
-0.5000
-1.0000
2009
2011
2013
2015
2017
Uruguay
fi
lnco2pc
1.0000
0.0000
-1.0000
-2.0000
2009
2011
2013
2015
2017
Paraguay
fi
lnco2pc

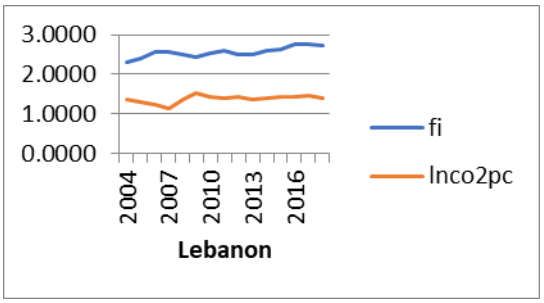

2.0000
0.0000
-2.0000
-4.0000
2004
2007
2010
2013
2016
Peru
fi
lnco2pc

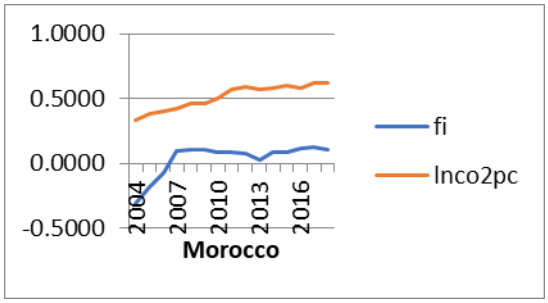
MENA Countries

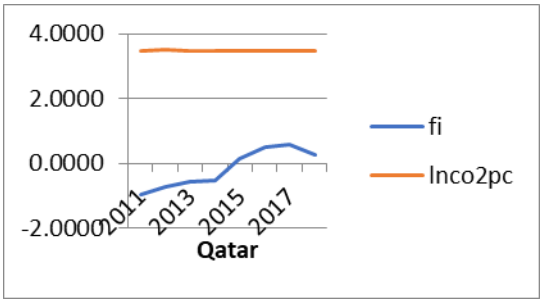


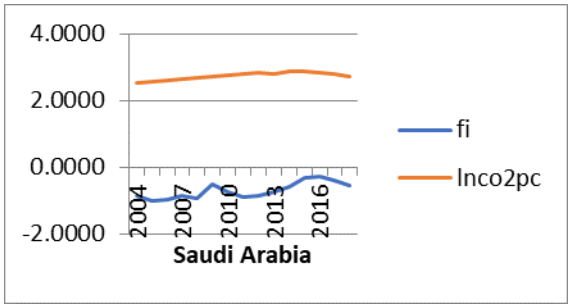


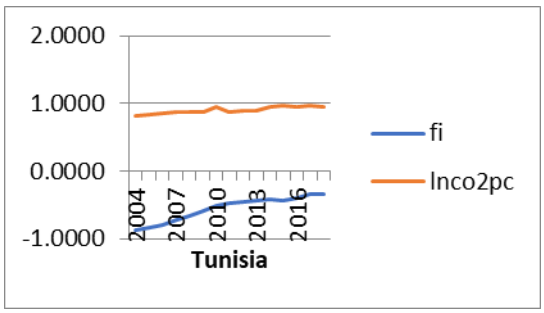


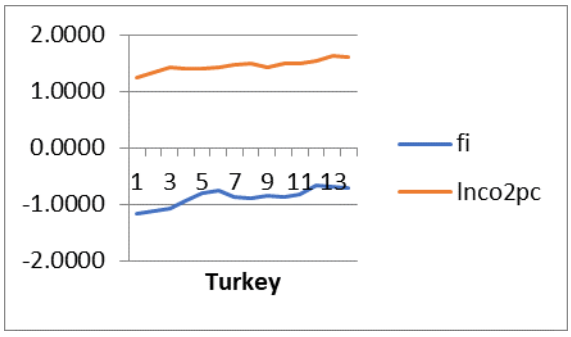












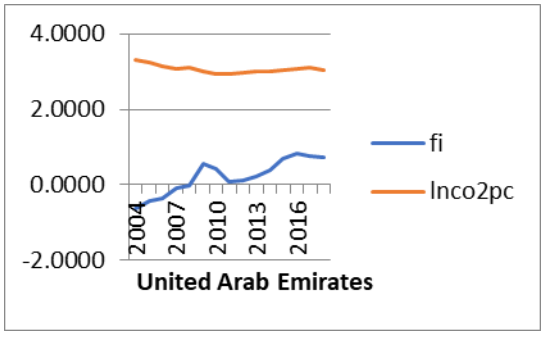


Table 2.1
Percentage of people who have an account at a financial institution

Region	2011	2014	2017
Latin America	**39.383**	**51.912**	**55.144**
East Asia & Pacific	59.852	71.997	73.694
OECD	89.987	94.017	94.680
MENA	**37.630**	**43.199**	**47.531**
Europe & Central Asia	69.290	77.727	81.456
Europe & Central Asia (excluding high income)	44.819	57.787	65.294
East Asia & Pacific (excluding high income)	55.075	69.136	70.619
The Whole World	**50.628**	**62.003**	**68.516**

Source: Global Findex Database 2018, World Bank

Table 2.2

Key findings of the relationship between financial development and CO_2 to emissions

Authors	Period	Countries	Methodology	Main Result
Panel A: Finance reduces CO_2 emissions				
Talukdar and Meisner (2001)	1987–95	44 developing countries	Random effects	Finance reduces **CO_2** emissions
Tamazian et al. (2009)	1992-2004	BRIC countries	Random effects	Finance reduces **CO_2** emissions
Tamazian and Bhaskara (2010)	1993-2004	24 transition countries	GMM estimation	Finance reduces **CO_2** emissions
Shahbaz et al. (2013)	1971-2011	Malaysia	ARDL approach	Finance reduces **CO_2** emissions
Dogan and Seker (2016)	1980–2012	The European Union	Panel estimation	Finance reduces **CO_2** emissions
Kahouli (2017)	1995–2015	South Mediterranean countries	Bounds testing a	Finance reduces **CO_2** emissions
Shahbaz et al. (2018)	1955–2016	France	ARDL approach	Finance reduces **CO_2** emissions
Paramati et al. (2018)	1992- 2011	43 developed and emerging countries	Panel cointegration	Stock markets negatively affect
Chen et al. (2019)	1990–2014	98 countries	Two-way fixed effects	Finance helps to reduce energy intensity
Zhao and Yang (2020)	2001–2015	China	PVAR model	Finance reduces **CO_2** emissions
Panel B: Finance increases CO_2 emissions				
Sadorsky (2010)	1990-2006	22 emerging countries	GMM estimation	Finance increases **CO_2** emissions
Boutabba (2014)	1971-2008	India	ARDL approach	Finance increases **CO_2** emissions
Shahbaz et al. (2015)	1970-2012	India	ARDL approach	Finance increases **CO_2** emissions
Abbasi and Riaz (2016)	1971-2011	Pakistan	ARDL approach	Finance increases **CO_2** emissions
Paramati et al. (2017)	1991-2012	G20 Countries	Panel cointegration test	Finance increases **CO_2** emissions
Xing et al. (2017)	2000-2013	China	ARDL approach	Finance increases **CO_2** emissions
Acheampong (2019)	2000–2015	46 sub-Saharan Africa countries	System GMM	Finance increases **CO_2** emissions
Ali et al. (2019)	1971-2010	Nigeria	ARDL approach	Finance increases **CO_2** emissions
Haug and Ucal (2019)	1974 - 2014	Turkey	ARDL model	Finance increases impacts on **CO_2** intensity.
Acheampong et al. (2020)	1980–2015	83 countries	Instrumental variable	Finance increases **CO_2** emissions in frontier economies.
Chiu and Lee (2020)	1984- 2015	79 countries	PSTR model	Finance increases energy consumption.
Khan et al. (2020)	1980-2018	192 countries	Panel quantile regression	Finance increases **CO_2** emissions
Kim et al. (2020)	1989–2013	86 developing and advanced countries.	System GMM	Market-led (bank-led) financial system alleviates (enhances)
Zeqiraj et al. (2020)	1980–2016	The European Union	(CS-ARDL) approach	Stock market development increases **CO_2** emissions

Aller et al. (2021)	1995–2014	92 countries	Bayesian model	Finance increases **CO_2** emissions
Yao and Tang (2021)	1971 - 2014	G20 countries	STIRPAT model	Finance negatively/positively affects emissions.
Panel C: Finance has no impact CO_2 emissions				
Omri et al. (2015)	1990-2011	12 MENA countries	Simultaneous equation	Finance has no impact on **CO_2** emissions.
Dogan and Turkekul (2016)	1960–2010	United States	ARDL approach	Finance has no impact on **CO_2** emissions.
Jamel and Martouf (2017)	1985-2014	40 European countries	OLS technique	Finance has no impact on **CO_2** emissions.
Maji et al. (2017)	1980-2014	Malaysia	OLS technique	Finance has no impact on **CO_2** emissions.
Yue et al. (2019)	2006–2015	21 transitional countries	SIRPAT model	Finance has no impact on energy consumption

Table 2.2
Definitions of variables, data sources, and statistical descriptions

Variable	Description	Source
ATM	Number of ATMs per 100,000 adults	FAS (IMF)
BB	Number of commercial bank branches per 100,000 adults	FAS (IMF)
ODCB	Outstanding deposits from commercial banks (% of GDP)	FAS (IMF)
OLCB	Outstanding loans from commercial banks (% of GDP)	FAS (IMF)
CO2PC	CO_2 emissions (metric tons per capita)	WDI
ENERGY	Primary energy supply[10]	IEA
INDUSTRY	Industry (including construction), value added (% of GDP)	WDI
GDPPC	GDP per capita (constant 2010 US$)	WDI
AGRICULTURE	Agriculture, forestry, and fishing to GDP	WDI
TRADE OPENNESS	Trade (% of GDP)	WDI
INVESTMENT	Gross fixed capital formation (% of GDP)	WDI

Note: Data Source: FAS: Financial Access Survey (International Monetary Fund); IEA: International Energy Agency; WDI: World Development Indicators; and WGI: Worldwide Governance Indicator.

[10] Energy data since 2018 is not available from the World Bank. We thus obtain the energy data from IEA for the period 2004-2018. Primary energy supply is defined as the amount of energy released by burning one tonne of crude oil.

Table 2.3
Mean values of variables by country

Country	CO2PC	ATM	BB	ODCB	OLCB	ENERGY	INDUSTRY	GDPPC	AGRICULTURE	TRADE OPENNESS	INVESTMENT
Latin America											
Argentina	4.10	27.65	13.26	16.74	11.94	0.10	25.26	9979.95	6.53	33.37	16.49
Bolivia	1.69	28.21	27.86	36.80	25.49	0.11	28.03	2165.41	10.48	72.93	18.94
Brazil	2.06	112.14	19.52	37.87	32.21	0.09	21.62	10892.64	4.52	25.66	18.26
Chile	4.19	53.51	16.31	50.91	76.98	0.09	33.70	13298.15	3.74	67.03	22.54
Colombia	1.57	37.02	15.03	34.88	36.81	0.06	30.47	7035.87	6.13	37.16	22.02
Costa Rica	1.59	50.72	20.52	44.17	42.46	0.07	21.96	8401.69	6.38	73.80	19.90
Ecuador	2.25	29.19	11.38	22.78	15.56	0.08	34.20	4837.27	9.33	55.04	24.12
El Salvador	0.80	32.99	12.27	46.34	44.97	0.09	25.60	3226.86	6.07	75.59	16.01
Honduras	1.03	17.15	19.64	43.19	49.85	0.14	26.00	1968.84	12.27	117.79	25.13
Mexico	4.02	45.23	13.51	20.71	17.16	0.09	32.34	9668.81	3.21	63.84	21.88
Nicaragua	0.80	11.46	7.80	29.67	28.36	0.12	23.29	1632.89	16.32	95.33	25.64
Panama	2.55	52.99	22.69	137.27	114.12	0.05	23.67	9569.75	3.24	128.77	35.02
Paraguay	0.92	22.47	9.52	30.43	28.85	0.08	34.41	4744.90	11.22	70.19	19.68
Peru	1.51	49.78	6.74	27.47	26.42	0.06	33.99	5226.33	6.90	49.81	21.67
Uruguay	2.05	58.53	12.25	40.59	24.95	0.07	24.28	13329.74	6.92	47.86	19.41
MENA											
Algeria	3.22	5.76	5.12	45.40	32.18	0.09	47.57	4531.00	9.40	65.68	33.29
Israel	8.57	103.25	19.97	99.43	77.12	0.08	20.70	31183.89	1.39	69.13	19.94
Jordan	2.84	24.92	15.80	117.39	80.26	0.10	26.22	3539.79	3.76	111.17	23.31
Lebanon	3.98	33.98	24.96	233.37	82.94	0.09	15.26	6602.75	3.80	86.49	23.89
Morocco	1.68	20.41	19.37	80.81	73.06	0.08	25.93	2888.61	12.47	77.91	30.27
Qatar	32.44	55.80	10.97	74.08	93.16	0.12	64.49	66831.76	0.15	79.06	35.63
Saudi Arabia	15.47	56.21	8.25	51.37	42.28	0.12	56.84	20171.64	2.62	80.11	23.38
Tunisia	2.47	20.18	16.80	56.92	65.06	0.09	27.18	4038.96	9.09	99.59	21.66

Turkey	4.31	60.94	17.29	45.00	44.12	0.07	26.86	12197.02	7.36	51.21	27.60
UAE	21.36	51.45	12.33	89.99	89.97	0.11	52.06	42601.37	0.89	151.65	21.23

Table 2.4
Modified Wald test and autocorrelation test

	LATIN AMERICA		MENA	
Test	Equation 1	Equation 2	Equation 1	Equation 2
Modified Wald test	1749.95 ***	1764.81***	127.13***	94.39***
Autocorrelation test (F-test)	49.287***	49.544***	17.927***	17.462***

Notes: *$p < 0.05$, **$p < 0.01$, *** $p < 0.001$. Heteroscedasticity: Modified Wald test for group-wise heteroscedasticity in fixed effect regression model; H0: sigma(i)^2 = sigma^2 for all i: No heteroscedasticity. Serial correlation: Wooldridge test for autocorrelation in panel data; H0: No first-order autocorrelation.

Table 2.5
Pesaran's (2004) CD test for cross-section independence in macro panel data

	LATIN AMERICA		MENA	
Variable	**CD test**	**P-value**	**CD test**	**P-value**
lnCO2PC	8.05	0.000	1.23	0.218
Fi	7.85	0.000	8.81	0.000
lnenergy	6.08	0.000	-1.79	0.074
lnindustry	4.08	0.000	7.37	0.000
Lngdppc	29.77	0.000	2.27	0.023

We use the xtcd command to implement Pesaran's (2004) CD test. Notes: Under the null hypothesis of cross-section independence, CD ~ N (0,1). P-values close to zero indicate data are correlated across panel groups.

Pesaran's (2015) test for weak cross-sectional dependence in Latin America

	Equation 1	Equation 2	Equation 1	Equation 2
	FE	FE	RE	RE
CD	-2.307	-2.223	-2.32	-2.263
P-value	0.021	0.026	0.02	0.024

Pesaran's (2015) test for weak cross-sectional dependence in the MENA region

	Equation 1	Equation 2	Equation 1	Equation 2
	FE	FE	RE	RE
CD	-2.245	-2.331	-1.834	-1.885
P-value	0.025	0.02	0.067	0.059

We use the xtcd2 command to implement Pesaran's (2015) CD test. Notes: Under the null hypothesis of errors are weakly cross-sectional dependent, CD ~ N (0,1). P-values close to zero indicate data are correlated across panel groups.

Table 2.6
Pesaran's simple panel unit root test in the presence of cross-section dependence in Latin America

Variables	Level		First difference	
	Z[t bar]	P value	Z[t bar]	P value
lnCO2PC	3.063	0.999	-2.264**	0.012
fi	2.039	0.979	-2.387***	0.009
lnenergy	-0.810	0.209	-3.383***	0.000
lnindustry	-0.012	0.495	-1.849**	0.032
lngdppc	0.982	0.837	-1.305*	0.096

Pesaran's simple panel unit root test in the presence of cross-section dependence in MENA

Variables	Level		First difference	
	Z[t bar]	P value	Z[t bar]	P value
lnCO2PC	0.796	0.787	-1.677**	0.047
fi	-1.227	0.110	-1.871**	0.031
lnenergy	-1.115	0.132	-3.381***	0.000
lnindustry	0.387	0.650	-3.270***	0.001
lngdppc	-0.084	0.466	-2.185**	0.014

Table 2.7
Pedroni panel cointegration test results between the variables in Latin America

	ADF-stat	P-value
Model including the variables of equation. (1)	-6.844***	0.0000
Model including the variables of equation. (2)	-7.728 ***	0.0000

Pedroni panel cointegration test results between the variables in MENA

	ADF-stat	P-value
Model including the variables of equation. (1)	-2.973***	0.0015
Model including the variables of equation. (2)	-6.266 ***	0.0000

*** indicates significance at the 1% level.

Table 2.8
The impact of financial inclusion on CO_2 emissions in Latin America

Variables	Model 1 Random effects	Model 2 Random effects (Driscoll–Kraay)	Model 3 Random effects	Model 4 Random effects (Driscoll–Kraay)	Model 5 GMM
fi	0.058*	0.058***	0.081***	0.081***	0.037***
	(0.031)	(0.017)	(0.029)	(0.006)	(0.014)
fi^2	0.003	0.003	0.002	0.002	-0.005
	(0.006)	(0.005)	(0.005)	(0.004)	(0.006)
Lnenergy	0.724***	0.724***	0.726***	0.726***	0.364***
	(0.156)	(0.079)	(0.164)	(0.08)	(0.087)
Lnindustry	-0.167	-0.167***	-0.7	-0.142***	-0.241**
	(0.114)	(0.034)	(0.095)	(0.041)	(0.101)
Lngdppc	0.839***	0.839***	-0.618	-0.618	1.118
	(0.123)	(0.051)	(1.165)	(0.942)	(0.899)
$Lngdppc^2$			0.084	0.084	-0.025
			(0.070)	(0.056)	(0.049)
Constant	-5.095***	-5.094***	1.246	1.246	-6.749
	(0.978)	(0.35)	(4.999)	(4.141)	(4.321)
number of countries	15	15	15	15	15
number of observations	200	200	200	200	170
Hausman test (P-value)	0.999		0.135		
Arellano-Bond test for AR(1)(P-value)					0.030
Arellano-Bond test for AR(1)(P-value)					0.256
Sargan test (P-value)					1.000
Time fixed effects	YES	YES	YES	YES	YES

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors of estimates are reported in parentheses. 1) Pooled OLS refers to Pooled OLS estimation. GMM refers to the dynamic GMM estimator. 2) fi refers to financial inclusion index by performing PCA on financial inclusion indicators (Z-score). fi^2 is the square term of fi. Lnenergy is a natural logarithm of energy supply defined as the amount of energy released by burning one tonne of crude oil; Lnindustry is a natural logarithm of industry as a share of GDP; Lngddpc is a natural logarithm of GDP per capita; and $Lngddpc^2$ is the square term of Lngddpc.

Table 2.9
The impact of financial inclusion on CO_2 emissions in the MENA region

Variables	Model 1 Fixed effects	Model 2 Fixed effects (Driscoll–Kraay)	Model 3 Fixed effects	Model 4 Fixed effects (Driscoll–Kraay)	Model5 GMM
fi	0.038	0.038	0.021	0.021	0.032
	(0.030)	(0.043)	(0.032)	(0.039)	(0.025)
fi^2	0.003	0.003	0.004	0.004	0.010
	(0.012)	(0.012)	(0.012)	(0.014)	(0.010)
Lnenergy	0.736***	0.736***	0.729***	0.729***	0.5***
	(0.066)	(0.066)	(0.065)	(0.069)	(0.100)
Lnindustry	-0.140	-0.140	-0.219	-0.219**	0.108
	(0.144)	(0.103)	(0.149)	(0.090)	(0.254)
Lngdppc	0.902***	0.902**	1.599***	1.599***	0.551
	(0.038)	(0.066)	(0.404)	(0.302)	(0.586)
$Lngdppc^2$			-0.037*	-0.037**	0.005
			(0.021)	(0.014)	(0.029)
Constant	-4.804***	-4.804***	-8.072***	-8.072***	-2.992
	(0.289)	(0.507)	(1.920)	(1.575)	(2.817)
number of countries	10	10	10	10	10
number of observations	139	139	139	139	119
Hausman test (P-value)	0.000		0.000		
Arellano-Bond test for AR(1) (P-value)					0.094
Arellano-Bond test for AR(1) (P-value)					0.618
Sargan test (P-value)					1.000
Time fixed effects	YES	YES	YES	YES	YES

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors of estimates are reported in parentheses. 1) Pooled OLS refers to Pooled OLS estimation. GMM refers to the dynamic GMM estimator. 2) fi refers to financial inclusion index by performing PCA on financial inclusion indicators (Z-score). fi^2 is the square term of fi. Lnenergy is a natural logarithm of energy supply defined as the amount of energy released by burning one tonne of crude oil; Lnindustry is a natural logarithm of industry as a share of GDP; Lngddpc is a natural logarithm of GDP per capita; and $Lngddpc^2$ is the square term of Lngddpc.

Table 2.10
The impact of financial inclusion on CO_2 emissions in Latin America (Robustness Check)

Variables	Model 1 Fixed effects	Model 2 Fixed effects (Driscoll–Kraay)	Model 3 Fixed effects	Model 4 Fixed effects (Driscoll–Kraay)	Model 5 GMM
fi	0.039***	0.039*	0.063***	0.063***	0.037**
	(0.015)	(0.019)	(0.016)	(0.017)	(0.018)
fi^2	-0.001	-0.001	-0.001	-0.001	-0.004
	(0.003)	(0.003)	(0.003)	(0.004)	(0.006)
Lnenergy	0.701***	0.701***	0.716***	0.716***	0.395***
	(0.100)	(0.082)	(0.103)	(0.083)	(0.079)
Lnindustry	-0.284***	-0.284***	-0.236***	-0.236***	-0.227***
	(0.054)	(0.045)	(0.056)	(0.050)	(0.082)
Lngdppc	0.808***	0.808***	-0.627	-0.627	0.947
	(0.096)	(0.067)	(0.657)	(0.359)	(1.031)
$Lngdppc^2$			0.08**	0.08***	-0.019
			(0.038)	(0.023)	(0.058)
lnagriculture	0.020	0.020	0.052	0.052*	-0.011
	(0.041)	(0.027)	(0.041)	(0.026)	(0.073)
lntrade openness	0.035	0.035	0.037	0.037	0.053
	(0.035)	(0.025)	(0.035)	(0.029)	(0.043)
lninvestment	0.252***	0.252***	0.237***	0.237***	0.092
	(0.061)	(0.061)	(0.060)	(0.049)	(0.060)
Constant	-4.56***	-4.56***	1.962	1.962	-5.536
	(0.829)	(0.570)	(2.998)	(1.553)	(4.751)
number of countries	15	15	15	15	15
number of observations	198	198	198	198	169
Hausman test (P-value)	0.000		0.002		
Arellano-Bond test for AR (1) (P-value)					0.030
Arellano-Bond test for AR (1) (P-value)					0.199

Sargan test (P-value)					1.000
Time fixed effects	YES	YES	YES	YES	YES

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors of estimates are reported in parentheses. 1) Pooled OLS refers to Pooled OLS estimation. GMM refers to the dynamic GMM estimator. 2) fi refers to financial inclusion index by performing PCA on financial inclusion indicators (Z-score). fi^2 is the square term of fi. Lnenergy is a natural logarithm of energy supply defined as the amount of energy released by burning one tonne of crude oil; Lnindustry is a natural logarithm of industry as a share of GDP; Lngddpc is a natural logarithm of GDP per capita; and $Lngddpc^2$ is the square term of lngddpc ; Lnagriculture is a natural logarithm of agriculture, forestry, and fishing, value added as a share of GDP; Lntrade openness is the natural logarithm of the sum of total exports and total imports as a share of GDP; Ln investment is the natural logarithm of gross fixed capital formation as a share of GDP.

Table 2.11
The impact of financial inclusion on CO_2 emissions in the MENA region (Robustness Check)

Variables	Model 1 **Fixed effects**	Model 2 **Fixed effects (Driscoll–Kraay)**	Model 3 **Fixed effects**	Model 4 **Fixed effects (Driscoll–Kraay)**	Model5 **GMM**
fi	0.008	0.008	0.007	0.007	0.034
	(0.030)	(0.041)	(0.030)	(0.041)	(0.031)
fi^2	0.004	0.004	0.004	0.004	0.004
	(0.011)	(0.011)	(0.012)	(0.011)	(0.007)
Lnenergy	0.764***	0.764***	0.763***	0.763***	0.53***
	(0.056)	(0.068)	(0.056)	(0.069)	(0.095)
Lnindustry	-0.514**	-0.514***	-0.529**	-0.529***	0.003
	(0.227)	(0.105)	(0.215)	(0.095)	(0.232)
Lngdppc	0.912***	0.913***	1.049*	1.049**	0.455
	(0.041)	(0.079)	(0.534)	(0.488)	(0.621)
$Lngdppc^2$	-0.005	-0.005	-0.007	-0.007	0.011
	(0.024)	(0.015)	(0.027)	(0.023)	(0.031)
lnagriculture	0.134***	0.134**	-0.007	-0.007	0.008
	(0.051)	(0.048)	(0.024)	(0.016)	(0.027)
lntrade openness	-0.067*	-0.067**	0.126*	0.126*	0.054
	(0.034)	(0.026)	(0.065)	(0.069)	(0.036)
lninvestment			-0.07*	-0.07**	-0.042
			(0.036)	(0.030)	(0.051)
Constant	-4.809***	-4.809***	-5.479**	-5.479*	-2.536
	(0.365)	(0.628)	(2.626)	(2.588)	(3.086)
number of countries	10	10	10	10	10
number of observations	139	139	139	139	119
Hausman test (P-value)	0.000		0.000		
Arellano-Bond test for AR(1)(P-value)					0.095
Arellano-Bond test for AR(1)(P-value)					0.613

Sargan test (P-value)					1.000
Time fixed effects	YES	YES	YES	YES	YES

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors of estimates are reported in parentheses. 1) Pooled OLS refers to Pooled OLS estimation. GMM refers to the dynamic GMM estimator. 2) fi refers to financial inclusion index by performing PCA on financial inclusion indicators (Z-score). fi^2 is the square term of fi. Lnenergy is a natural logarithm of energy supply defined as the amount of energy released by burning one tonne of crude oil; Lnindustry is a natural logarithm of industry as a share of GDP; Lngddpc is a natural logarithm of GDP per capita; and $Lngddpc^2$ is the square term of Lngddpc. ; Lnagriculture is a natural logarithm of agriculture, forestry, and fishing, value added as a share of GDP; Lntrade openness is the natural logarithm of the sum of total exports and total imports as a share of GDP; Lninvestment is the natural logarithm of gross fixed capital formation as a share of GDP.

Table A1

Within and between variances of variables in Latin America

Standard deviation	Variables							
	CO_2PC	FI	ENERGY	INDUSTRY	GDPPC	AGRICULTURE	TRADE	INVESTMENT
Overall	0.556	1	0.278	0.191	0.698	0.498	0.459	0.207
Between	0.56	0.959	0.28	0.173	0.704	0.49	0.445	0.194
Within	0.101	0.338	0.063	0.086	0.107	0.118	0.135	0.097
Observations of each variable	200	200	200	200	200	200	200	200

Within and between variances of variables in MENA

Standard deviation	Variables							
	CO_2PC	FI	ENERGY	INDUSTRY	GDPPC	AGRICULTURE	TRADE	INVESTMENT
Overall	0.915	1.045	0.195	0.117	1.039	1.178	0.314	0.223
Between	1.007	1.039	0.188	0.123	1.138	1.375	0.299	0.195
Within	0.09	0.238	0.085	0.031	0.1	0.182	0.122	0.134
Observations of each variable	139	139	139	139	139	139	139	139

Table A2
Sample composition

Country name (Latin America)	Observation period	Country name (MENA)	Observation period
Argentina	[2004–2018]	Algeria	[2004–2018]
Bolivia	[2007–2018]	Israel	[2004–2018]
Brazil	[2004–2018]	Jordan	[2007–2018]
Chile	[2004–2018]	Lebanon	[2004–2018]
Colombia	[2008–2018]	Morocco	[2004–2018]
Costa Rica	[2004–2018]	Qatar	[2011–2018]
Ecuador	[2004–2018]	Saudi Arabia	[2004–2018]
El Salvador	[2009–2018]	Tunisia	[2004–2018]
Honduras	[2004–2018]	Turkey	[2005–2018]
Mexico	[2004–2018]	UAE	[2004–2018]
Nicaragua	[2004–2018]		
Panama	[2009–2018]		
Paraguay	[2009–2018]		
Peru	[2004–2018]		
Uruguay	[2009–2018]		

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CHAPTER THREE: FINANCIAL DEVELOPMENT AND TRADE OPENNESS: EVIDENCE FROM OIL-EXPORTING COUNTRIES

Abstract

Although trade openness is usually seen as a discretional policy decision, how much a country opens to international trade may depend on how advanced its financial sector is. In this chapter we analyse the effect of financial development on trade openness. Using a panel of 24 oil-exporting countries, we investigate how financial development measured using liquid liabilities to GDP, private credit to GDP and domestic credit to GDP have affected countries' trade openness during the years 1996-2017. After controlling for GDP per capita growth, general government final consumption expenditure (% of GDP); gross fixed capital formation (% of GDP); foreign direct investment net inflows (% of GDP) and human capital index and addressing the potential endogeneity, we discover that the impact of financial development on trade openness follows a U-shaped relationship. This result suggests that at initial stages, financial development reduces trade openness, but then trade openness accelerates after a certain threshold of financial development in the oil-exporting countries has been reached. Further, there are variations in the results across regional groupings.

JEL Classification: F13, G21

Keywords: Financial development; Trade openness; Panel data analysis; Oil-exporting countries.

3.1 Introduction

Over the last few decades, several studies have identified a link between financial development and trade openness (Baltagi et al., 2009; Braun & Raddatz, 2005; Kim et al., 2010; Yakubu et al., 2018). Theoretically, Feeney and Hillman (2004) establish how capital market incompleteness affects trade openness. They argue there is no inducement for special interest groups to lobby for protection if risks can be fully diversified. Therefore, improvement in the financial sector in a way that eliminates asymmetric information and rigidities could potentially lead to higher trade flows among countries. Others argue that trade openness may improve financial development. As proposed in the study by Rajan and Zingales (2003), interest groups and especially the industrial, and financial sectors frequently stand to lose from financial development or changes in economic systems. They suggest that when countries are open to trade and capital flows freely, it is likely to deliver benefits to financial development because openness to both trade and finance breeds competition and threatens the profits and market share of certain industries and finance sector players. Furthermore, the relative political power of these incumbents may decline with trade as well. In this way trade openness wields a favourable effect on financial development.

The empirical studies that have investigated the causal link between financial development and trade openness have almost exclusively examined a linear relationship by focusing on different groups of countries. For example, we can find studies focused on the Asia-Pacific region (Le et al., 2016), Africa (David et al., 2014; Sare et al., 2019), new member states of the European Union (Wajda-Lichy et al., 2020) and a combination of developed and developing countries (Beck 2002; Huang & Temple, 2005; Kim et al., 2010; Niroomand et al., 2014; Thuy & Trong, 2021). However, previous work examining the link between financial development and trade openness has largely neglected: (1) a possible non-

linearity in the relationship between the two variables; and (2) the possible different characteristics of this relationship in oil-exporting countries.

The main objective of this study is to investigate whether there is a non-linear relationship between financial development and trade openness using a sample of 24 oil-exporting countries. The investigation of the impact of financial development on trade openness in the oil-exporting developing countries is important for several reasons. First, referring to the financial system, it will be given less importance as a growth source, and economic progress will depend less on the financial system despite its proved importance to the economy (Nawaz et al., 2019; Niknamian, 2019; Shahbaz et al., 2018). Second, Yuxiang and Chen (2011) state that the strength and reliability of the financial sector reforms need credible and strong governments that can enforce the law, whereas in oil-rich countries these are eroded by rent-seeking and corruption, compromising the development of the financial sector.

This chapter addresses several issues. First, to the best of our knowledge, this is the first study to investigate the non-linear impact of financial development on trade openness using a sample of 24 oil-exporting developing countries.[11] Second, this study further investigates whether the relationship between financial development and trade openness differs according to the region's oil production. To address endogeneity issues, including the possible reverse causality between our two variables of interest, we use the dynamic Generalized Method of Moments (GMM) proposed by Arellano and Bond (1991). The results contend that financial development has a U-shaped relationship with trade openness. This implies that at initial

[11] Recently, Emara and Kasa (2021) investigate the non-linear association between financial access and domestic savings during the period 1980-2018. The results for the full sample indicate that improvement in financial access may initially increase the savings rate leading to an increase in savings. Nevertheless, once the financial access index reaches its threshold level further improvement in financial access tends to curtail households' precautionary savings which subsequently decline. However, the main purpose of our study is to examine the non-linear financial development-trade openness nexus for a large sample of oil-exporting countries.

stages, financial development discourages trade openness yet the latter expands after a certain threshold of financial development is met in the oil-exporting countries. Further, when splitting the whole sample into regional groupings, we find interesting results. In GCCI and Latin American selected countries, financial development exerts an insignificant effect on trade openness. In Asian and African nations, however, financial development has a U-shaped relationship with trade openness. The chapter is organised as follows. In section 3.2, the literature review is presented followed by the hypothesis development in section 3.3. Section 3.4 explains the choice of model based on solid research methodology. In section 3.5, we present the data being used in this chapter and report interesting descriptive statistics whereas section 3.6 concentrates on discussing results and the regional analysis. The final section contains some concluding remarks and policy implications.

3.2 Literature Review

The direct link between financial development and trade openness (the sum of total exports and total imports to GDP) has been reported on during the last two decades. Svaleryd and Vlachos (2002) investigated the effects of financial development on trade openness, employing fixed and random effects models for a panel of 80 countries during the period 1960-1994, averaged over 5 years. They show a positive and statistically significant relationship between financial development and trade openness. Huang and Temple (2005), employing the GMM estimation, indicate in a panel of 80 countries during the period 1960-1999, a positive relationship between financial development (private credit to GDP, market capitalisation to GDP) and trade openness (sum of total exports and total imports to GDP). Do and Levchenko (2007) point out empirically that financial development strongly impacts on trade openness since greater participation to international trade exposes countries to the vagaries of the international market. A well-developed financial sector provides a powerful insurance instrument that reduces barriers to trade, and hence helps stimulate international trade.

Law (2008), using the bounds testing method, explores the impact of trade openness on financial development in Malaysia. He discovers that trade openness is a key determinant in promoting the development of the financial sector during 1970-2004. To explain the direct relationship between financial development and trade openness, Law (2008), employing the GMM estimation, contends they are positively and significantly associated in a sample of 40 developing countries. Kim et al. (2010a), using a large sample of developing countries, suggest there is a positive long-term relationship between financial development (domestic credit to GDP and private credit to GDP) and trade openness (sum of total exports and total imports to GDP). Conversely, they find a negative short-term relationship between these two variables. Niroomand et al. (2014) investigate the effect of financial development on trade

openness using data for a sample of 18 emerging countries for the period 1980–2011. Employing a bounds testing approach to co-integration to estimate the relationship, their results highlight that a significantly positive relationship emerges between banking sector development and trade openness.

Despite many similarities among the countries examined in the sample, additional evidence suggests that the link between banking sector development and trade openness works via each country's specific policy and economic structure. Using a system-GMM estimator, Mlachila and Ouedraogo (2020) recently explore the causal link between financial development (domestic credit to the private sector, bank deposits, bank liquid liabilities, and the ratio of private credit to bank deposits) and trade openness in a large sample of 68 resource-rich developing countries for the years 1980–2014. The results indicate that trade openness is positively associated with the all financial development indicators. Similarly, Canh and Thong (2020) find that trade openness has a positive impact on all financial development indicators (liquid liabilities to GDP, private credit to GDP, domestic credit to GDP) in a large sample of 86 economies over the period 2002–2017.

However, a great deal of scepticism regarding the positive relationship between financial development and trade openness is noted by many investigators. Using a sample of countries of the Organization for Economic Co-operation and development (OECD) for the period 1960-2005, Kim et al. (2011) conclude that financial development exerts negligible effects on trade openness. David et al. (2014), utilising a panel of 34 Sub-Saharan countries for the years 1970-2009, demonstrate there is an insignificant link between trade openness and financial development once they control for other factors such as GDP per capita and inflation. The authors point out that these findings are the consequence of several factors including distortions in domestic financial markets, relatively weak institutions, and a poor financial sector supervision. Further, Bayar et al. (2017), using a sample of 9 Central and

Eastern European countries during the period 1996-2014, contend that financial development measured using domestic credit to the private sector relative to GDP, exerts no significant influence on trade openness in the overall panel over the long-term. The authors suggest these outcomes can result from a poor institutional or regulatory environment where enforcement of legislation is poor. In more recent research, Sare et al. (2019) examine the financial development and trade openness nexus in 46 African countries. It is revealed that the financial sector's development does not have any significant effect on trade openness irrespective of the measure that is used.

Other studies indicate a negative relationship emerging between financial development and trade openness. For instance, Bilas et al. (2017) investigate the causal link between financial development and trade openness in Croatia during Q1 1997 to Q4 2015. The autoregressive distributed lag (ARDL) bounds testing to co-integration is applied. They indicate there is a negative link between financial development and trade openness. Using nine indices of financial development, Dogan et al. (2020) recently investigate the causal link between financial development and trade openness in 9 resource-rich countries (Australia, Brazil, Canada, China, Iran, Saudi Arabia, United States, and Venezuela) during the period 1980-2017. The results indicate that while trade openness harms financial institutions' access index, financial markets' access index, and financial market's efficiency index, it affects other financial development indicators positively. A summary of the previous empirical studies which explore the direct relationship between financial development and trade openness is presented in Table 3.1.

[Insert Table 3.1]

3.3 Hypothesis Development

Several studies have suggested that the level of financial development is good only up to a point, after which it becomes a drag on economic growth. This would imply that the relationship between financial development and economic growth is non-monotonic. For example, Arcand et al. (2015) highlight that the relationship turns negative for high-income countries, where finance starts having a damaging effect when credit to the private sector reaches 100% of GDP. Additionally, Law and Singh (2014) indicate there is a threshold effect in the finance–growth relationship using a sample of 88 countries. They find that the level of financial development (private sector credit, liquid liabilities, and domestic credit) helps growth only up to a certain threshold; beyond that threshold level further development of finance tends to seriously undermine growth. They exactly find that when financial development indicators such as private sector credit to GDP, liquid liabilities to GDP and domestic credit to GDP are higher than the thresholds of 88% of GDP, 91% of GDP and 99% of GDP, respectively, the impact on financial development on economic growth is negative and statistically significant. The authors contend there is an inverted U-shaped relationship between financial development and economic growth. In other words, financial development fosters growth only up to a certain threshold before becoming a drag on economic growth.

However, recent studies have a different view. Global (2018) and Botev et al. (2019), for example, confirm the too-much-finance-is healthy attitude for economic growth in a large sample of developing, emerging and advanced economies during the years 1990-2012. The authors cannot identify a tipping point beyond which financial development has a clear negative relationship to economic progress. Furthermore they argue that too much financial development has a beneficial impact on economic growth.

A few years ago, Gächter and Gkrintzalis (2017) revealed the finance–trade nexus is also non-linear. They discovered that the relationship between financial development and trade

openness is an inverted U-shaped one in a large sample of developed countries. This suggests that financial development initially increases trade openness, but the latter starts to decline after a certain threshold of financial development. In contrast, Yakubu et al. (2018) find that the relationship between financial development (private credit to GDP) and trade openness (sum of total exports and total imports to GDP) is a U-shaped one, meaning that financial development initially contributes to the decline in trade openness in a large sample of African countries. One possible explanation for these different results is based on the characteristics of the countries included in the study. However, according to the "finance resource curse (FRC)" hypothesis (see e.g., Asif et al., 2020; Yuxiang & Chen, 2011), when resource-rich countries are at low levels of financial development, this scenario dampens trade openness. However, at higher levels of financial development, trade openness accelerates. Subsequently, in the light of the above-mentioned arguments, our hypothesis is posited below:

H_1: The relationship between financial development and trade openness is characterised by a U-shaped in the oil-exporting countries.

3.4 The Model and Dynamic GMM

This section introduces the use of the model in studying trade openness and explains the model's assumptions which is followed by the choice of estimation methodology. We begin here with an explanation of the selected model.

3.4.1 The model

This subsection examines the factors explaining the trade openness process by setting up a model where countries' level of trade openness depends on financial development and its square term, and other controls. Specifically, the model in its compact form can be expressed as the model of trade openness given below following Ibrahim and Sare (2018):

$$TO_{it} = \text{f}\,(FD_{it}, FD_{it}^{2}, CONT_{it}) \qquad (1)$$

where TO_{it} in the above Equation (1) is a vector of trade openness in country "i "at time "t"; FD_{it} and FD_{it}^{2} stand for financial development indicators liquid liabilities to GDP (LL), private credit to GDP (PRIV); and domestic credit to GDP (DC), and their square terms LL^2, $PRIV^2$, and DC^2, respectively; along with the control variables: GDP per capita growth (GDPPCG); government expenditure to GDP (GE); investment to GDP (INV); foreign direct investment, net inflows to GDP (FDI); and human capital (EDU).

There is a growing literature which shows a two-way link between financial development and trade openness. On one hand, financial development may lead to greater trade openness if financial institutions provide more adequate insurance and risk diversification (Svaleryd & Vlachos, 2002; Feeney & Hillman, 2004), or if mature financial markets constitute a comparative advantage for industrial sectors that rely heavily on external financing (Beck, 2002). On the other hand, trade facilitates financial development because trade openness weakens the incentives of incumbent firms and financial sectors to block financial

development in intention to reduce entry and competition (Rajan & Zingales, 2003; Braun & Raddatz, 2005), or because countries specializing in financially dependent goods will have a high demand for external finance and thus a high level of financial intermediation (Do & Levchenko, 2007). On this score, we address a potential endogeneity using the dynamic GMM proposed by Arellano and Bond (1991). We specify trade openness (TO) equation as a function of financial development (FD) and its square term (FD^2), and other controls in the following equation:

$$TO_{it} = \alpha + \alpha_{it} TO_{it-1} + \beta_1 FD_{it} + \beta_2 FD^2_{it} + \beta_3 GDPPCG_{it} + \beta_4 GE_{it} + \beta_5 INV_{it} + \beta_6 FDI_{it} + \beta_7 EDU_{it} + \pi_t + \Omega_i + \varepsilon_{it} \quad (2)$$

where: α is a constant parameter; TO_{it-1} denotes the lagged trade openness; π_t represents time-fixed effects; Ω_i controls the unobserved variables within a country and ε_{it} stands for the stochastic error.

where: α is a constant parameter; T_{it-1} denotes the lagged trade openness; π_t represents time-fixed effects; Ω_i controls the unobserved variables within a country and ε_{it} stands for the stochastic error

3.4.2 Dynamic GMM

The inclusion of the lagged dependent variable in Equation (2) implies a correlation between the regressors and the error term, since lagged financial development depends on the lagged error term, which is a function of the cross-section-specific effect. Because of this correlation, a dynamic panel data estimation of Equation (2) suffers from the Nickell (1981) bias, which disappears only if *T* tends to infinity. The preferred estimator in this case is the dynamic GMM as suggested by Arellano and Bond (1991), which basically differentiates the model to get rid of cross-section-specific effects or any time-invariant country-specific variable. This also eliminates any endogeneity that may be caused by the correlation of these country specific effects and the regressors.

The consistency of the dynamic GMM estimator depends on the validity of the assumption that **ε** does not exhibit serial correlation and on the validity of the instruments. We use two tests proposed by Arellano and Bond (1991) to test for these assumptions. The first is a Sargan test of over-identifying restrictions, which tests for the overall validity of the instruments by analysing the sample analog of the moment conditions used in the estimation procedure. The second test examines the assumption of no serial correlation in the error terms. It tests whether the differenced error terms are second order serially correlated. Failure to reject the null hypotheses of both tests does offer support for the model.

The relationship between financial development and trade openness could be non-monotonic. So, the relationship between financial development and trade openness is an inverted U-shape if: firstly, $\boldsymbol{\beta_1}$ is positive and statistically significant; and secondly, $\boldsymbol{\beta_2}$ is negative and statistically significant. Otherwise, the relationship between financial development and trade openness is U-shaped if $\boldsymbol{\beta_1}$ is negative and statistically significant and $\boldsymbol{\beta_2}$ is positive and statistically significant. The inverted U-shaped relationship suggests that financial development initially increases trade openness, yet openness starts to diminish after a certain threshold of financial development is reached (Gächter & Gkrintzalis, 2017).

In contrast, if the relationship between financial development and trade openness is U-shaped, it means that financial development initially contributes to the decline in trade openness, but trade openness starts to rise after a certain threshold of financial development is reached (Yakubu et al., 2018).

3.5 Data and Descriptive Statistics

3.5.1 Sample Selection and Variable Definitions

3.5.1.1 The Sample Selection

The sample selection method in this chapter is based on a panel data covering 24 oil-exporting countries,[12] covering the period 1996–2017.[13] According to Beck (2011), Mlachila and Ouedraogo (2020), oil-rich countries generally have lower levels of financial development. This seems contradictory to initial expectations provided these countries have high liquidity levels from export revenues (Bhattacharyya & Hodler, 2014). Resource-rich countries are pointed to in the literature as being those nations that grow slower than those with fewer resources, face development failures, and generally have smaller incomes (Marques & Pires, 2019).

3.5.1.2 Trade Openness Measure

With reference to the measure of trade openness, here we use TO. It is defined as the sum of total imports and total exports over GDP. Harrison (1996) suggests that TO is a simple and common indicator of trade openness; the larger the ratio, the more the country is exposed to international trade. Furthermore, as contended by Kim et al. (2011), TO measures actual exposure to trade interactions, accounts for the effective level of integration and has the advantage of being both clearly defined and well measured. This measure has been extensively used in the literature as a proxy of trade openness (see Acheampong et al., 2020; Ahmed, 2013; Huang & Temple, 2005; Kim et al., 2011), among many others.

3.5.1.3 Financial Development Measures

Regarding the degree of financial development, this chapter uses three common indicators in the literature: Liquid Liabilities, Private Credit, and Domestic Credit.[14] For the level of

[12] See Appendix 3.1.
[13] The Global Financial Development Database (GFDD) has been updated through to 2017.
[14] We do not consider stock market development in this study because data is missing for many of our sample countries.

financial development, we use liquid liabilities relative to GDP (LL), measured as currency plus demand and interest-bearing liabilities of banks and other financial intermediaries relative to GDP as the first indicator of financial development. It captures the broad coverage of financial intermediation activities across various financial institutions (central banks, deposit money banks, and other financial institutions) relative to the economy's size. A higher liquidity ratio means there is higher intensity in the banking system. The assumption is that the size of the financial sector is positively associated with financial services (Saaed & Hussain, 2015).

Nevertheless, Ang and McKibbin (2007) argue that liquid liabilities (LL) do not constitute a very good proxy for financial development since it reflects the extent of transaction services provided by the financial system rather than its ability to channel funds from depositors to investment opportunities. As an alternative measure, private credit (PRIV) is often argued to be a superior measure of financial development (Ang & McKibbin, 2007). It is defined as a source of credit to the private sector by deposit money banks and other financial institutions relative to GDP. Although it measures only part of the mobilised savings, it measures the part that is channelled to private sector firms. Although it is not a direct measure of efficiency, it captures part of it, since it excludes credit to the private sector by the central bank, assuming that the latter is less efficient than private intermediaries in allocating resources (Baltagi et al., 2009; Svaleryd & Vlachos, 2002).[15]

Apart from private credit, a domestic credit source to the private sector as a proportion of GDP (DC) is used as a third measure of financial development (Al-Mulali & Sab, 2012; Boutabba, 2014; Omri et al., 2015; Shahbaz et al., 2013). It corresponds to credit granted to the private sector by the central banks and commercial banks as a fraction of GDP; we henceforth refer to this variable as DC. A high ratio of domestic credit to GDP indicates not

[15] Beck (2002) uses private credit which is defined as credit made available to the private sector by deposit money banks and other financial institutions as a share of GDP. It also indicates there is a positive and statistically significant relationship between private credit and international trade.

only a higher level of domestic investment but also a more refined and sophisticated financial system. Financial systems that allocate more credit to the private sector are more likely to be engaged in researching borrower firms, exerting corporate control, providing risk management control, facilitating transactions, and mobilising savings (Levine, 2005). The three indicators are respectively sourced from Global Financial Development Database (GFDD).

3.5.1.4 Other variables

We use a set of control variables identified in previous studies to impact on trade openness and report the sign of the relationship.

-GDP per capita growth (GDPPCG): We include GDP per capita growth since several impact studies indicate GDP per capita growth strongly influences trade openness (Ben Naceur et al., 2014; Gächter & Gkrintzalis, 2017; Kim et al., 2010). Economic growth could increase trade openness since the demand for greater variety in the choice of goods and services is likely to increase with wealth. Other studies reveal that economic growth significantly decreases trade openness, that is, when the economy grows, trade openness dampens (Yakubu, Aboagye, Mensah, & Bokpin, 2018). When the economy expands, local consumption of goods and services might also increase because many consumers within the domestic economy will be employed, and incomes rise. This in turn leads to 'big-ticket' spending for locally manufactured goods and services which may reduce the export market.

-Government expenditure (GE): Government expenditure is included because it has significant and negative influences on trade openness (Gächter & Gkrintzalis, 2017; Yakubu et al., 2018). As argued by Benarroch and Pandey (2008), governments may be more protectionist in their economic policies and thus less open.

-Investment (INV): Higher investment in the domestic economy would cause manufacturing activities to flourish and hence the share of industrial production increases. The rising level of production in the industrial sector will influence the export sector significantly and hence the degree of trade openness will be accelerated. A large body of literature argues that domestic investment increases trade openness (Kim et al., 2011; Tahir et al., 2018; Yakubu et al., 2018).

-Foreign direct Investment (FDI): FDI is included because it has emerged as helping create a positive and significant relationship between FDI inflows and trade openness (Furceri & Borelli, 2008; Gächter & Gkrintzalis, 2017; Liargovas & Skandalis, 2012).

-Education: The average years of schooling (EDU) is also considered to proxy for the degree of human capital in the economy. Tahir et al. (2018) assert that an educated labour force is more productive than an uneducated one. Table 3.2 summarises the variables used and their expected signs.

[Insert Table 3.2]

3.5.2 Descriptive Statistics

Table 3.3 presents the descriptive statistics of the full sample including first and the third quartiles. On average, there is considerable variation in financial development indicators across countries. For example, private credit (PRIV) ranges from a low of 6.44% in Sudan to a high of 85.13% in Bahrain. Trade openness (TO) also reveals a substantial variation across countries, whereas Brazil's share of trade openness relative to GDP was 24.11%, and Bahrain's share was 153.32%. There is also a sizable variation in financial development indicators across regions. For instance, private credit (PRIV) spans from a low of 9.8% in Africa to a high of 54.8% in the GCCI region. Further, Trade openness (TO) shows a

significant variation across regions whereas the Latin American region's share of trade openness relative to GDP was 46.5%, and the GCCI's share was 94.0%. It is important to note that most of these variables have higher average (mean) values than the median (below 50% of the sample observation). This is due to some high extreme values in these variable which are pulling the mean up. Moreover, Q1 and Q3[16] columns show the values below 25% and 75%, respectively.

[Insert Table 3.3]

Table 3.4 reports the correlation between the variables devised for this study. There is a positive and significant correlation between financial development indicators and trade openness. The results further indicate domestic investment and trade openness are positively and highly correlated. Domestic investment in the economy may positively influence how much is produced in the industrial sector. Consequently, the export sector will benefit significantly. Similarly, increasing domestic investment may also force domestic producers to import capital goods for the development of the domestic industrial sector. In both cases, the degree of trade openness would be positively affected (Tahir et al., 2018). Finally, foreign direct investment is found to be positively and significantly correlated with trade openness.

[Insert Table 3.4]

3.6 Empirical Results

Before presenting the results of the non-linear association between financial development and trade openness. We first perform a Durbin–Wu–Hausman (DHW) endogeneity test to examine whether financial development is endogenous in the model(s). We use the rule of law index as an instrument of financial development. Banks sign many contracts, and a country with a tradition for having a reliable justice or law and order system, is likely to

[16] Thanks to Professor Sabri Boubaker pointingout this point.

ensure its financial sector's development is orderly. Rule of law index ranges from -2.5 to 2.5 points according to the Worldwide Governance Indicators database (WGI). Higher values for the rule of law index signify a greater adherence to law and order. This index has been extensively used in the literature as an instrument of financial development (see e.g., Donou-Adonsou & Sylwester, 2016; Levine et al., 2000; Svaleryd & Vlachos, 2002). Table 3.5 presents the results. We reject the null hypothesis (H0) that our regressors are exogenous in all models, meaning that financial development is indeed endogenous.

[Insert Table 3.5]

Table 3.6 presents and discusses the results concerning the impact of financial development on trade openness in oil-exporting countries using a dynamic GMM estimation technique proposed by Arellano and Bond (1991). It must be noted that Models 1-3 in Table 3.6 are based on equation (2). The estimated coefficient on the lagged of trade openness is positive and statistically significant at 1% in all the specifications and ranges between 0.87 and 0.90. Thus, current year trade openness is influenced by previous year trade openness. This result is in line with the findings of work done by Gächter and Gkrintzalis (2017) and Yakubu et al. (2018), which show that previous year trade openness has a positive influence on current year trade openness. The results further show that the linear and squared terms of liquid liabilities and domestic credit, exert a significant negative and positive effect on trade openness. This suggests there is a U-shaped relationship between financial development and trade openness, i.e., financial development initially contributes to the decline in trade openness, but trade openness starts to rise after a certain threshold of financial development. We determine the nature and exact threshold by taking the first derivative of trade openness in the equation with respect to financial development and setting the result to zero.[17] Referring to Model 1 of

[17]By setting the derivative to zero, from equation (2), the threshold is calculated as $FD_{it}=\frac{-\beta 1}{2\beta 2}$

Table 3.6, where the financial development indicator is liquid liabilities, the point estimate of the threshold value is 56.3% of GDP. Model 3 presents results of the repeated analysis, which used domestic credit as an alternative proxy for financial development. The threshold value is 50.3% of GDP. The estimated finance coefficient below the threshold discourages trade openness, as was found in the case of liquid liabilities.

The implication is that, for oil-exporting countries to benefit from financial development, levels of financial development indicators (liquid liabilities and domestic credit) should be maintained above the thresholds, which are 56.3% of GDP and 50.3% of GDP, respectively. This evidence does not support the argument made by Gächter and Gkrintzalis (2017) that the relationship between financial development and trade openness is an inverted U-shape in a large sample of developed countries. Nonetheless, our results do agree with Yakubu et al. (2018) who reveal that the relationship between financial development and trade openness is a U-shaped one. Foreign direct investment has a statistically significant positive effect on trade openness at the 1% level in all models. This finding is analogous to previous research, which indicates there is a positive and significant relationship between FDI inflows and trade openness (Furceri & Borelli, 2008; Gächter & Gkrintzalis, 2017; Liargovas & Skandalis, 2012). It is also worth noting that all the diagnostics in Table 3.6 are satisfactory. Specifically, the Sargan test does not reject the over-identification restrictions, the absence of first order serial correlation is rejected and the absence of second order serial correlation is not rejected.

[Insert Table 3.6]

3.6.1 Additional Analysis

Two additional analyses were carried out to examine the sensitivity of the results to alternative estimation strategies and methods. The first analysis involves using the fixed

effects (within) estimator. The results are reported in Table 3.7. The second analysis involves using Fixed Effects IV estimator. Table 3.8 reports the results. The results are at large similar those presented in Table 3.6 in terms of sign and significance, but the magnitudes are different, as would be expected, since the lagged dependent variable captures a longer time period. As well, a U-shaped relationship is observed between financial development and trade openness. Financial development initially contributes to the decline in trade openness, but trade openness starts to rise after a certain threshold of financial development is attained.

[Insert Table 3.7]

[Insert Table 3.8]

3.6.2 Regional Analysis

One of the important factors that might have caused the findings of empirical literature to be inconsistent is the structural differences that countries have. This subsection examines whether the relationship between financial development and trade openness varies according to the region's oil production.[18] For instance, in 2020, the Gulf Corporation Council countries and Iran (GCCI) produced over 31% of the world's oil. Meanwhile, only 6.6% and 7.8% of oil worldwide were produced, respectively, in Latin America and Africa (DOIPW, 2021).[19] This sub-section examines the regional effect of financial development on trade openness. Its findings will have important policy ramifications for the regional blocs in their attempt to increase trade openness. The estimates for GCCI, Asia, Latin America and Africa are presented in Tables 3.9, 3.10, 3.11, and 3.12, respectively.

[Insert Table 3.9]

[Insert Table 3.10]

[Insert Table 3.11]

[Insert Table 3.12]

The results indicate that for Asian and African countries, the linear and squared terms of private credit and domestic credit exert significant negative and positive effect on trade openness. Thus, private credit and domestic credit have a U-shaped relationship with trade openness (see Tables 3.10 and 3.11). This result does not the support the findings of Gächter and Gkrintzalis (2017) who assert there is an inverted U-shaped relationship between financial development and trade openness in a large sample of developed countries. Contrarily, for GCCI and the Latin American countries, not one proxy of financial development exerts a significant non-linear effect on trade openness.

[18] See Appendix 3.1 for each region's classification.

[19] Please see the following link: https://www.statista.com/statistics/277621/distribution-of-global-oil-production-by-region/#statisticContainer

The results further indicate that GDP per capita growth is positive and statistically significant in GCCI countries (see Model 3 of Table 3.9). Contrarily, it exerts a significant negative effect on trade openness in Asia and Latin America (see Tables 3.10 and 3.11). It should be noted that the results reveal the relationship between government expenditure and trade openness is significantly and negatively related in Latin America (efficiency hypothesis), while it is insignificantly associated in GCCI, Asian and African nations. The finding further reveals that FDI exerts a significant positive effect on trade openness in GCCI, Asia and Africa. However, for the Latin American countries the results point out that FDI exerts a statistically significant negative effect on trade openness. This outcome differs from that of Amal et al. (2010) who assert that trade openness and foreign direct investment are positively and significantly related in Latin America. Additionally, throughout Asia the findings seem to suggest that education exerts a statistically significant positive effect on trade openness. This outcome is consistent with Tahir et al. (2018), who contend that an educated labour force is believed to be more productive than an uneducated one. In contrast, the results reveal that education wields a negative significant impact on trade openness in GCCI nations. The specification tests indicate that the data do not reject the assumption of no serial correlation in the error terms and the validity of the instruments across all estimations.

3.7 Concluding Remarks

Although the relationship between financial development and trade openness has been a popular research topic over the past few decades, prior research has largely neglected a possible non-linearity between the two variables. The current study applies a dynamic GMM approach to examine the non-linear effect of financial development on trade openness in 24 oil-exporting countries in the period between 1996 and 2017. To advance knowledge about the impact of financial development on trade openness in oil-exporting countries, sensitivity analyses accounted for regional heterogeneities among the countries in this sample.

The main results show the following. First, we find that the main terms of financial development (liquid liabilities and domestic credit) and their square terms, exert negative and positive effects on trade openness, respectively. This means two things: firstly, there is a U-shaped relationship between financial development and trade openness; and secondly, liquid liabilities and domestic credit could initially curtail trade openness. However, trade openness increases after certain thresholds of these financial development indicators in the oil-exporting countries.

Second, the empirical results confirm the non-linear effect of financial development differs from region to region. For GCCI and Latin America countries, no proxy of financial development has a significant curvilinear effect on trade openness. For Asian and African nations, financial development variables (private credit and domestic credit) and their square terms exert negative and positive effects on trade openness, respectively.

This study does have some important policy implications. To enable opening to international trade, oil-exporting countries should pay more attention to their financial sectors and the policies and routines required to ensure they work well. This sector should also be as open, competitive, and efficient as possible. Government-business partnerships should be strengthened, and greater financial integration with the rest of the world is required so that the

wider national interests are accounted for. Future research could explore the role of governance in the relationship between financial development and trade openness in oil-exporting countries. Future studies could also explore the non-linear relationship between financial development and trade openness in other developing countries.

Table 3.1
Key findings for the finance and trade relationship

Authors	Country	Variables	Method	Result
Svaleryd and Vlachos (2002)	138 countries	LHS: TO RHS: LL, DC, MC, POP, GDP	Fixed-Random effects	Positive
Huang and Temple (2005)	88 countries	LHS: LL, DC, MC, VT, TR RHS: TO, GDP, Legal origins	GMM technique	Positive-whole sample and Low-income group insignificant-high income group
D.-H. Kim et al. (2010)	87 countries	LHS: LL, PC, BA RHS: TO, GE, INF	Pooled mean group	Positive-whole sample and non-OECD Mixed result in OECD group.
Kim et al. (2011)	70 countries	LHS:TO, DC, LL RHS: GDP, GOVE, INF, POP, EDU, INV	Simultaneous equation	Finance promotes trade. Trade stymies finance
Ben Naceur et al. (2014)	12 MENA countries	LHS: LL, DC, MC, TR RHS: GDP, GDS, INV, GOVE, TO, FDI, Governance	Fixed-Random effects approach	Positive relationship between stock markets and Mixed result between banking sector and trade openness.
David et al. (2014)	34 Sub-Saharan countries	LHS: LL, DC, MC, TR RHS: TO, FO, GDP, INF, GOV	Mean group estimator	No significant relationship.
Niroomand et al. (2014)	18 emerging economies	LHS: TO RHS: MC, VT, LL, BA	Bounds testing	Positive (12 in 18 countries)
Le et al. (2016)	26 countries in the Asia-Pacific region	LHS: LL, DC RHS: TO, GDP, INS	GMM estimation	Positive-developed countries insignificant--whole sample and developing countries
Bayar et al. (2017)	9 central and eastern European countries	LHS: TO, DC RHS: TO, DC	co-integration test	No significant relationship.
Bilas et al. (2017)	Croatia	LHS: TO RHS: PC, GDP, Exchange rate	Bounds testing	Negative
Gächter and Gkrintzalis (2017)	Large sample of countries	LHS: EXP, IMP RHS: POP, INV, EDU, GOVE, INF, FDI	GMM estimation	Inverted U-shaped relationship
Yakubu et al. (2018)	46 African countries	LHS: TO, EXP RHS: GDP, INV, EDU, GE	GMM estimation	U-shaped relationship

		INF, SAV.		
Sare et al. (2019)	46 African countries	LHS: TO, EXP RHS: PC, DC, agriculture, service manufacturing, and industrial sectors	Pooled mean group estimator	No significant relationship.
Asif et al. (2020)	Pakinstan	LHS: DC, BM, MC RHS:TO, GDPPC, DI, gas rents, oil rents	ARDL cointegration test	Trade openness positively affects financial development indicators
Canh and Thong (2020)	86 economies	LHS:FM, FI, FIA,FIE,FMD, FMA, FME RHS:TO,FDI, real growth, rents to GDP	Granger causality tests	Trade openness has a positive impact on FM, FI, FIA,FIE,FMD, FMA, FME
Dogan et al. (2020)	9 resource-rich countries	LHS: FM, FI, FIA,FIE,FMD, FMA, FME RHS: TO, rents, GDPPC, DI	Quantile regression estimators	While trade openness harms financial institutions' access index, financial markets access index, and financial market efficiency index, it affects other financial development indicators positively.
Mlachila and Ouedraogo (2020)	68 commodity-rich developing countries	LHS: LL, PRIV, DC RHS: TO, ROL, GDPPC, INF, FDI, price stock, export concentration	System GMM	Trade openness is positively associated with all the financial development indicators.
Wajda-Lichy et al. (2020)	New 11 states in the European Union	LHS: TO and DC RHS: TO and DC	Granger Bootstrap Panel Approach	Finance Granger cause of trade in Lithuania and Poland. Trade Granger cause of finance in Estonia, Hungary, Latvia, Lithuania, and Slovenia.

Please note that TO: trade share (sum of exports and imports to GDP), EXP: total exports to GDP, LL: Liquid liabilities to GDP, PC: private credit to GDP, DC: Domestic credit to GDP; MC: Market capitalisation to GDP; VT: value trade to GDP; TR: turnover ratio; GDP: real GDP per capita; POP: total population; GOVE: government expenditure; INF: Inflation rate; BA: bank assets to GDP; EDU: education; SAV: savings to GDP; FDI: foreign direct investment, net inflows to GDP; FM: Financial markets; FI: Financial institutions; FIA: Financial institutions access; FIE: Financial institutions efficiency; FMD: Financial markets depth; FMA: Financial markets access; FME: Financial markets efficiency.

Table 3.2
Summary of variables and sign predictions

Characteristics	Variables	predicted relationship with trade openness (TO)
Trade openness		
TO	Sum of total exports and total imports to GDP	
Financial development		
LL	Measured as currency plus demand and interest-bearing liabilities of banks and other financial intermediaries (% of GDP	
LL^2	Square term of liquid liabilities (LL)	U-shaped relationship
PRIV	Credit offered to the private sector by deposit money banks and other financial institutions (% of GDP)	
$PRIV^2$	Square term of private credit (PRIV)	U-shaped relationship
DC	It corresponds to credit granted to the private sector by the central bank and commercial banks (% of GDP)	
DC^2	Square term of domestic credit (DC)	U-shaped relationship
Other variables		
GDPPCG	Real GDP per capita growth	Positive or negative
GE	General government final consumption expenditure (% of GDP)	Negative
INV	Gross fixed capital formation (% of GDP)	Positive
FDI	Foreign direct investment, net inflows (% of GDP)	Positive
EDU	Human capital index, based on years of schooling and returns to education; see Human capital in PWT9.	Positive

Table 3.3
Summary statistics, whole sample

Variable n=490	Mean	SD	Min	Max	Median	First Quartile (Q1)	Third Quartile (Q3)
to	0.7	0.38	0.16	2	0.59	0.43	0.91
ll	0.38	0.23	0.07	1.45	0.32	0.22	0.51
priv	0.31	0.24	0.01	1.21	0.24	0.12	0.46
dc	0.32	0.23	0.02	1.31	0.26	0.14	0.44
gdppcg	1.78	4.22	-15.15	16.26	1.78	-0.24	4.28
ge	0.14	0.05	0.01	0.31	0.13	0.11	0.17
inv	0.24	0.07	0.11	0.51	0.23	0.19	0.28
fdi	0.03	0.04	-0.09	0.5	0.02	0.01	0.04
edu	2.33	0.49	1.32	3.4	2.34	2.01	2.69

Table 3.3
Correlations (Pearson)

	to	ll	priv	dc	gdppcg	ge	inv	fdi	edu
to	1.00								
ll	0.43*	1.00							
priv	0.43*	0.86*	1.00						
dc	0.40*	0.87*	0.93*	1.00					
gdppcg	-0.02	-0.13	-0.15*	-0.09*	1.00				
ge	-0.03	0.28*	0.19*	0.13*	-0.19*	1.00			
inv	0.26*	0.20*	0.07	0.10*	0.05	-0.07	1.00		
fdi	0.25*	-0.02	0.01	0.04	0.07	-0.09*	0.10*	1.00	
edu	0.05	0.22*	0.23*	0.34*	0.00	0.19*	-0.11*	0.12*	1.00

Table 3.4
Test of endogeneity

	Equation 2	Equation 2	Equation 2
Financial development indicator	LL	PRIV	DC
Durbin-Wu-Hausman test P-value	0.000	0.000	0.000

Table 3.5
The link between financial development and trade openness (GMM estimation)

	Model 1	Model 2	Model 3
	LL	PRIV	DC
TO(-1)	0.872***	0.9***	0.887***
	(0.061)	(0.062)	(0.054)
FD	-0.364***	-0.155	-0.319**
	(0.124)	(0.128)	(0.127)
FD^2	0.323***	0.186*	0.317***
	(0.063)	(0.097)	(0.075)
GDP per capita growth (GDPPCG)	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)
Government expenditure (GE)	(0.061)	(0.099)	(0.031)
	(0.192)	(0.156)	(0.166)
Investment (INV)	0.011	-0.044	-0.011
	(0.091)	(0.096)	(0.094)
Foreign direct investment (FDI)	0.408***	0.406***	0.389***
	(0.141)	(0.144)	(0.140)
Education (EDU)	(0.036)	0.020	0.002
	(0.046)	(0.035)	(0.037)
Constant	0.339***	0.147	0.218**
	(0.120)	(0.090)	(0.106)
Time fixed effects	YES	YES	YES
AR(1) P-value	0.001	0.001	0.001
AR(2) P-value	0.334	0.449	0.165
Sargan P-value	0.117	0.117	0.115
Number of observations	394	394	394
Number of countries	24	24	24

GMM estimation technique is used. The dependent variable is TO which is the sum of total exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). FD and FD^2 are endogenous variables. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.6
The link between finance and trade openness-Fixed effects estimation (Within) (Additional analysis 1)

	Model 1	Model 2	Model 3
	LL	PRIV	DC
FD	-0.544***	-0.241	-0.57***
	(0.131)	(0.148)	(0.139)
FD^2	0.849***	0.608***	0.869***
	(0.076)	(0.153)	(0.121)
GDP per capita growth (GDPPCG)	0.005***	0.006***	0.005***
	(0.001)	(0.002)	(0.002)
Government expenditure (GE)	0.098	0.422*	0.489**
	(0.220)	(0.225)	(0.222)
Investment (INV)	0.251**	0.242**	0.289**
	(0.109)	(0.120)	(0.125)
Foreign direct investment (FDI)	0.229	0.281	0.197
	(0.215)	(0.218)	(0.237)
Education (EDU)	-0.221***	-0.004	-0.057
	(0.068)	(0.072)	(0.072)
Constant	1.044	0.501***	0.649***
	(0.149)	(0.154)	(0.154)
Time fixed effects	YES	YES	YES
R^2	0.940	0.928	0.934
Number of observations	490	490	490
Number of countries	24	24	24

Fixed effects estimation is used. The dependent variable is TO which is the sum of total exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.7
The link between finance and trade openness Fixed effects estimation (IV) (Additional analysis 2)

	Model 1	Model 2	Model 3
	LL	PRIV	DC
FD	-1.03**	-0.359	-0.535
	(0.418)	(0.354)	(0.426)
FD^2	1.066***	0.665**	0.787***
	(0.222)	(0.300)	(0.243)
GDP per capita growth (GDPPCG)	0.004*	0.006**	0.006**
	(0.002)	(0.003)	(0.003)
Government expenditure (GE)	0.288	0.378	0.481
	(0.524)	(0.457)	(0.452)
Investment (INV)	0.317	0.238	0.251
	(0.208)	(0.218)	(0.265)
Foreign direct investment (FDI)	0.322	0.336	0.264
	(0.227)	(0.267)	(0.235)
Education (EDU)	-0.158	0.022	-0.016
	(0.177)	(0.178)	(0.184)
Constant	0.985**	0.458	0.560
	(0.385)	(0.366)	(0.379)
Time fixed effects	YES	YES	YES
R^2	0.432	0.34	0.391
Number of observations	442	442	442
Number of countries	24	24	24

We use the fixed effects IV estimation. The dependent variable is TO which is the sum of total exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). Lagged levels of financial development at t – 1 and t − 2 represented by FD lag1 and FD lag2, respectively, are used as instruments. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.8
The link between finance and trade openness in GCCI countries

	Model 1	Model 2	Model 3
	LL	PRIV	DC
TO(-1)	0.805***	0.855***	0.759***
	(0.091)	(0.134)	(0.117)
FD	0.694	0.675	0.925
	(0.848)	(0.534)	(0.742)
FD^2	-0.017	-0.315	-0.094
	(0.472)	(0.364)	(0.324)
GDP per capita growth (GDPPCG)	0.001	0.000	0.002**
	(0.001)	(0.001)	(0.001)
Government expenditure (GE)	-0.707	0.114	-0.869
	(0.581)	(0.449)	(0.638)
Investment (INV)	-0.261*	-0.305*	-0.615***
	(0.154)	(0.168)	(0.147)
Foreign direct investment (FDI)	0.867	1.129	1.295*
	(0.712)	(0.743)	(0.708)
Education (EDU)	-0.45*	-0.317	-0.294*
	(0.232)	(0.222)	(0.166)
Constant	1.126***	0.857**	0.924***
	(0.304)	(0.435)	(0.319)
Time fixed effects	YES	YES	YES
AR(1) P-value	0.052	0.042	0.033
AR(2) P-value	0.223	0.528	0.302
Sargan P-value	0.397	0.324	0.362
Number of observations	86	86	86
Number of countries	6	6	6

GMM estimation technique is used. The dependent variable is TO which is the sum of total exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). FD and FD^2 are endogenous variables. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.9
The link between finance and trade openness in Asian countries

	Model 1	Model 2	Model 3
	LL	PRIV	DC
TO(-1)	0.455***	0.67***	0.658***
	(0.020)	(0.122)	(0.084)
FD	0.93***	-0.222***	-0.503***
	(0.295)	(0.025)	(0.055)
FD^2	-0.050	0.415***	0.514***
	(0.125)	(0.063)	(0.044)
GDP per capita growth (GDPPCG)	-0.006***	-0.01***	-0.012***
	(0.002)	(0.004)	(0.002)
Government expenditure (GE)	0.162	-0.126	-0.123
	(0.452)	(0.845)	(0.499)
Investment (INV)	-0.288***	-0.228	-0.348
	(0.025)	(0.325)	(0.278)
Foreign direct investment (FDI)	0.448***	0.529***	0.537***
	(0.174)	(0.090)	(0.094)
Education (EDU)	0.068	0.429**	0.699***
	(0.164)	(0.171)	(0.119)
Constant	0.237	-0.833	-1.008*
	(0.319)	(0.608)	(0.537)
Time fixed effects	YES	YES	YES
AR(1) P-value	0.111	0.095	0.095
AR(2) P-value	0.123	0.107	0.110
Sargan P-value	0.515	0.442	0.540
Number of observations	53	53	53
Number of countries	3	3	3

GMM estimation technique is used. The dependent variable is TO which is the sum of exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). FD and FD^2 are endogenous variables. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.10
The link between finance and trade openness in Latin American countries

	Model 1	Model 2	Model 3
	LL	PRIV	DC
TO(-1)	0.879***	0.875***	0.866***
	(0.087)	(0.091)	0.092)
FD	-0.047	0.026	0.115
	(0.152)	(0.267)	(0.258)
FD^2	-0.131	-0.099	-0.238
	(0.176)	(0.334)	(0.333)
GDP per capita growth (GDPPCG)	-0.003**	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)
Government expenditure (GE)	-0.82***	-0.912***	-0.921***
	(0.309)	(0.349)	(0.335)
Investment (INV)	-0.092	-0.092	-0.060
	(0.157)	(0.156)	(0.162)
Foreign direct investment (FDI)	-0.502**	-0.561***	-0.534***
	(0.218)	(0.182)	(0.176)
Education (EDU)	0.036	-0.036	-0.021
	(0.083)	(0.061)	(0.059)
Constant	0.221	0.41*	0.352
	(0.264)	(0.235)	(0.227)
Time fixed effects	YES	YES	YES
AR(1) P-value	0.011	0.012	0.011
AR(2) P-value	0.626	0.633	0.500
Sargan P-value	0.570	0.547	0.522
Number of observations	157	157	157
Number of countries	9	9	9

GMM estimation technique is used. The dependent variable is TO which is the sum of exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). FD and FD^2 are endogenous variables. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Table 3.11
The link between finance and trade openness in African countries

	Model 1	Model 2	Model 3
	LL	PRIV	DC
TO(-1)	0.642***	0.568***	0.579***
	(0.092)	(0.077)	(0.093)
FD	0.008	1.929***	1.914***
	(0.490)	(0.491)	(0.478)
FD^2	-0.086	-8.606***	-7.259***
	(0.256)	(2.682)	(2.072)
GDP per capita growth (GDPPCG)	0.001	0.000	0.000
	(0.003)	(0.002)	(0.002)
Government expenditure (GE)	0.345	0.457	0.339
	(0.401)	(0.385)	(0.343)
Investment (INV)	0.338**	0.363***	0.335***
	(0.165)	(0.132)	(0.129)
Foreign direct investment (FDI)	0.399***	0.54***	0.547***
	(0.099)	(0.127)	(0.126)
Education (EDU)	0.050	0.122	0.170
	(0.103)	(0.113)	(0.120)
Constant	0.058	-0.151	-0.265
	(0.254)	(0.286)	(0.308)
Time fixed effects	YES	YES	YES
AR(1) P-value	0.035	0.031	0.032
AR(2) P-value	0.630	0.207	0.359
Sargan P-value	0.216	0.257	0.242
Number of observations	98	98	98
Number of countries	6	6	6

GMM estimation technique is used. The dependent variable is TO which is the sum of exports and total imports relative to GDP. Financial development indicators are liquid liabilities (LL), private credit (PC), and domestic credit (DC). Control variables are real GDP per capita (GDP), government expenditure (GE), gross fixed formation to GDP (INV), foreign direct investment, net inflows relative to GDP (INF) and human capital (EDU). FD and FD^2 are endogenous variables. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors of estimates are reported in parentheses.

Appendix 3.1 Sample composition

Country name	Observation period	Region's classification
Algeria	1996-2017	Africa
Angola	2002-2017	Africa
Argentina	1996-2017	Latin America
Bahrain	2004-2015	GCCI
Bolivia	1996-2017	Latin America
Brazil	1996-2017	Latin America
Colombia	1996-2017	Latin America
Congo	1996-2015	Africa
Ecuador	1996-2017	Latin America
Gabon	1996-2017	Africa
Guatemala	1996-2016	Latin America
Iran	1996-2016	GCCI
Kazakhstan	1996-2017	Asia
Kuwait	1996-2017	GCCI
Mexico	1996-2017	Latin America
Nigeria	1996-2017	Africa
Peru	1996-2017	Latin America
Qatar	2002-2017	GCCI
Russia	1996-2017	Asia
Saudi Arabia	1996-2017	GCCI
Sudan	1996-2015	Africa
United Arab Emirates	2001-2017	GCCI
Venezuela	1996-2013	Latin America
Vietnam	1996-2017	Asia

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CHAPTER FOUR: FINANCIAL LIBERALISATION AND STOCK MARKET DEVELOPMENT IN THE MENA REGION

Abstract

This chapter revisits the impact of financial liberalisation on stock market development in 9 MENA countries using data for the years 1979-2017. The results indicate a positive and statistically significant relationship between financial liberalisation and stock market development predominantly over the medium-term and long-term. It is observed that the size and liquidity effects of this relationship tend to increase following the decision to implement a freer market-based economic policy. This chapter also reports a variation in the impact of financial liberalisation on stock market development for countries in the MENA region. Countries with common law origins and traditions, high education levels, low trade openness, low political stability, and small government size stand to benefit more from liberalising their stock markets.

JEL Classification: G2; G28

Keywords: Liberalisation; Stock markets; MENA; Country Characteristics

4.1 Introduction

Over the last few decades, several countries have embarked on a series of reforms, including liberalising their stock markets. Stock market liberalisation refers to a country's decision to allow foreigners to purchase shares in that country's stock market (Henry, 2000, p. 529). This can be accomplished through the direct purchase of shares in local currency, a country's funds or American depository receipts. It has been revealed that stock market liberalisation results in rising equity prices (Bekaert & Harvey, 2000; Yao et al., 2018), a reduction in the cost of capital (Stulz, 1999), and an improvement of the liquidity of domestic stock markets (Chan & Kwok, 2017; Fuchs-Schündeln & Funke, 2003; Jain-Chandra, 2002; Saliya, 2020).

In the late 1980s and early 1990s, several countries in the MENA region started to liberalise their stock markets. The finance systems of MENA countries have been gradually liberalised to operate on free market principles by reducing and eliminating interest rate subsidies to priority industry sectors. Liquidity is now being managed through a more active use of reserve requirements and a more market-based allocation of refinancing. New banking laws have been introduced for various reasons: firstly, increasing the autonomy of the central banks; secondly, put into effect more prudential regulations in line with international standards; and, thirdly, update and modernise stock market legislation and activities (Achy, 2005).

In this chapter, we first revisit the impact of financial liberalisation on stock market development using data from 9 MENA countries for the period 1979-2017. Then, we extend our investigation to explore whether this relationship is affected by a selection of country characteristics. However, to the best of our knowledge, there is no published

paper that examines whether the relationship between financial liberalisation and stock market development differs according to country characteristics. We examine whether the following country characteristics - (1) legal origin, (2) level of education, (3) trade openness, (4) political stability and, (5) government size - affect the relationship between financial liberalisation and stock market development across the MENA region.

Our results show a significant positive impact of financial liberalisation on stock market size measured using stock market capitalisation to GDP over the short-term, the medium-term**,** and long-term scenarios. Our findings are consistent with Fuchs-Schündeln and Funke (2003) who indicate that stock market liberalisation has a significant positive effect on the growth rates of market capitalisation in the first 5 years following post-liberalisation, and subsequently, does favour stock market capitalisation. In addition, the results suggest there is a positive effect of financial liberalisation on stock market value traded and turnover ratio mainly over the medium- and long-terms. These outcomes are in line with Levine (2001) who finds that following financial liberalisation, stock market liquidity measured using value traded to GDP and turnover ratio in a sample of 15 emerging countries, is actually enhanced. The author indicates that none of the countries considered in the study experienced significant liquidity falls after liberalising its stock markets.

These results, however, do not agree with Ben Naceur et al. (2008) who detect a negative association between financial liberalisation and stock market development in the first 5 years after liberalisation in the MENA region. We find that countries with common law origins tend to benefit from liberalising their stock markets than countries with civil law origins. As argued by La Porta et al. (1998), countries whose legal systems are rooted in

the common law provide, on average, more substantial shareholder protection than civil-law systems do. Greater shareholder protection leads, in turn, to a higher level of stock market development. Furthermore, we find that the liberalisation effect is larger in countries with high education levels. Ernest et al. (2020) indicate that the level of education is determinative in explaining stock market development in emerging countries. Finally, we show that countries with low trade openness, not much political stability and small government size stand to benefit more from liberalising their stock markets. The rest of the chapter is organised as follows. Section 4.2 presents the literature review, followed by research design and hypotheses development in section 4.3. Section 4.4 presents the methodology, the data and report descriptive statistics. Empirical results and discussions are presented in section 4.5. The final section contains some concluding remarks.

4.2 Literature Review

4.2.1 Financial Liberalisation and Stock Market Development

During the last few decades, the relationship between financial liberalisation and stock market development has become a hotly debated issue, with several studies reporting a positive and significant impact of the former on the latter. Levine and Zervos (1998), for example, study the link between financial liberalisation and stock market development using 16 developing countries for the period 1976-1993. They suggest that stock markets become larger, more liquid, and more internationally integrated following the removal of restrictions on capital and dividend flows. Levine (2001) examines the case of stock markets' liquidity after financial liberalisation has been introduced in 15 developing economies situated in Latin America, Asia, and the Middle East. The author reports that 14 nations show strong evidence of greater stock market liquidity. Using data from 1976 to 1996 for 11 emerging countries across Asia and Latin America, Henry (2000) empirically investigates the impact of stock market liberalisation on equity prices. He reports a significant appreciation of aggregate share prices, occurring both in the months leading up to the implementation of a country's initial stock market liberalisation as well as in the implementation month itself. After controlling for co-movements with world stock markets, economic policy reforms, and macroeconomic fundamentals, the average valuation increase remains large and statistically significant (26% overall) abnormal return over an 8-month window leading up to the implementation of initial stock market liberalisation.

In a subsequent study, Bekaert et al. (2003), employing data from 31 emerging markets including 4 MENA markets, emphasise that the emerging markets' integration into a

world market, after liberalisation, contributes to permanent appreciation in equity prices that decrease dividend yields and expected returns. They furthermore suggest that integration is accompanied by increased stock market development - significantly higher market capitalisation to GDP and sizeable jumps in trading activity and liquidity. Fuchs-Schündeln and Funke (2003) contend that financial liberalisation wields a greater influence on stock market development in 27 developing countries, over a long period of time, i.e., 1975-2000. OLS test indicates that liberalisation contributes to, on average, an increase of 7% in market capitalisation growth and turnover growth in the five years following liberalisation. The authors also assert that the benefits of liberalisation are better in countries that have improved their institutional framework prior to adopting free market-type economic policies.

Using a panel data set on 16 countries from all continents for the period 1986-2002, Jain-Chandra (2002) explores the impact of financial market liberalisation on stock market liquidity. The results indicate that financial liberalisation enhances stock market liquidity after controlling for the government size and other relevant factors. Employing cross-sectional estimation methods and panel data regressions in a sample of 40 emerging countries for the period 1980-2000, El-Wassal (2005) examines the relationship between financial liberalisation policies and stock market development, proxied by market capitalisation and value traded. He documents two important things: a positive relationship between financial liberalisation and stock market development and that the emerging stock markets' capitalisation has increased over time. De la Torre et al. (2007) study the impact of reforms on domestic stock market development using fixed effects estimation for 117 developing and developed countries from 1975 to 2004. They show

that reforms tend to be followed by increases in domestic market capitalisation and trading. A few years ago, Yao et al. (2018) examined the effects of China's financial liberalisation on market integration for the years 2000-2015. These authors' results show that China's stock markets have become more developed and integrated with the world economy after liberalisation became the government's preferred strategy.

However, other studies document a negative influence of financial liberalisation on stock market development. For example, Kaminsky and Schmukler (2008) assessed the case of stock markets following financial liberalisation for a large set of developed and developing countries. They find that liberalisation of stock markets undermines any progress they may wish to make. Elsewhere, Ben Naceur et al. (2008) note that the impact of financial liberalisation on stock market development is negative in the first five years following the date to free up the economy to market forces.

4.2.2 Country Characteristics and Stock Market Development

Apart from the studies that examine the impact of financial liberalisation on stock market development, some research examines the relationship between country characteristics such as legal origin, education, trade openness, political stability, government size and the development of stock markets. La Porta et al. (1997, 1999, 2002), for example, argue that countries whose legal systems are rooted in the common law provide, on average, more substantial shareholder protection than civil law systems do. Greater shareholder protection leads, in turn, to a higher level of stock market development. There has been some discussion on why this is the case. La Porta et al. (1997) suggest that political and historical differences occurring within and between mother countries shape their laws and the trajectory of legislative processes. They argue that in England in the seventeenth century the Crown lost control of the courts to Parliament, which was dominated by property owners. Subsequently, common law evolved to protect the latter against the crown (this protection was later expanded to investors). In France and Germany, on the other hand, parliaments were weaker, commercial codes were adopted only in the nineteenth century, and the state in the form of more autocratic governments maintained political control over firms. They did not surrender their power to the courts when it came to making economic decisions and the legislation underlining them. In this interpretation, the relationship between indicators of investor rights and financial development with legal origins is noted because legal origins correlate with the extent of state intervention in the economy. The differences in the extent of state intervention will be largely determined by cultural aspects and circumstances that shaped the history of a nation.

Higher-quality human capital is associated with greater economic growth in line with growth theory (Barro, 1991; Lucas, 1988) which consequently enhances financial development consistent with the feedback-causality literature (Calderon & Liu, 2003; Demetriades & Hussein, 1996; Patrick, 1966). Evidence suggests that countries with high-quality human capital have very advanced financial systems. Examples are South Korea, Canada, Japan, the United States, and the United Kingdom, among others (S.-Y. Ho & Iyke, 2021). Satrovic (2017) further investigates the long-run and short-run relationships between financial development and human capital (enrolment in secondary education (% gross)) in Turkey using the ARDL approach for the period 1986-2015. Results reveal a significant positive impact of human capital on financial development.

A 1% increase in human capital leads to a 0.89% increase in financial development in the long-run and 0.39% in the short-run. Ibrahim and Sare (2018) examine the relationship between human capital and financial development in Africa relying on data for 46 countries spanning 1980–2015 using the system GMM. They find that the impact of human capital on financial development is largely positive and significant. A 10%-point increase in secondary school enrolment increases financial development by 0.22%. Thus, accumulation of human capital stock spurs financial markets development. Human capital strengthens the demand for and supply of money and financial services in a society, which in turn positively contributes to financial development (Zaidi et al., 2019).

Rajan and Zingales (2003) argue that trade opening, especially when combined with openness to capital flows, weakens the incentives of certain business firms or financial intermediaries to block finance system changes in order to reduce entry and competition. This will have implications for the relative political power of affected industries and

financial players, which may wane when the rules of trade/commerce change. Then, trade openness has a beneficial impact on financial development. Braun and Raddatz (2005) explore the political channel further and demonstrate that countries in which trade liberalisation reduces the power of groups most interested in blocking financial development observe an improvement in the financial system. However, when trade opening strengthens those groups, external finance suffers.

Empirically, Kim et al. (2010) investigate the relationship between financial development and trade openness for a sample of 88 countries during the period 1960–2005. Their results show that a positive long-run relationship between trade openness and financial development coexists with a negative short-run relationship. However, when splitting the data into different income or inflation groups, this finding is observed only in relatively low-income countries or high-inflation economies. S.-Y. Ho and Iyke (2021) recently examine the impact of trade openness on financial development in a panel of 43 sub-Saharan African countries for the period 1996 to 2014. They find that trade openness enhances financial development in the long-term. In the short-term, however, the effect of openness is not clear, but it does appear to be negative. When they divide the sample into low- and middle-income groups, they find that openness enhances financial development in the former group but detrimentally affects it in the latter group.

Institutional quality is important for stock market development because efficient and accountable institutions tend to broaden appeal and confidence in equity investment. Equity investment thus becomes gradually more attractive as political risk is resolved over time, and consequently, the development of good quality institutions can affect the attractiveness of equity investment and lead to viable stock markets. Yartey (2010) finds

good quality institutions such as law and order, democratic systems where accountability is respected, and a good quality bureaucracy are important determinants of stock market development in African countries. This because they reduce political risk and enhance the viability of external finance. Bekaert (1995) provides evidence that higher levels of political risk are linked to more instances of market segmentation and subsequently a low level of stock markets developing.

4.3 Additional Analyses

In this section, we re-examine the connection between financial liberalisation and stock market development in the MENA region. We use three proxies for stock market development: market capitalisation relative to GDP, value traded relative to GDP and turnover ratio. Then, we investigate whether country characteristics shape stock market development in the MENA region. Different country characteristics emerge from: variations in common law versus civil law traditions; high education level versus low education level; high trade openness versus low trade openness; high political stability versus low political stability; and big government versus small government.

4.3.1 Financial Liberalisation and Stock Market Capitalisation

We use stock market capitalisation which is defined as the stock market value of listed companies as a percentage to GDP and, as such, represents the size of the stock market relative to the economy. While this is perhaps the most important indicator of stock market development and is widely used in the literature, its main weakness is that it may fluctuate excessively over time, reflecting any excess volatility in stock prices (Baltagi et al., 2009). Market capitalisation has been extensively used in the literature as a proxy of stock market development (see Bekaert et al., 2001; Fuchs-Schündeln & Funke, 2003; Garcia & Liu, 1999; Levine, 2005; Yartey, 2008). Fuchs-Schündeln and Funke (2003) report a positive impact of stock market liberalisation on market capitalisation in a sample of 27 emerging economies. El-Wassal (2005) reports evidence suggesting there is a positive link between financial liberalisation and stock market size in a large sample of emerging economies. Furthermore, De La Torre et al. (2007) state that stock market liberalisation is associated with increases in domestic stock market valuation. However, Ben Naceur et al. (2008) find a negative relationship between stock market liberalisation

and market valuation in the first five years following liberalisation. We examine the impact of financial liberalisation on stock market capitalisation and test the following hypothesis:

H_1: Stock market liberalisation is expected to increase the size of stock markets in the MENA region.

4.3.2 Financial Liberalisation and Stock Market Liquidity

We also use two related measures of market liquidity. First, value traded, which is defined as the total value of trades on the stock market exchange divided by GDP. Value traded measures trading volume as a share of national output and should therefore positively reflect liquidity on an economy-wide basis (Bekaert et al., 2001; De la Torre et al., 2007; Jain-Chandra, 2002; Li, 2007), and many others. Levine (2001) suggests that value traded increases significantly following stock market liberalisation. Levine and Zervos (1998a) find that stock market liberalisation has a positive and significant impact on stock market liquidity. In the opinion of Jain-Chandra (2002) it leads to enhanced liquidity after controlling for other relevant factors. Meanwhile, De La Torre et al. (2007) argue that it is related to increases in value traded. Lee and Wong (2012) confirm there is a positive significant relationship between stock market liberalisation and stock market liquidity. Ben Naceur et al. (2008), on the other hand, demonstrate a negative link between stock market liberalisation and value traded is evident in the first five years following liberalisation. Thus, the aforementioned arguments lead us to posit the following hypothesis:

H_2: Stock market liberalisation is expected to promote the value traded in the MENA region.

The second measure of market liquidity is turnover ratio. It is defined as the value of total shares traded divided by market capitalisation. While value traded captures trading relative to the size of the economy, turnover reflects trading relative to the size of the stock market (see e.g., Bekaert et al., 2005; Ben Naceur et al., 2014; Jain-Chandra, 2002). Kim and Singal (2000) find that stock market liberalisation contributes to an increase in stock market liquidity, while Fuchs-Schündeln and Funke (2003) report a positive significant relationship between these concepts. Furthermore, Jain-Chandra (2002) demonstrate that stock market liberalisation does indeed lead to an increase in turnover ratio. Ben Naceur et al. (2008), however, show that the impact of stock market liberalisation on turnover ratio is negative in the first five years following liberalisation. Thus, my next hypothesis is as follows:

H_3: Stock market liberalisation is expected to promote the turnover ratio in the MENA region.

4.3.3 Common Law versus Civil Law

The "law and finance" theory essentially states that legal origin plays an important role in explaining stock market development. The conclusion from the law and finance theory is that countries whose legal traditions derived from British Common Law have more highly developed financial markets than countries following French Civil Law. La Porta et al. (1997) classify the legal origin as one depending on common law or civil law history. Based on legal origin, countries are grouped into British, German, Scandinavian and French antecedents. British legal origin countries inherited the common law which originated from the United Kingdom while the German, Scandinavian, and French legal origin countries practice civil law. La Porta et al. (1997, 1998) argue that: (1) common law gives more protection of investors than civil law; (2) British common law countries

have more sophisticated stock markets than German, Scandinavian, and French civil law countries; and (3) countries with institutions having higher legal protection mechanisms for investors have better stock markets.

In a panel dataset consisting of 20 advanced and emerging economies, Armour et al. (2009) assert that common law countries are more protective of investors than civil law regimes. In the same vein, Sarkar (2010) argues that common law improves the quality of legal institutions based on factors such as adaptability and politics. The adaptability consideration focuses on the process of framing new rules. In countries where common law is practiced, judges interpret the laws on a case-by-case basis, which allows the formation of legal regulations to be more adaptable to changing environments. In contrast, judges in countries practicing civil laws are constrained by explicit laws and codes, leaving little discretion to them. Therefore, the civil law system may suffer from inflexibility because changes may only be initiated by fits and starts through legislation. Armour et al. (2009) further point out that there is greater independence provided to the judiciary under the common law system. Judges under the latter are less influenced by the legislature, and therefore can better protect individual property rights from the clutches or claims of the state. In contrast, under the civil law system, the legislature has greater control over legal institutions and here the judges are less able to protect individual property rights from the state. In essence, legal origin has a strong bearing on the quality of institutions, and thus the effective functioning of stock markets. Based on this, the afore-mentioned arguments lead us to hypothesise the following relationship:

H_4: The effect of financial liberalisation on stock market development is higher in common law countries than civil law countries.

4.3.4 High Education vs Low Education

Human capital is believed to play an important role in financial development. Theory suggests that human capital can promote financial development by reducing informational gaps and increasing demand for the different financial instruments (Barro & Sala-i-Martin, 1995; W.-H. Ho, 2013). Using cross-country data of 57 developing countries, Outreville (1999) investigates the effect of human capital on financial development and finds that there is a positive relationship here. Hakeem and Oluitan (2012) examine the relationship between these concepts in South Africa for 1965-2005. The empirical evidence suggests that human capital measured using secondary school enrolment has a positive influence on financial development.

Human capital also plays a central role in accelerating financial development and improves people's quality of life (Hatemi & Shamsuddin, 2016). For example, educated individuals are generally better at using financial resources than illiterate and unskilled individuals. Economic theory also contends that human capital contributes to financial development, as several studies have documented (Cleeve et al., 2015; Lucas, 1990). In the case of Bangladesh, Hatemi and Shamsuddin (2016) analyse the association between financial development and human capital measured using Barro–Lee index. The results indicate a higher level of education leads to a greater level of financial development. Sapkota and Bastola (2017) point out that human capital if used properly should engender a better understanding of the global and domestic financial systems, and how to share knowledge. It creates demand for high-quality services and products offered by financial institutions.

Indeed, higher quality human capital accumulation suggests that well educated people have better access to information and are more likely to behave as less risk averse people

(Ibrahim, 2018; Outreville, 1999), and accumulate more money (Kelley, 1980). Recently, Zaidi et al. (2019) studied the impact of human capital measured using secondary school enrolment rate (% gross) on financial development in the Organisation of Economic Co-operation and Development (OECD) countries for 1990–2016. Their results show that there is a significant positive link between human capital and financial development, indicating the importance of education in OECD countries' finance systems. Their empirical findings also suggest that a 1% increase in human capital increases financial development by 0.126%, all else remaining constant. The authors suggest that human capital enables firms and individuals to use limited resources efficiently. Human capital strengthens the finance system through competitive technology and good processes, improves the standard of living, and promotes economic growth. Thus, the next hypothesis is as follows:

H_5: The impact of financial liberalisation on stock market development is greater in high education countries than low education countries.

4.3.5 High Trade vs Low Trade

The relationship between financial market development and trade openness has been investigated in the literature. Rajan and Zingales (2003) argue that trade openness has a beneficial impact on such development because it weakens the incentives of special interest groups or financial intermediaries to block financial market changes to reduce entry and competition. Trade openness increases investment and banks' lending practices, thus improving how well financial markets operate. Braun and Raddatz (2005) demonstrate that countries observe an improvement in their financial system when trade liberalisation reduces the power of groups most interested in preventing it. In contrast, greater openness to the world's goods/services markets may reinforce domestic economic

fluctuations (Arora & Vamvakidis, 2005; Rodrik, 1998) and lead to much more vulnerability to external shocks (Loayza & Ranciere, 2004; Tornell et al., 2004). This may worsen stock market imperfections and compromise the functioning of finance systems. These arguments lead us to hypothesise the following relationship:

H_6: The impact of financial liberalisation on stock market development is greater in high trade openness countries than low trade openness countries.

4.3.6 High Political Stability vs Low Political Stability

The relationship between political risk and stock market development has been discussed in the literature. Erb et al. (1996), for instance, show that expected returns are related to the magnitude of political risk. They find that in both developing and developed countries, the lower the political risk, the lower are required stock returns.[20] In addition, they suggest that political risk is an important factor in people's investment decisions and that it strongly affects the local cost of equity, which may have important implications for stock markets. Perotti and Van Oijen (2001) examine the relationship between political risk and stock market development using a sample of 22 countries for 1988-1995. Their empirical findings indicate that political risk improvements, correlated with the progress of a sustained privatisation program, appear to be an important factor in the rapid rise of stock markets in emerging economies. They suggest if political risk is improved by 1% in a year, there is a nearly 4% increase for the traded value over GNP. Equity investment thus becomes gradually more attractive as political risk is resolved over time.

Yartey (2010), using a panel dataset of 42 countries for the period 1990 to 2004, investigates the relationship between stock market development and political risk, a

[20] Diamonte et al. (1996) find that changes in political risks are related contemporaneously to stock returns, using several quantitative indicators that proxy for the notion of political risk.

measure of the institutional framework that supports the viability of external finance. Political risk resolution is strongly associated with growth in stock market capitalisation and this suggests that having good quality institutions (resolution of political risk) can be an important factor in stock markets in emerging economies. Dimic et al. (2015) look at the impact of political stability on stock markets returns using data from 64 countries divided into three categories (emerging, frontier, and developed) from 1990 to 2013. They find that political stability is positive and highly statistically significant, suggesting that less political risk leads to higher stock market returns regardless of the type of economy. Lehkonen and Heimonen (2015) examine the impact of political risk on stock market development using annualised panel data for 49 emerging economies for 2000–2012. They find evidence which suggests that decreases in political risk led to higher returns. More recently, Asaad and Marane (2020) explore the impact of terrorism activities and political risk on the Iraqi stock exchange using ISX60 index as a proxy of stock markets for the period 2005-2019. The authors show that fewer terrorist activities and more stability in the political system strongly encourage stock market development in Iraq. Thus, the following hypothesis is formulated here:

H_7: The impact of financial liberalisation on stock market development is greater in high politically stable countries than unstable countries.

4.3.7 Big Government vs Small Government

There is a substantial theoretical and empirical literature on the relationship between economic growth and size of government (Barro, 1990, 1991; Levine & Renelt, 1992; Ram, 1986; Tanzi & Zee, 1997). Most of these studies show that undisciplined government expenditure or too much control of 'levers of the economy' is detrimental to progress. For the MENA region, Abu-Bader and Abu-Qarn (2003) investigate the

relationship between government size and economic growth in Israel, Egypt, and Syria for the years 1967-1998. Their empirical results indicate that government size measured using the total government expenditure to GDP has a negative impact in all three nations. Sabra (2016) uses the 2SLS technique and the GMM system analysis to examine the relationship between government size and economic growth in eight MENA nations for the period 1977-2013. This author finds a negative relationship between government size and economic growth.

In addition, Gurley and Shaw (1967) and Jung (1986) suggest there is a causal relationship between financial development and economic growth which runs from the latter to the former. The increasing demand for financial services triggers an expansion in the financial sector. So, high economic growth creates demand for financial instruments or services and arrangements, enabling the financial markets to respond to these demands. Empirically, several studies maintain that causality runs from economic growth to stock market development, as well as overall financial development (Ang & McKibbin, 2007; Awdeh, 2012; Kahouli, 2017; Kwon & Shin, 1999; Odhiambo, 2008; Panopoulou, 2009).

Elsewhere, several empirical studies investigate the direct relationship between financial development and government size. Demetriades and Rousseau (2010), for example, using data for 82 developed and developing countries over the period 1960-2008, provide evidence suggesting that countries with less government control over the economy have better functioning financial markets. They also suggest that higher government spending increases the cost of borrowing and make resources less available for private sector investment. A 1% rise in government expenditure relative to GDP is associated with

1.4% decline in the evolution of stock markets. Using a large sample of 105 countries over the period 1984-2009, Chen et al. (2009) reveal that the relationship between financial development and government expenditure is a negative one. Excessive government expenditure increases the cost of domestic financing and crowds out private sector activity, thereby hindering financial development.

However, other empirical studies show no significant relationship between government expenditure and stock markets. Bekhet and Othman (2012) employ the methodology of vector error correction modelling to examine the role of fiscal policy in the Malaysian stock market using quarterly data covering the period 1999 to 2011. The results show that government expenditure has no significant long-run and short-run effect on the growth of the country's stock market. Similarly, using an ARDL, Gowriah et al. (2014) investigate the effect of monetary and fiscal policies on stock prices on the Mauritius Stock Exchange. Their results point to no significant short-term or long-term relationship between government spending and stock market prices. Thus, in light of the above-mentioned arguments, the next hypothesis is documented here:

H_8: The impact of financial liberalisation on stock market development is higher in countries with small governments than countries with big governments.

4.4 Econometrics Framework

To investigate the impact of financial development on stock market development, we estimate the following panel data model:[21]

$$Y_{it} = \beta_1 + \beta_2 LIBST_{it} + \beta_3 LIBMT_{it} + \beta_4 LIBLT_{it} + \beta_5 X_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} refers to a stock market development variable in country i at time t. Stock market development is proxied by either market capitalisation (MC), value traded (VT) or turnover ratio (TR). LIBST is a dummy variable that takes a value of 1 in the two years that follow the year of the official liberalisation date, otherwise 0. LIBMT is a dummy variable taking the value of 1 in the third year after liberalisation and the two years afterwards, otherwise 0. LIBLT is a dummy variable that takes the value 1 in the sixth-year post-liberalisation and all the years that follow; otherwise 0. X refers to control variables representing the macroeconomic environment, banking sector and institutional quality. ε_{it} stands for the error term.

To assess whether country characteristics dictate the relationship between financial liberalisation and stock market development, we use the following panel data model:

$$Y_{it} = \alpha_1 + \alpha_2(FL_i . Country\ Characteristic_i) + \alpha_3 \left(FL_i . (1 - Country\ Characteristic_i)\right) + \alpha_4 X_{it} + \varepsilon_{it} \quad (2)$$

where Y refers to one of the three stock market indicators; market capitalisation relative to GDP (MC), value traded relative to GDP (VT) or turnover ratio (TR). FL takes the value of 1 in the year that follows the year of liberalisation and all years afterwards, otherwise 0. X refers to control variables representing the macroeconomic environment

[21] This study is the first to use this model investigating the impact of short-term, medium-term and long-term financial liberalisation on the development of stock markets.

and banking sector development. Country characteristic takes the value of 1, otherwise 0. Country characteristic assesses the following: common law vs civil law; high education vs low education; high trade openness vs low trade openness; high political stability vs low political stability; and big vs small government.

In order to obtain consistent and efficient estimates, we first run both fixed and random effects models and then choose a valid model based on Hausman's specification test (Hausman, 1978). The null hypothesis in this test is H_0: $E\ (\varepsilon_i \mid X_{it}) = 0$ which implies the random effects model yields consistent and efficient estimates if H_0 is true. However, under the alternative, the fixed effects model is consistent, but the random effects model is not.[22] Hill et al. (2018) have argued that it is safer to analyse panel data with fixed effects estimator than using the random effects estimator because of the likely correlation among the explanatory variables and the error term. In all our estimations, the Hausman test has provided evidence in favour of fixed effects estimation.

4.4.1 Control variables

We use a set of control variables identified in previous studies that influence stock market development variables and report the sign of the relationship between them.

-GDP per capita growth (GDPPCG): research (Billmeier & Massa, 2007; Garcia & Liu, 1999; Li, 2007; Yartey, 2008) finds a positive and significant relationship between growth rate and stock market development. As argued by Garcia and Liu (1999), higher income usually goes hand-in-hand with better defined property rights, better education,

[22] The fixed effects model indicates that individual effects are correlated with the explanatory variables.

and a better general environment for doing business. Hence, we expect economic growth to have a positive effect on stock market development.[23]

-Government expenditure (GE): It is noted that government expenditure and stock market development are negatively related (Ahmed, 2013; Li, 2007). Public expenditure increases the need for domestic financing, and crowds out private sector activity, with adverse effects on financial development. For this reason, it is expected that government expenditure will have a negative effect on stock market development. This proxy has been used in empirical studies such as Li (2007), Ahmed (2013), and many others.

-Inflation rate (IR): Theoretical studies argue that higher inflation rates are associated with less liquid and smaller stock markets (see Azariadis & Smith, 1996; Choi et al., 1996). Empirically, Boyd et al. (2001) and Li (2007) point out a negative association between the rate of inflation and stock market development. A high rate of inflation curtails incentives towards more savings and more investment in the financial sector. Thus, we expect inflation to have a negative effect on stock market development. The inflation rate is measured by the annual percentage change of the consumer price index. It reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at yearly intervals. This proxy has been used elsewhere in Boyd et al. (2001), Marques et al. (2013), Ho (2017), among others.

-Investment (INV): Garcia and Liu (1999) reveal there is a positive relationship between domestic investment and stock market development because the larger the investment,

[23] La Porta et al. (1998) shed some light on the rationale for positive income effect on stock market development. They find that per capita income is a crucial variable in explaining the enforcement of legal rights and the quality of accounting standards. These are important predictors of how well stock markets develop.

the more capital that will flow through stock markets. Based on this, we expect investment to be a positive influence on stock market development.

-Credit given to the private sector (CPS): It has been found that most stock market indicators are highly correlated with financial intermediaries (Beck & Levine, 2004; Garcia & Liu, 1999; Li, 2007; Yartey, 2008). Shown here is that banking sector development, proxied by domestic credit given to the private sector relative to GDP and stock markets indicators are positively and significantly associated. Furthermore, Levine (2005) argues that the banking sector and stock market complement each other in providing financial services to clients and investors. This proxy has been used in other empirical studies such as Levine et al. (2000), Boyd et al. (2001), Sehrawat and Giri (2016), and Ho (2017).[24]

-Trade openness (TO): the literature suggests that trade openness may benefit stock markets in two ways (Niroomand et al., 2014). First, trade openness helps to improve the supply side (Braun & Raddatz, 2005; Rajan & Zingales, 2003) and second, increases the demand for financial products and services (Svaleryd & Vlachos, 2002). From the empirical perspective, Do and Levchenko and Huang and Temple (2005) indicate that trade openness has a positive and statistically significant influence on stock market development in a large group of countries. We expect that more trade openness leads to better stock markets. This measure has been widely used in the literature as a proxy for trade openness (see Huang & Temple; Ibrahim & Sare, 2018).

[24] Levine and Zervos (1998) favoured bank credit because it isolates credit issued by banks as opposed to credit issued by central banks, and by identifying credit to the private sector, as opposed to governments.

-Foreign direct investment (FDI): Concerning the relationship between foreign direct investment (FDI) and stock market development, theoretical studies present opposing views. Some researchers argue that FDI is a just a substitute for domestic stock market development whereas others believe FDI promotes stock markets (Hausmann & Fernandez-Arias, 2000).

Alongside these macroeconomic factors, institutional quality factors might also play an influential role in how stock markets develop. The factors investigated by the existing literature include legal origin, legal protection on investors, corporate governance, and stock market integration. Overall, theories explain how favourable institutional factors, such as common law systems, better legal protection of the interests of shareholders and creditors, political stability, and effective corporate governance can promote viable stock markets (La Porta et al., 1998; Yartey, 2008).

In this chapter, we use the indicator political stability as a proxy of institutional quality:

-Political stability (PS): The political environment plays an important role in prospering economies. Political stability significantly contributes to reducing costs of local equity, which positively influences stock market development in general. Yartey (2008) reveals a positive and statistically significant relationship between political stability and stock market development.

- **Legal origin:** British legal origin countries inherited the common law traditions of Britain while the German, Scandinavian, and French legal origin countries practice civil law. The main difference between the two systems is that in common law the courts are given the main task of discretionary interpretation of the law. In contrast, civil law is based on the theory of separation of powers, the role of a legislator is to legislate, while

the courts should apply the law. To examine the role of legal origin in the relationship between financial liberalisation and stock market development, we create a variable, COMMON, that takes a value of 1 if a country practices common law and a variable CIVIL, that takes a value of 0 if a country practices civil law

- The role of education: this chapter investigates whether the association between financial liberalisation is influenced by the level of education. Hence, we create a variable, HEDU, that takes the value of one if the country-specific median level of education is greater than all countries' median level of education, otherwise zero.
- We also examine the role of international trade. Similar to the method for education, we created a variable, HTRADE, which takes a value of one if the country-specific median trade openness is greater than the whole sample median trade openness, otherwise zero.
- The role of political stability. Similarly, we create a variable, HPS, that takes the value of one if the country-specific median political stability is greater than all countries' median political stability, otherwise zero.
- We finally examine the role of government size. We create a variable, BGOV, that takes the value of one if the country-specific median government expenditure to GDP ratio is greater than all countries' median government expenditure to GDP ratio, otherwise zero. A summary of the variables discussed, and their construction is provided in Appendix 3.1.

4.4.2 Data

We use annual data for 9 MENA countries for the period 1979-2017.[25] The dataset for stock market development indicators and banking sector development is obtained from Global Financial Development Database (GFDD).[26] As for macroeconomic variables, the dataset is retrieved from the World Bank Development Indicators. Table 4.1 provides the official years of financial liberalisation of MENA countries investigated in this study and these were obtained from Bekaert et al. (2005).[27]

[Insert Table 4.1]

4.4.3 Descriptive Statistics

Table 4.2 (Panel A) provides the descriptive statistics of the panel data set for 9 MENA countries[28] from 1979 to 2017. All figures are reported using annual frequency. Panel B of Table 4.2 reports the correlation coefficient matrix of the variables used in the study. The results show a highly positive correlation between market size and value traded (0.61). Likewise, also shown is a highly positive correlation between value traded and the turnover ratio (0.64). This is consistent with Levine and Zervos (1998b) who find strong positive correlations between different stock markets' indicators. Their results confirm there is a highly positive correlation between market capitalisation and trade openness (0.54). Trade openness seems to be a determinative factor of stock market valuation.

[25] The list of countries included in this chapter: Egypt, Israel, Jordan, Kuwait, Morocco, Oman, Saudi Arabia, Tunisia and Turkey.
[26] The Global Financial Development Database (GFDD) has been updated with data through to 2017.
[27] The exception is Kuwait's stock market official liberalisation date which is obtained from IMF. Please see the link https://www.imf.org/en/Publications/CR/Issues/2016/12/30/Kuwait-Staff-Report-for-the-2002-Article-IV-Consultation-16291.

[28] Please refer to table 4.1.

More trade between MENA countries and the world economy raises incentives to introduce more advanced financial systems in the region. Finally, the results show that foreign direct investment emerges as highly correlated with stock market capitalisation (0.61). Foreign direct investment has a favourable effect on stock sector development by gaining access to more resources and chances to mobilise them productively.

[Insert Table 4.2]

4.5 Empirical Results

We estimate equation (1) using a panel of data for 9 MENA countries. We use three proxies of stock market development: market capitalisation, value traded and turnover ratio. We first use the Hausman test to choose whether a fixed effects or random effects model is relevant for estimating the equation. Table 4.3 reports the results. According to the Hausman test statistic, we estimate Models 1-9 of Table 3 using the fixed effects estimation. As shown in Models 1, 2 and 3, the results show that financial liberalisation has a positive impact on stock market capitalisation. These empirical results are consistent with Henry (2000) who indicates that the market capitalisation rate increases significantly in the post-liberalisation period, suggesting an important part of the effect is due to the revaluation of equity prices. The results also show that financial liberalisation has a positive influence on stock market liquidity as shown in Models 4, 5, and 6 (value traded) and Models 7, 8, and 9 (turnover ratio). The results agree with Levine and Zervos (1998) who suggest that stock market liquidity improved significantly following the financial liberalisation policy decision. However, the outcomes contradict the findings of Ben Naceur et al. (2008) which means that financial liberalisation negates stock market development in the MENA region.

The results reveal that the coefficient of economic growth is positive and statistically significant in Models 1 and 3. This finding is supported by Garcia and Liu (1999) and Yartey (2008) who also detect a positive relationship between GDP per capita growth and stock market development. A higher volume of intermediation through stock markets contributes to higher real income growth. Higher income growth in turn promotes stock markets. As expected, it is discovered that the relationship between government expenditure and stock market development is negatively and significantly related in Models 1, 2 and 4. This finding validates the results of Bekhet and Othman (2012) which also indicates there is a negative relationship between government expenditure and financial development in Malaysia.

As shown in Model 2, the coefficient of inflation rate is negative and statistically significant. This is consistent with Boyd et al. (2001), Almalki and Batayneh (2015) who find a negative relationship between the rate of inflation and stock market development. They suggest that for economies with annual inflation rates above 15%, there is a large discrete drop in the financial sector's emergence. As expected, it is observed that domestic investment has a positive and significant influence on stock markets in most models. This result is in line with Garcia and Liu (1999) who reveal that domestic investment is an important determinant here. Higher incentives for investment help mobilise resources in the stock markets, resulting in stronger stock markets emerging.

The results show that domestic credit exerts a significant positive effect on stock market capitalisation in Models 1 and 3. This is consistent with previous findings (Garcia & Liu, 1999; Yartey, 2008) where domestic credit to GDP promotes stock market development. Yartey (2008) asserts that if domestic credit to the private sector divided by GDP

increases by one percentage point, market capitalisation increases by 0.527 percentage point. Trade openness enters with a significant positive coefficient in all models suggesting that stock markets improve due to a higher integration between the MENA countries and the world economy. Trade linkages increase opportunities to attract inflows and revive economic conditions (Huang & Temple, 2005). This finding contradicts what Ho (2017) reported, as that study revealed trade openness having a negative influence on stock market development in South Africa. Consistent with Yartey (2008), the results show that capital inflow is positively and significantly related to such development. Inflows increase the demand for portfolio investment, contributing to better valuation of equity shares.

[Insert Table 4.3]

Considering each of the five types of country characteristics, we divide the nine countries into the two distinct groups—that is, common law versus civil law, high level of education versus low level of education, high trade openness versus low trade openness, high political stability versus low political stability and big government versus small government.

Tables 4.4 to 4.8 report the estimation results of equation (2). According to the Hausman test statistic, we estimate Models 1-3 in Tables 4.4 to4.8 using the fixed effects estimation. In Table 4.4, we examine the role of legal origin and it emerges that the coefficient of liberalisation indicator is larger for countries that have common judicial legal systems in place. This finding is consistent with the law and finance theory which argues that countries whose legal traditions derived from British Common Law have better stock markets than countries following French Civil Law. This evidence echoes

what was argued by La Porta et al. (1997), Smaoui et al. (2017), and De Vita et al. (2020). Our results, however, contradict the findings of Aluko and Azeez (2019) and Fowowe (2014) which argue that legal origin (Common Law or/and Civil law) does not have any impact on stock market development in Africa. The Wald tests show that the difference between the two liberalisation effects is statistically significant at 1% and 5%, respectively, as shown in Models 1 and 2. In these scenarios market capitalisation and value traded are proxies of stock market development.[29]

[Insert Table 4.4]

Table 4.5 investigates the role of education. We create a variable, HEDU, that takes the value of one if the country-specific median level of education is greater than all countries' median level of education. As be clearly seen in Table 4.5, the liberalisation effect is larger in countries with high education levels. This result is in line with Ernest et al. (2020) who argue that the level of education is determinative in explaining stock market development. The Wald test indicates that the difference between the two liberalisation effects is statistically significant at 1% and 10%, respectively, as shown in Models 1 and 2 when market capitalisation and value traded are proxies of stock market development.

[Insert Table 4.5]

The third experiment examines the role of trade openness. Similar to the method for the education, we created a variable, HTRADE, which takes on a value of one if the country-

[29] We use the Wald test to show if the difference between two liberalisation effects is statistically significant or not. If P-value H0: Country characteristic = (1- Country characteristic) is statistically significant, we reject the null hypothesis and accept the alternative hypothesis.

specific median trade openness is greater than the whole sample median trade openness. The results are presented in Table 4.6. It is clear from these results that countries with low trade openness stand to benefit more from financial market liberalisation. This result contradicts Kim et al. (2010), who contend that trade openness increases financial development in low-income countries but confirms they are valid in the case of high-income countries (trade openness has an adverse effect on financial development) in a sample of 88 countries for the period 1960–2005. The Wald test indicates that the difference between the two liberalisation effects is statistically significant at 1% in all specifications.

[Insert Table 4.6]

The fourth experiment focuses on high political stability versus low political stability. Similarly, we create a variable, HPS, that takes the value of one if the country-specific median political stability is greater than all countries' median political stability. As shown in Table 4.7, the impact of liberalisation on stock market development is larger for countries with poor political stability, so countries such as Turkey, Egypt, and Israel have matured stock markets and are more integrated with the world financial markets despite their current deep-seated political tensions. They are doing better than more politically stable countries such as Kuwait, Oman and Morocco (Neaime, 2005). These results are consistent with other research (Asaad & Marane, 2020; Lehkonen & Heimonen, 2015; Yartey, 2010). These analyses argue that political risk resolution (more political stable environment) is strongly associated with the growth of stock markets. The Wald test indicates that the difference between the two liberalisation effects is statistically significant at 1% in all specifications.

[Insert Table 4.7]

The final experiment focuses on big government versus small government. Similarly, we create a variable, BGOV, one that takes the value of one if the country-specific median government spending to GDP ratio is greater than all countries' median government spending to GDP ratio. Table 4.8 shows that the impact of liberalisation on stock market development is larger for countries with small governments. Under all specifications, the Wald test shows that the difference between the two liberalisation effects is statistically significant at 1% and 5%, respectively. These results do agree with previous studies which indicate that government size has an unfavourable impact on financial development (Bekhet & Othman, 2012; Demetriades & Rousseau, 2010; Gowriah et al., 2014).

[Insert Table 4.8]

4.6 Conclusion

This study revisits the impact of financial liberalisation on stock market development using panel data for 9 MENA economies covering the period 1979-2017. The results show that the size of this effect grows larger over time. Financial liberalisation policies have improved stock market capitalisation, the value of shares traded relative to GDP and the share turnover ratio suggesting improved liquidity over time. The impact of financial liberalisation is robust to the inclusion of a comprehensive set of control variables representing the macroeconomic environment, banking sector and institutional regulatory quality. These outcomes are in contrast to Ben Naceur et al. (2008), who suggested that the decision to liberalise markets impedes the progress of stock markets. In addition, we examine whether different country characteristics impact such development in MENA countries experiencing financial liberalisation in our sample. We find that countries with common law origins, high levels of education, low trade openness, low political stability, and small government will benefit more when they liberalise their stock markets and let the free market decide.

Table 4.1
Dates of stock market liberalisation

Country	Official year of liberalisation
Egypt	1992
Israel	1993
Jordan	1995
Kuwait	2000
Morocco	1988
Oman	1999
Saudi Arabia	1999
Tunisia	1995
Turkey	1989

Table 4.2
Descriptive Statistics, 1979-2017, 9 countries

Variable	mc	vt	tr	gdppcg	ge	Inf	Inv	cps	to	fdi	ps
Panel A											
Obs	254	253	252	253	256	248	256	247	256	256	166
Mean	44.99	22.18	47.19	1.51	19.60	13.87	22.59	50.15	77.42	2.31	-0.35
Std. Dev.	36.84	37.54	53.83	3.69	6.01	37.48	4.65	19.55	25.78	2.88	0.68
Min	2.77	0.10	3.06	-14.48	9.34	-1.33	10.67	14.14	30.25	-3.18	-2.01
Max	230.83	331.27	287.62	15.99	38.25	373.22	34.42	91.77	149.45	23.54	1.12
Panel B **Correlation (Pearson)**											
mc	1.00										
vt	0.61*	1.00									
tr	0.09	0.64*	1.00								
gdpg	-0.04	-0.04	0.18	1.00							
ge	0.25	0.10	-0.19	-0.24*	1.00						
inf	-0.18	0.00	0.42*	0.13	-0.42*	1.00					
inv	0.03	0.00	0.07	0.13	0.05	0.00	1.00				
cps	0.45	-0.04	-0.41*	-0.15	0.32*	-0.38*	0.17	1.00			
to	0.54*	0.16	-0.31	-0.24*	0.38*	-0.29	0.17	0.51*	1.00		
fdi	0.61*	0.32*	-0.05	0.08	0.01	-0.09	0.21	0.40*	0.48*	1.00	
ps	0.07	-0.06	-0.31*	-0.16	0.25*	-0.28	0.07	-0.04	0.55*	-0.06	1.00

Table 4.3
Liberalisation and stock market development controlling for macroeconomic, banking, and institutional environment control variables

Regressors	MC			VT			TR		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
LIBST	0.021	0.011*	0.013	-0.009	-0.002	0.018	-0.074	-0.056	-0.027
	(0.033)	(0.033)	(0.023)	(0.040)	(0.041)	(0.139)	(0.053)	(0.053)	(0.145)
LIBMT	0.043***	0.071***	0.091*	0.07**	0.075**	0.171	0.091*	0.118**	0.241*
	(0.033)	(0.022)	(0.050)	(0.035)	(0.037)	(0.124)	(0.054)	(0.054)	(0.138)
LIBLT	0.152***	0.089***	0.129**	0.15***	0.115***	0.193*	0.164***	0.173***	0.224
	(0.021)	(0.033)	(0.088)	(0.021)	(0.012)	(0.122)	(0.051)	(0.040)	(0.131)
GDP per capita growth (GDPPCG)	0.868**	0.223	0.385*	0.182	0.112*	-0.401	0.123	0.748	-0.012
	(0.145)	(0.151)	(0.211)	(0.299)	(0.175)	(0.987)	(0.358)	(0.378)	(0.531)
Government expenditure (GE)	-0.891	-0.642*	0.003	-0.999*	-0.727	-0.285	0.466	0.397	-0.081
	(0.185)	(0.365)	(0.483)	(0.600)	(0.566)	(0.769)	(0.747)	(0.711)	(0.779)
Inflation rate (IR)	-0.044	-0.423***	-0.040	0.034	-0.020	-0.168	0.075	0.025	0.080
	(0.021)	(0.099)	(0.121)	(0.046)	(0.039)	(0.126)	(0.078)	(0.077)	(0.151)
Gross domestic investment (INV)	0.823***	0.229	0.821*	0.116***	0.731**	0.237**	0.579*	0.343*	0.042*
	(0.296)	(0.264)	(0.436)	(0.415)	(0.408)	(0.714)	(0.163)	(0.454)	(0.383)
Credit given to the private sector	0.118***	0.411***	0.165**	0.136	-0.003	-0.343	-0.253	-0.312*	-0.622**
	(0.142)	(0.123)	(0.338)	(0.142)	(0.132)	(0.234)	(0.207)	(0.341)	(0.452)
Trade openness (TO)		0.591***	0.855***		0.728***	0.791***		0.947***	0.944***
		(0.127)	(0.155)		(0.225)	(0.277)		(0.229)	(0.224)
Foreign direct investment (FDI)		1.551***	1.378***		1.788***	1.989***		0.611	1.111***
		(0.234)	(0.758)		(0.997)	(0.857)		(0.689)	(0.812)
Political stability (PS)			-0.012			-0.321			-0.056
			(0.051)			(0.561)			(0.045)
Constant	-0.234	-0.134**	-0.271***		-0.234***	-0.676***		-0.612**	-0.123

	(0.823)	(0.231)	(0.119)		(0.453)	(0.565)		(0.134)	(0.349)
R^2	0.566	0.785	0.542	0.341	0.671	0.521	0.911	0.816	0.733
F-test	29.88***	35.87***	22.14***	16.96***	18.51***	9.88***	6.46***	7.76***	8.39***
Hausman test	77.67***	161.58***	104.660***	100.5***	110.87***	81.5***	131.27***	141.55***	104.06***
No. of countries	9	9	9	9	9	9	9	9	9
No. of observations	235	235	155	234	234	154	233	233	153

Table 4.3 reports the estimation results of eq. (1) Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. The table also reports the F test under the null hypothesis which estimated coefficients are jointly equal to zero. The Hausman (1978) specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null that individual unobserved effects are not correlated with independent variables.

Table 4.4
The effect of origin of legislative system on the relationship between financial liberalisation and stock market development.

Regressors	**MC**	**VT**	**TR**
	Model 1	**Model 2**	**Model 3**
FL*COMMON	0.09***	0.149***	0.113
	(0.028)	(0.054)	(0.075)
Fl*CIVIL	0.06**	-0.004	0.058
	(0.023)	(0.035)	(0.060)
GDP per capita growth (GDPPCG)	0.220	-0.058	0.397
	(0.154)	(0.288)	(0.398)
Government expenditure (GE)	-0.822**	-0.922	-0.225
	(0.362)	(0.571)	(0.706)
Inflation rate (IR)	-0.084***	0.033	0.042
	(0.031)	(0.045)	(0.094)
Gross domestic investment (INV)	0.011	0.455	0.265
	(0.264)	(0.395)	(0.488)
Credit given to the private sector	0.51***	0.192*	-0.093
	(0.106)	(0.108)	(0.183)
Trade openness (TO)	0.623***	0.704***	1.04***
	(0.126)	(0.206)	(0.243)
Foreign direct investment (FDI)	2.301***	2.845***	0.915**
	(0.367)	(0.452)	(0.446)
Constant	-0.163**	-0.316***	-0.304
	(0.081)	(0.116)	(0.185)
R^2	0.84	0.613	0.689
F-test	37.75***	19.25***	6.96***
Hausman test	27.6***	614.17***	129.67***
P-value from Wald test	0.001	0.023	0.216
No. of countries	9	9	9
No. of observations	235	234	233

Tables 4.4 reports the estimation results of equation. (2). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. The table also reports the F test under the null hypothesis that estimated coefficients are jointly equal to zero. Wald test examines whether the difference between two liberalisation effects is statistically significant. The Hausman (1978) specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null hypothesis that individual unobserved effects are not correlated with independent variables.

Table 4.5
The effect of education on the relationship between financial liberalisation and stock market development

Regressors	MC	VT	TR
	Model 1	Model 2	Model 3
Fl*HEDU	0.095***	0.102**	0.097
	(0.024)	(0.044)	(0.061)
Fl*LEDU	0.035	0.000	0.059
	(0.023)	(0.029)	(0.064)
GDP per capita growth (GDPPCG)	0.211	-0.141	0.366
	(0.154)	(0.282)	(0.390)
Government expenditure (GE)	-0.699*	-0.803	-0.181
	(0.368)	(0.590)	(0.695)
Inflation rate (IR)	-0.087***	-0.006	0.028
	(0.031)	(0.043)	(0.086)
Gross domestic investment (INV)	0.023	0.625*	0.324
	(0.247)	(0.357)	(0.443)
Credit given to the private sector	0.484***	0.109	-0.123
	(0.106)	(0.114)	(0.180)
Trade openness (TO)	0.62***	0.756***	1.059***
	(0.124)	(0.214)	(0.247)
Foreign direct investment (FDI)	2.402***	2.949***	0.954**
	(0.371)	(0.453)	(0.465)
Constant	-0.176**	-0.383***	-0.327*
	(0.079)	(0.125)	(0.180)
R^2	0.841	0.606	0.688
F-test	38.79	19.99	7.05
Hausman test	30.61	109.49	57.99
P-value from Wald test	0.000	0.062	0.229
No. of countries	9	9	9
No. of observations	235	234	233

Tables 4.5 reports the estimation results of equation. (2). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. The table also reports the F test under the null hypothesis that estimated coefficients are jointly equal to zero. Wald test examines whether the difference between two liberalisation effects is statistically significant. The Hausman test specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null hypothesis that individual unobserved effects are not correlated with independent variables.

Table 4. 6
The effect of trade openness on the relationship between financial liberalisation and stock market development

Regressors	MC	VT	TR
	Model 1	Model 2	Model 3
Fl*HTO	0.027	-0.055	-0.041
	(0.024)	(0.035)	(0.046)
Fl*LTO	0.106***	0.153***	0.177***
	(0.024)	(0.041)	(0.065)
GDP per capita growth(GDPPCG)	0.232	-0.076	0.459
	(0.155)	(0.283)	(0.384)
Government expenditure (GE)	-0.856**	-1.095**	-0.299
	(0.353)	(0.527)	(0.646)
Inflation rate (IR)	-0.069**	0.048	0.095
	(0.032)	(0.042)	(0.090)
Gross domestic investment (INV)	0.047	0.661*	0.329
	(0.242)	(0.347)	(0.418)
Credit given to the private sector	0.504***	0.147	-0.101
	(0.105)	(0.105)	(0.169)
Trade openness (TO)	0.601***	0.686***	0.954***
	(0.124)	(0.204)	(0.229)
Foreign direct investment (FDI)	2.359***	2.948***	1.107***
	0.368	0.451	0.418
Constant	-0.161**	-0.342***	-0.285*
	(0.079)	(0.111)	(0.162)
R^2	0.843	0.626	0.704
F-test	37.93	19.81***	7.84***
Hausman test	29.34***	104.82***	133.88***
P-value from Wald test	0.000	0.000	0.009
No. of countries	9	9	9
No. of observations	235	234	233

Tables 4.6 reports the estimation results of equation. (2). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. The table also reports the F test under the null hypothesis that estimated coefficients are jointly equal to zero. Wald test examines whether the difference between two liberalisation effects is statistically significant. The Hausman test specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null hypothesis that individual unobserved effects are not correlated with independent variables.

Table 4.7
The effect of political stability on the relationship between financial liberalisation and stock market development

Regressors	MC	VT	TR
	Model 1	**Model 2**	**Model 3**
Fl*HPS	0.027	-0.055	-0.041
	(0.024)	(0.035)	(0.046)
Fl*LPS	0.105***	0.152***	0.177***
	(0.024)	(0.041)	(0.065)
GDP per capita growth(GDPPCG)	0.2316	-0.076	0.459
	(0.155)	(0.283)	(0.384)
Government expenditure (GE)	-0.856**	-1.095**	-0.299
	(0.353)	(0.527)	(0.646)
Inflation rate (IR)	-0.069**	0.048	0.095
	(0.032)	(0.042)	(0.090)
Gross domestic investment (INV)	0.046	0.661*	0.329
	(0.242)	(0.347)	(0.418)
Credit given to the private sector	0.504***	0.147	-0.101
	(0.105)	(0.105)	(0.169)
Trade openness (TO)	0.601***	0.686***	0.954***
	(0.124)	(0.204)	(0.229)
Foreign direct investment (FDI)	2.359***	2.948***	1.107***
	(0.368)	(0.451)	(0.418)
Constant	-0.152*	-0.318***	-0.261
	(0.079)	(0.109)	(0.160)
R^2	0.843	0.626	0.704
F-test	37.93***	19.81***	7.85***
Hausman test	98.35***	94.87***	29.86***
P-value from Wald test	0.000	0.000	0.009
No. of countries	9	9	9
No. of observations	235	234	233

Tables 4.7 reports the estimation results of equation (2). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels. The table also reports the F test under the null hypothesis that estimated coefficients are jointly equal to zero. Wald test examines whether the difference between two liberalisation effects is statistically significant. The Hausman test specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null hypothesis that individual unobserved effects are not correlated with independent variables.

Table 4.8
The effect of government size on the relationship between financial liberalisation and stock market development

Regressors	MC	VT	TR
	Model 1	Model 2	Model3
Fl*BIGGOV	0.065***	0.054	0.017
	(0.023)	(0.044)	(0.058)
Fl*SMALLGOV	0.081***	0.074**	0.185***
	(0.028)	(0.032)	(0.061)
GDP per capita growth (GDPPCG)	0.194	-0.170	0.331
	(0.152)	(0.280)	(0.383)
Government expenditure (GE)	-0.898**	-1.121*	-0.755
	(0.374)	(0.591)	(0.667)
Inflation rate (IR)	-0.096***	-0.023	0.013
	(0.030)	(0.040)	(0.080)
Gross domestic investment (INV)	0.077	0.704*	0.545
	(0.261)	(0.377)	(0.434)
Credit given to the private sector	0.5***	0.137	-0.089
	(0.107)	(0.116)	(0.176)
Trade openness (TO)	0.641***	0.793***	1.038***
	(0.126)	(0.225)	(0.240)
Foreign direct investment (FDI)	2.285***	2.742***	0.967**
	(0.363)	(0.455)	(0.439)
Constant	-0.173**	-0.379***	-0.294*
	(0.081)	(0.130)	(0.170)
R^2	0.839	0.600	0.695
F-test	37.82	20.84	8.18
Hausman test	114.54	389.29	37.45
P-value from Wald test	0.001	0.042	0.011
No. of countries	9	9	9
No. of observations	235	234	233

Tables 4.8 reports the estimation results of equation (2). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels. The table also reports the F test under the null hypothesis that estimated coefficients are jointly equal to zero. Wald test examines whether the difference between two liberalisation effects is statistically significant. The Hausman test specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null hypothesis that individual unobserved effects are not correlated with independent variables.

Table 4.9
Liberalisation and stock market development controlling for macroeconomic, banking, and institutional environment control variables (excluding Global Financial Crisis Period)

Regressors		MC			VT			TR	
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
LIBST	0.034	0.040*	0.062*	-0.009	-0.002	0.018	-0.074	-0.056	-0.027
	(0.021)	(0.024)	(0.058)	(0.040)	(0.041)	(0.139)	(0.053)	(0.053)	(0.145)
LIBMT	0.068***	0.071***	0.091*	0.07	0.075**	0.171	0.091*	0.118**	0.241*
	(0.022)	(0.022)	(0.050)	(0.021)	(0.037)	(0.124)	(0.054)	(0.054)	(0.138)
LIBLT	0.162***	0.097***	0.119**	0.18***	0.102***	0.194	0.196***	0.163***	0.214
	(0.025)	(0.022)	(0.050)	(0.036)	(0.032)	(0.122)	(0.052)	(0.050)	(0.136)
GDP per capita growth (GDPPCG)	0.488**	0.223	0.385*	0.182	-0.131	-0.501	0.564	0.424	-0.009
	(0.194)	(0.151)	(0.211)	(0.299)	(0.275)	(0.487)	(0.388)	(0.378)	(0.531)
Government expenditure (GE)	-0.891**	-0.642*	0.003	-0.999*	-0.727	-0.285	0.466	0.397	-0.081
	(0.385)	(0.365)	(0.483)	(0.600)	(0.566)	(0.769)	(0.747)	(0.711)	(0.779)
Inflation rate (IR)	-0.054	-0.093***	-0.020**	0.029	-0.020	-0.168	0.075	0.025	0.080
	(0.037)	(0.030)	(0.106)	(0.046)	(0.039)	(0.126)	(0.078)	(0.077)	(0.151)
Gross domestic investment (INV)	0.923***	0.229	0.727*	1.756***	0.931**	1.437**	1.579***	0.84*	1.062*
	(0.296)	(0.264)	(0.436)	(0.415)	(0.408)	(0.614)	(0.464)	(0.474)	(0.583)
Credit given to the private sector	0.519***	0.408***	0.165	0.136	-0.003	-0.343*	-0.256	-0.388*	-0.583**
	(0.132)	(0.113)	(0.128)	(0.142)	(0.132)	(0.199)	(0.207)	(0.210)	(0.262)
Trade openness (TO)		0.591***	0.855***		0.728***	0.791***		0.947***	0.944***
		(0.127)	(0.155)		(0.225)	(0.277)		(0.229)	(0.224)
Foreign direct investment (FDI)		2.161***	1.886***		2.544***	2.849***		0.491	1.087***
		(0.377)	(0.439)		(0.458)	(0.597)		(0.404)	(0.412)
Political stability (PS)			-0.002			-0.009			-0.019
			(0.021)			(0.030)			(0.034)
Constant	-0.005	-0.194**	-0.471***		-0.418***	-0.577***		-0.402**	-0.373*

	(0.091)	(0.081)	(0.109)		(0.123)	(0.215)		(0.164)	(0.209)
R^2	0.776	0.8426	0.847	0.511	0.610	0.662	0.687	0.7127	0.833
F-test	33.81***	15.17***	33.44***	15.11***	98.11***	11.66***	5.33***	6.12***	7.11***
Hausman test	55.17***	71.53***	74.113***	67.51***	66.81***	91.15***	77.23***	67.15***	75.16***
No. of countries	9	9	9	9	9	9	9	9	9
No. of observations	177	177	113	176	176	112	175	175	111

Table 4.9 reports the estimation results of eq. (1). Standard errors of estimates are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. The table also reports the F test under the null hypothesis which estimated coefficients are jointly equal to zero. The Hausman (1978) specification test is used to select whether the model should be estimated using fixed or random effects. The Hausman test is χ^2 distributed under the null that individual unobserved effects are not correlated with independent variables.

Appendix 4.1

Variable	Description	Source
Market capitalisation	Total market value of all listed shares over GDP.	Global Financial Development Database (GFDD)
Value traded	Value of trades of domestic stocks over GDP.	GFDD
Equity market turnover	The ratio of equity market value traded to market capitalisation	GFDD
GDP per capita growth	Annual growth of real GDP per capita.	World Development Indicators (WDI)
Government expenditure	Government final consumption expenditure over GDP:	WDI
Inflation rate	Increasing rate of consumer price index over one-year period.	WDI
Investment	Gross domestic fixed capital formation as a share of GDP.	WDI
Private credit	Credit to private sector over GDP.	GFDD
Trade openness	The trade dependency ratio is the sum of exports and imports of goods and services measured as a share of gross domestic product (GDP).	WDI
Foreign direct investment	Foreign direct investment, net inflows over GDP	WDI
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.	Worldwide Governance Indicators (WGI)
The role of Legal origin	British legal origin countries inherited the common law which originated in the UK while the German, Scandinavian, and French legal origin countries practice civil law. To examine the role of legal origin in the relationship between financial liberalisation and stock market development, We create a variable, COMMON, that takes a value of one if a country practices common law and a variable CIVIL, that takes a value of 0 if a country practices civil law.	Authors' construction
The role of education	We create a variable, HEDU and it takes the value of one if the country-specific median level of education is greater than all countries' median level of education, otherwise zero.	Authors' construction
The role of trade openness	We created a variable, HTRADE, which takes a value of one if the country-specific median trade openness is greater than the whole sample median trade openness, otherwise zero.	Authors' construction
The role of political stability	We create a variable, HPS, that takes the value of one if the country-specific median political stability is greater than all countries' median political stability, otherwise zero.	Authors' construction

The role of government size	We create a variable, BGOV, that takes the value of one if the country-specific median government spending to GDP is greater than all countries' median government spending to GDP ratio Otherwise, zero.	Authors' construction

Appendix 4.2
Sample description

Egypt	[1989–2017]
Israel	[1979–2017]
Jordan	[1989–2017]
Kuwait	[1993–2013]
Morocco	[1989–2017]
Oman	[1993–2017]
Saudi Arabia	[1992–2017]
Tunisia	[1989–2017]
Turkey	[1989–2017]

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CHAPTER FIVE: CONCLUSION AND POLICY IMPLICATIONS

5.1 Summary of the Thesis

The main objective of this thesis is to empirically examine, with an emphasis on the MENA and oil-exporting countries, how key characteristics of the financial market affect, not only some aspects of the function of the economy, but also the natural environment. Chapter 2 investigates the effect of financial inclusion on CO_2 emissions in MENA and Latin American countries. It presents evidence suggesting different results of this relationship across these two regions, and when compared to previous studies with no regional focus. While financial inclusion has a linear significant positive effect on CO_2 emissions in Latin American countries, financial inclusion does not appear to impact CO_2 emissions in MENA countries. These results are also in contrast to the work of Renzhi and Baek (2020), who for a large number of countries from a mix of regions find that the effect of financial inclusion on CO_2 emissions follows an inverted U-shaped relationship.

Chapter 3 explores the non-linearity in the impact of financial development on trade openness in oil-exporting countries. Results reveal that the relationship between financial development and trade openness is U-shaped, i.e., financial development initially contributes to a decline in trade openness, but trade openness starts to rise after a certain threshold of financial development. The chapter also reports some important variations in these results across regional groupings. Finally, Chapter 4 revisits the relationship between financial liberalisation and stock market development. In contrast to previous

research, it contends there is a positive and statistically significant causal link between financial liberalisation and stock market development over the medium-term. The chapter also assesses whether different country characteristics affect the relationship between financial liberalisation and stock market development. It emerges that countries with common law origins, high education levels, low trade openness, poor political stability, and small governments stand to benefit more from liberalising their stock markets.

5.2 Policy Implications

The findings of this thesis should be of general interest to policymakers, government departments/agencies, academic researchers, and others interested in what the implications of the financial sector are for CO_2 emissions, trade openness and stock market development.

First, the finding that indicates (1) financial inclusion has a linear significant positive effect on CO_2 emissions in selected Latin American countries and (2) financial inclusion has no significant impact on CO_2 emissions in selected MENA countries, strongly suggests that policymakers should consider different regional characteristics when evaluating what their financial inclusion policies mean for the natural environment. On the one hand, the growth of financial inclusion is not increasing or decreasing CO_2 emissions in the MENA region. This implies that countries in this region can strengthen their policies to improve financial inclusion without the need to introduce changes to protect the environment. However, if policymakers in this region opted to make financial inclusion policies more environmentally friendly, they may be able to use these policies to even reduce CO_2 emissions. On the other hand, the growth of financial inclusion is damaging the natural environment in Latin America. Hence, policymakers should revise

the policies that promote financial inclusion, to: (1) make them more environmentally friendly, or (2) if the first option is not possible, resort to economic strategies with an aim to abate the growth in CO_2 emissions produced by financial inclusion.

Second, the finding that the impact of financial development on trade openness follows a U-shaped relationship in oil-exporting countries suggests that when financial development gets underway, trade openness declines but after a certain threshold of finance, international trade improves. Consequently, for oil-exporting countries to integrate more with the global economy, more emphasis should be put on developing the financial market. In particular, considering the U-shaped relationship found in this study, governments may design policies to accelerate the process of financial development to pass the inflection point in this relationship. This is due to the fact that at low levels of financial development, as it improves, trade openness is expected to be negatively affected in these countries.

5.3 Contributions

Chapter 2 contributes to the literature by focusing on Latin American and MENA nations by addressing a research question, *'how financial inclusion affects and impacts on CO_2 emissions?'*. It helps us to understand 'how relevant the policy implications of empirical global studies are, when compared to regionally focused research?'. It observes significant positive impact of financial inclusion on CO_2 emissions in Latin America; and there is no significant impact of CO_2 emissions in the MENA region.

Chapter 3 contributes to the literature by investigating the non-linear impact of financial development on trade openness using a sample of 24 oil-exporting developing countries. Further, it examines whether the relationship between financial development and trade openness differs according to the region's oil production.

In chapter 4, we contribute to the literature by exploring how different country characteristics such as legal origin, level of education, trade openness, political stability, and government size affect stock market development in MENA countries experiencing financial liberalisation in our sample.

To the best of our knowledge no regional studies are done on these topics so our thesis is the first of its type to address these issues relevant to Latin America and MENA regions.

5.4 Future Research Directions

Chapter 2 focuses on the Latin America and MENA regions and arrives at different results regarding the relationship between financial inclusion and CO_2 emissions. Future work could further explore the underlying factors that generate these differences and, provided the necessary data are available, it could focus on individual countries. The

latter would allow policymakers to take into account each country's individual characteristics in the design of country-specific policy actions. Furthermore, the broad definition of financial inclusion allows for measurement approaches that go beyond the proxy used in this chapter. Future research could explore the impact of financial inclusion on the natural environment while varying the way financial inclusion is measured.

Chapter 3 investigates the effect of financial development on trade openness in oil-exporting countries. Future researchers will need to be cautious when concluding about the effects of financial development on trade openness since a suite of indicators could have different outcomes (positive or insignificant) for issues of trade openness. The indirect effects of financial development measures on trade openness are sensitive to regions' structural variations.

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