**IBN HALDUN UNIVERSITY**
**SCHOOL OF GRADUATE STUDIES**
**DEPARTMENT OF ECONOMICS**

**MASTER THESIS**

# E-COMMERCE IMPACT ON TRADE OPENNESS: THE CASE OF EMERGING AND DEVELOPED EUROPEAN COUNTRIES

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**THESIS SUPERVISOR**

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**ISTANBUL, 2022**

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# E-COMMERCE IMPACT ON TRADE OPENNESS: THE CASE OF EMERGING AND DEVELOPED EUROPEAN COUNTRIES

**by**

**ABUBAKAR ADAM**

**A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Arts in Economics**

**THESIS SUPERVISOR**

**PROF. RASİM ÖZCAN**

**ISTANBUL, 2022**

APPROVAL PAGE

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Arts in Economics.

Thesis Jury Members

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This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

Date of Submission Seal/Signature

ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented following academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name Surname:

Signature:

# ÖZ

## E-TİCARETİN TİCARET AÇIKLIĞI ÜZERİNE ETKİSİ: GELİŞEN VE GELİŞMİŞ AVRUPA ÜLKELERİ ÖRNEĞİ

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Eylül 2022, 63 sayfa

Günümüzde e-ticaret, birçok ekonomik faaliyette vazgeçilmez bir rol oynamakla birlikte bazı ekonomik sorunlara da çareler sunmaktadır. E-ticaret sadece ülkeler arasındaki kaynak kıtlığına etkin bir çözüm sunmakla kalmaz, aynı zamanda kaynakların etkin dağılımını da sağlar. E-ticaret, dünya ekonomik büyümesinin güç merkezi olarak hizmet eder ve sınır ötesi ticareti etkin bir şekilde sürdürür ve böylece ekonomik verimliliği teşvik eder. Ancak bugün, tam potansiyeli erişilemeyecek kadar uzaktır. Bu araştırma, 14 Avrupa ülkesinde E-ticaret, Ticaret açıklığı, Tarifeler, Döviz Kuru, Doğrudan Yabancı Yatırım, Sanayi Büyüklüğü ve Gayri Safi Yurtiçi Hasıla ile ilgili dört aylık verileri kullanır. Ülkeler, 2009q1-2020q4 dönemi için gelişmiş Avrupa ülkeleri ve gelişmekte olan Avrupa ülkeleri olarak gruplandırılmıştır. Bu çalışmada, sabit etki modeli ve FGLS tahmin tekniği ile panel veri analizini uygulamaktadır. Hem gelişmiş hem de gelişmekte olan Avrupa ülkelerinde, e-ticaretin ticari açıklık üzerinde pozitif ve istatistiksel olarak anlamlı bir etkisi olduğunu göstermektedir. Bununla birlikte, gelişmiş Avrupa ülkeleri arasında e-ticaretin ticari açıklık üzerinde daha yüksek bir etkisi olduğu kaydedilmiştir. Daha yüksek katsayı değerinden ve istatistiksel olarak anlamlı bir P-değerinden açıkça görülmektedir. Gelişmiş avrupa ülkelerinde uygun yol ağları, adres sistemleri, yüksek performanslı kurumlar gibi söz konusu oldukça, gelişmekte avrupa ülkelerinde e-ticaret faaliyetlerinin işleyişini düzenleyen katı tedbirler ve kanunlarla birlikte bir sonucu olabilir. Hem gelişmiş hem de yükselen gelişmekte avrupa ekonomilerinde, ticari açıklık ve tarifeler arasında

negatif bir ilişki olduğunu göstermektedir. Gelişmiş Avrupa ülkeleri arasında GSYİH, döviz kuru, endüstri büyüklüğü ve doğrudan yabancı yatırımın ticari açıklık üzerinde olumlu bir etki kaydedilmiştir. Gelişmekte olan Avrupa ekonomileri söz konusu olduğunda ise, doğrudan yabancı yatırım dışında tüm değişkenler ticari açıklık üzerinde olumlu bir etki göstermektedir.

**Anahtar Kelimeler:** Çevrimiçi Satış, Dış Ticaret, E-ticaret, Ticari açıklık.

ABSTRACT

E-COMMERCE IMPACT ON TRADE OPENNESS: THE CASE OF EMERGING AND DEVELOPED EUROPEAN COUNTRIES

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Today e-commerce plays an indispensable role in many economic activities by providing remedies to some economic problems. E-commerce not only provides an efficient solution to the scarcity of resources among countries but also ensures an effective allocation of resources. It serves as a powerhouse of world economic growth and effectively sustains cross-border trade, thereby stimulating economic efficiency. Yet today, its full potential is far beyond reach. This research employs quarterly data on e-commerce, trade openness, tariffs, exchange rate, foreign direct investment, industry size, and gross domestic product in 14 European countries. Countries are grouped into developed European countries and emerging European countries for the period 2009Q1-2020Q4. The study applies panel data analysis through a fixed effect model and FGLS estimation technique. In both developed and emerging European countries, results show that e-commerce has a positive and statistically significant impact on trade openness. However, a higher impact of e-commerce on trade openness among developed European countries is recorded. This is evident from the higher coefficient value and a strongly statistically significant P-value. This may be a result of highly developed infrastructure such as proper road networks, address systems, and high performing institutions together with more relaxed measures and laws governing the operation of e-commerce activities in these developed European countries as compared to stringent measures and laws governing e-commerce activities among emerging European countries. In both developed and emerging European economies,

results show a negative correlation between trade openness and tariffs. Among developed European countries, GDP, exchange rate, industry size, and foreign direct investment recorded a positive effect on trade openness. Whereas in the case of emerging European economies, all variables show a positive impact on trade openness with the exception of foreign trade investment.

**Keywords:** E-commerce, Foreign trade, Online sales, Trade openness.

DEDICATION

I wholeheartedly dedicate this piece of work to my very good friend and brother Umut Güngor and his family for their unconditional love and support throughout my studies in the Republic of Turkey.

ACKNOWLEDGEMENTS

Much appreciation goes to Prof. Dr. Rasim Özcan for his immense contribution and guidance in putting this work together. Not forgetting my colleague and friend Mutawakkil Abdul Rahman for all his constructive criticisms.

Abubakar Adam

ISTANBUL, 2022

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## LIST OF SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| ADF | Augmented Dickey-Fuller Test |
| ARDL | Autoregressive Distributed Lag |
| B2B | Business-to-Business |
| B2C | Business-to-Consumer |
| C2C | Consumer-to-Consumer |
| CDs | Compact Discs |
| E-commerce | Electronic commerce |
| E-learning | Electronic Learning |
| EU | European Union |
| ECM | Error Correction Model |
| FDI | Foreign Direct Investment |
| FE | Fixed Effect Model |
| FGLS | Feasible Generalized Least Square |
| GMM | General Method of Moment |
| GARCH | Generalized Autoregressive conditional Heteroscedasticity |
| G7 | Group of Seven |
| GDP | Gross Domestic Product |
| GCA | General Choice Algorithm |
| ICTs | Information Communication Technologies |
| IMF | International Monetary Fund |
| LDC's | Less Developed Countries |
| MENA | Middle East and North Africa |
| MRA | Meta Regression Analysis |
| NARDL | Nonlinear Autoregressive Distributed Lag |
| OECD | Organisation for Economic Co-operation and Development |
| OLS | Ordinary Least Square |
| RE | Random Effect Model |
| SMEs | Small Medium Enterprises |
| USA | United States of America |
| UK | United Kingdom |

| | |
|---|---|
| UNCTAD | United Nations Conference on Trade and Development Database. |
| VECM | Vector Error Correction Model |
| VAT | Value Added Tax |
| WDI | World Development Indicator |

# CHAPTER I

# INTRODUCTION

## 1.1. General Overview

E-commerce is a term that can be described as buying and selling together with other business activities which involve customer services, after-sales services, e-learning, etc. over the internet within and across national borders (Hernando, 2003). The outburst of high-speed internet and ICTs coupled with the recent COVID-19 pandemic have led to the intense proliferation of e-commerce transactions globally. As estimated by Statista, retail website traffic hit a record high of 14.3 billion visits during the lockdown in March 2020. Hence remarkable growth in online business emerged during the 2020 lockdown. This has prompted business entities to move from the traditional business model. Figure 1.1 below shows how online retail websites have made strong traffic gains as a result of the global COVID-19 pandemic as shoppers preferred shopping online than in stores. An unprecedented number of 3.68 million online shoppers visited Amazon.com in 2020. Other prominent websites such as Ebay.com also recorded 1.01 million visits on average per month. Many other websites such as Rakuten.co.jp, Samsung.com, AliExpress.com, Apple.com, andothers also saw significant growth in the number of online visits monthly.

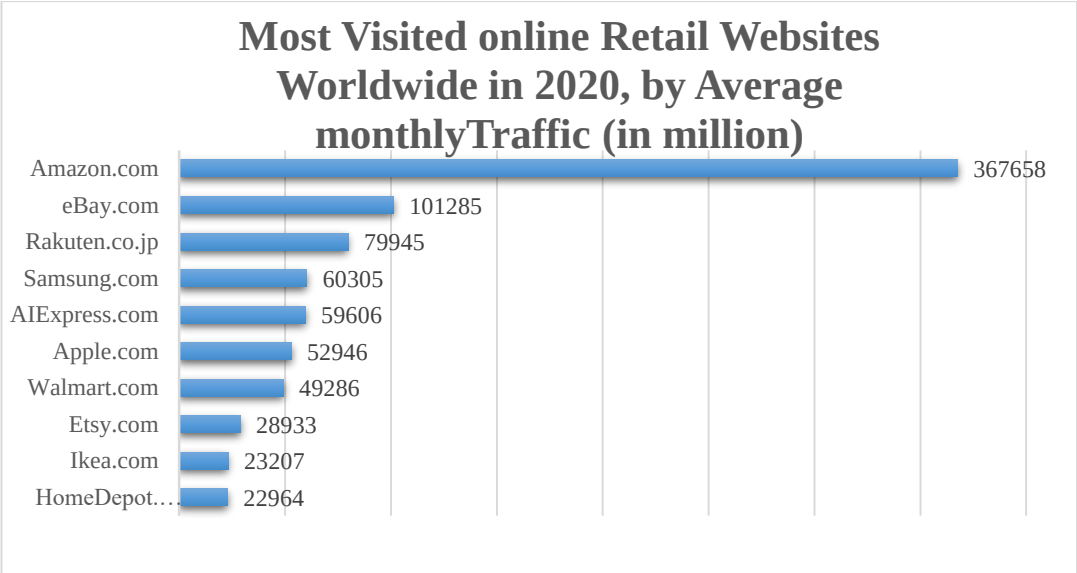


**Figure 1.1. Most Visited Online Retail Websites Worldwide in 2020 By Average Monthly Traffic (in million).**

Looking at it from the regional point of view, undoubtedly e-commerce transactions have seen dramatic growth in various parts of the world over the years. As evident from Figure 1.2, in 2020, e-commerce sales soared highest in Latin America with a 36.7% increase in online retail. North America also saw a laudable increase in e-commerce sales of 31.8%. Other regions such as Central and Eastern Europe saw a 29.1% increment in online sales. However, the Middle East and Africa showed a slower e-commerce sales growth of 19.8%. In general, the world recorded around 27.6% growth in e-commerce sales in 2020.

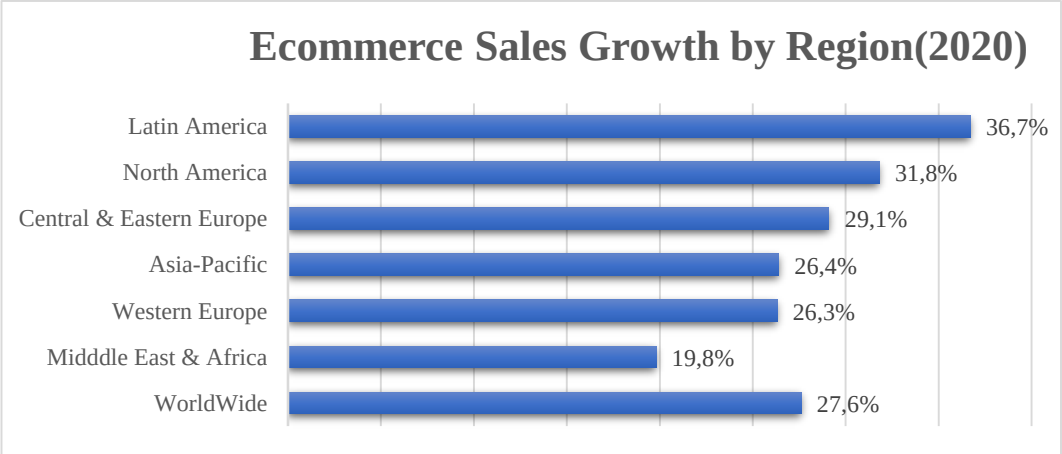


**Figure 1.2. E-commerce Sales Growth by Region (2020)**

Source: Oberlo, 2020

Among its multitudinous capabilities, e-commerce facilitates international trade through selling, buying, finding, and collaborating with business partners around the globe (Turban et al., 2017). The internet provides a backup avenue to traditional retailing where storefronts are established through web pages. This provides the opportunity for better business connections between the seller and the buyer without coming together nearby (Terzi, 2011a). E-commerce has been indispensable and helps shape the way shoppers shop nowadays as well as helps boost cross-border trade.

With the aid of e-commerce, the processes and procedures involved during business transactions are made much simpler, easier, flexible, and cost-effective. Internet usage and e-commerce applications will most likely facilitate trade and lift trade barriers in the same way as other trade policies would. There is a high cost in transportation and costs involved in establishing and selling in foreign markets. These costs can be exorbitant to the extent that they can substantially discourage cross-border trade. Hence they are a barrier to trade (Terzi, 2011a). According to Loff (2010), the cost involved in engaging in foreign trade went down by 15% between the years 1996 and 2014 through e-commerce.

Implementation of e-commerce coupled with the usage of other ICT tools enable companies to easily reach production input markets for relatively lower prices of inputs. Online transactions lower costs incurred in collecting data about the quality and other characteristics of production inputs. Besides minimizing the cost of communication, e-commerce ensures flexibility in transacting business (Babenko et al., 2019). E-commerce provides buyers with a wide range of choices at a relatively lower cost. For instance, prices of CDs and books on the internet were found to be relatively cheaper as compared to prices offered by traditional retailers.

E-commerce advancements improve productivity. With digitalization, demand for labour falls whether in preparing orders, transporting goods from one place to another, and most importantly streamlining production activities. An analysis conducted among nine OECD countries suggests that information and communications technology's contribution to economic growth was between 0.2% and 0.5% annually over the past two decades.

E-commerce brings about alternative ways consumers make purchases and ways in which they wish to receive their purchases. Almost all retail growth comes as a result of e-commerce. Activities in the e-commerce sector have seen remarkable growth. However, the full potential of the European e-commerce market has not yet been fully utilized. Today out of 65% of European online shoppers, only 16% of SMEs make sales online. It is also stipulated that less than half of those SMEs that sell online make sales across borders (7.5%). Hence the fact that online firms in Europe still face difficulties and obstacles trying to sell abroad today cannot be taken lightly. In figure 1.3, companies were told to measure the level of difficulty in conducting e-commerce across national borders in Europe. 32% of the firms that took part in the questionnaire believe that it is difficult to sell across national borders whiles 17% strongly believe that it is very difficult to sell abroad in Europe. Very few (6%) of the respondents indicated that it is easy engaging in cross-border trade through e-commerce in Europe.

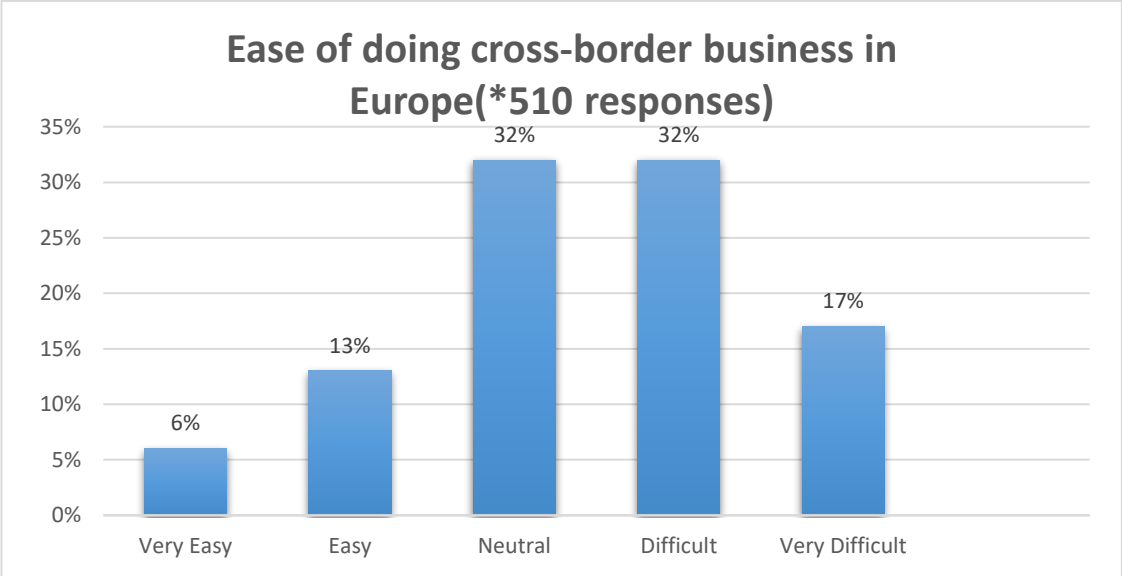


**Figure 1.3. Ease of Doing Cross-Border Business in Europe**
(E-commerce Europe Report, 2016)

Businesses in Europe cited a plethora of reasons hindering cross-border e-commerce sales such as legal fragmentation, over-expensive taxes, logistics issues, overly restrictive regulations, and the like. This is evident from the responses received by (e-commerce Europe, 2016) concerning the obstacles facing merchants involved in cross-border e-commerce. Figure 1.4 below shows 148 responses received by e-commerce Europe on the reasons making it difficult for businesses to trade across national borders

through e-commerce. Out of 148 responses, 69 responses that represent the majority agree that over-restrictive regulations form a major part of the reasons why businesses are failing to embark on cross-border e-commerce. 29 responses are of the view that it is not a strategic priority to engage in cross-border e-commerce. However, 7 responses believe that foreign markets are too competitive to venture in. Meanwhiles 42 other responses also cited other reasons why it is difficult to sell across borders through e-commerce in Europe.

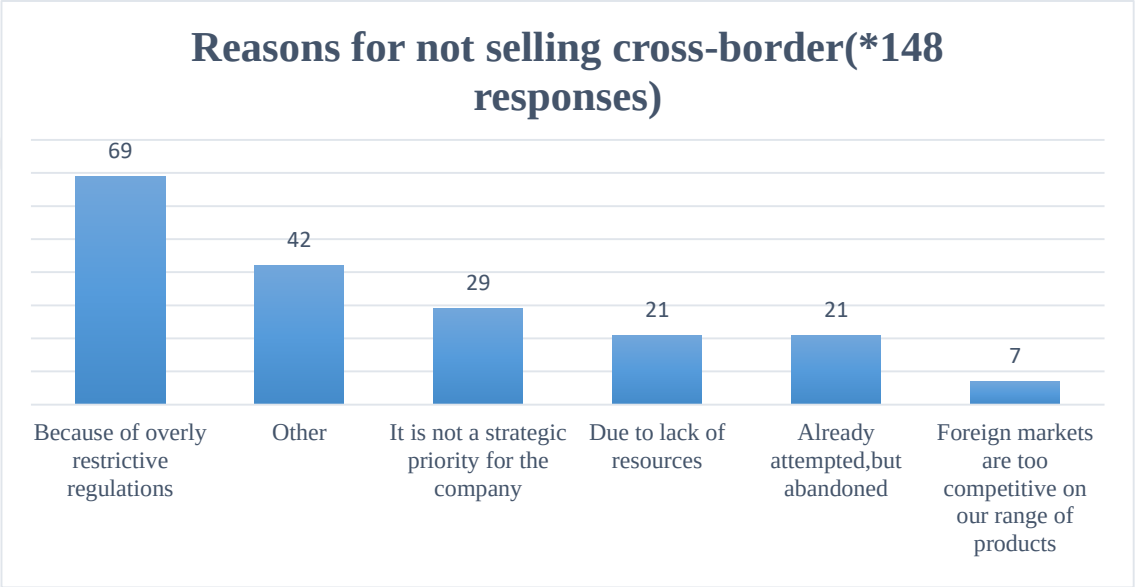


**Figure 1.4. Reasons for Not Selling Cross-Border**
(E-commerce Europe Report, 2016)

Figure 1.5 below shows the percentage of total sales across borders through e-commerce. The figure shows e-commerce turnover by 358 respondents from European countries. 28% of companies that represent a big chunk of companies selling abroad saw less than 5% of their yearly sales abroad as compared to only 11% of the companies that recorded more than 50% of their annual e-commerce sales abroad.

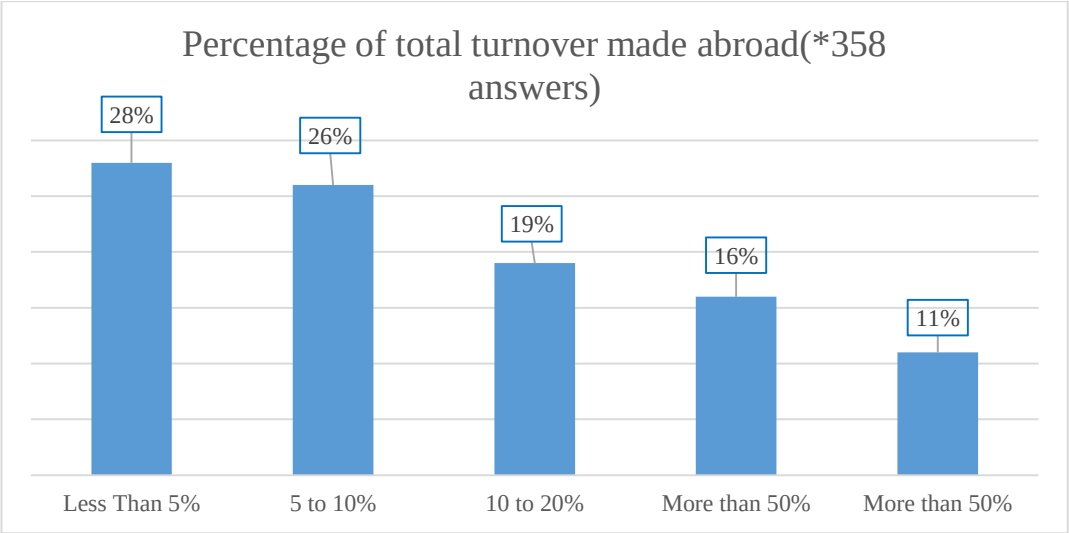


**Figure 1.5. Percentage of Cross-Border E-Commerce Turnover**

(E-commerce Europe Report, 2016)

The fact that many researchers confuse trade liberalization with trade openness is worth mentioning. Most researchers fail to provide a clear-cut definition of these concepts. Though closely related, the two concepts are not the same. Trade liberalization involves deliberate policy implementations to stimulate trade whiles increased openness to trade comes as a result of an increase in total output due to higher outputs produced by traded sectors (Pigka-Balanika, 2013)

### 1.2. Problem Statement

This study explores and compares the level of impact of e-commerce on trade openness among developed and emerging European countries. Undeniably, empirical works concerning the impact of e-commerce on trade openness are hard to come by (Lopez Gonzalez & Frencz, 2018). Hence this paper empirically determines the impact of e-commerce on trade openness in Europe.

Very few scholars have shown interest through their works and have explored empirically the influence of e-commerce on trade openness. Furthermore, due to a lack of techniques for measuring e-commerce activities or probably due to a lack of data on e-commerce, many of these scholars resort to proxies that are deemed not the best fit for measuring e-commerce. For example, Campbell and Holland (2007) measure e-

commerce as the total sum of the index through the availability of fixed telephone subscriptions, mobile internet users, and household computers in a given country within a given time frame. Xing (2018) measures e-commerce variables by rating the level of B2B and B2C use from 1 to 7 according to their readiness indices. Wulansari and Parwanto (2020) measure e-commerce as fixed broadband subscriptions, fixed telephone subscriptions, secure internet servers, and mobile cellular subscriptions. Americo and Veronico (2018) defined e-commerce as household internet accessibility and purchases made by individuals online.

Meanwhiles in this study, E-commerce which is our main focus is measured as the percentage of enterprises with e-commerce sales of at least 1% turnover. This paper also investigates and provides a deep examination of the impact of e-commerce on trade openness. This thesis attempts to add up to the literature by exploring how e-commerce impacts the openness of trade in the case of developed and emerging European economies. Hence an answer to the research question; what is the level of influence of e-commerce on trade openness among developed European economies and that of emerging European economies?

### 1.3. Contribution to the Literature

This work contributes to the literature in two-fold. To begin with, it expands the research framework and throws more light on the level of influence of e-commerce on the openness of trade at different country levels. This work focuses on the two scenarios of developed and emerging European countries. Secondly, the study uses for the first time an e-commerce measurement that has not been used in the literature. As a novel approach, e-commerce is measured as enterprises with at least 1% e-commerce turnover.

This research work provides important insights to policymakers, business managers, and governments in general on the need to invest in e-commerce through digitalization to increase profitability and ensure a general increase in economic output.

### 1.4. The Structural Arrangement of the Thesis

The structural arrangement of the thesis falls into 5 chapters. Chapter 2 covers the literature reviews. The research methodology is explained in chapter 3. In Chapter 4, the empirical analysis is carried out and the outcome is explained. Chapter 5 finally concludes and also talks about some implications and possible recommendations.

# CHAPTER II

# LITERATURE REVIEW

Explosive usage of the internet over the years has seen a remarkable change in the mode in which trade is conducted through e-commerce. This triggers many researchers to shift their attention more to the potential of e-commerce. Many factors explicate why countries are open to each other through trade. According to the literature, there is a wide range of variables that stimulate cross-border trade among countries. However, this section covers relevant as well as brief literature on the impact of e-commerce on trade openness.

## 2.1. Trade Openness versus GDP

GDP is an economic indicator that measures the productivity level of a country. In accordance with the theory, higher growth in productivity may result in output surpluses for export abroad. Therefore, higher growth in GDP increases trade openness among countries. Furthermore, higher exports by a country lead to a substantial increase in economic growth. The figure below shows the ratio of world merchandise to world GDP growth. As evident from the figure below, there exists a positive correlation between trade growth and GDP growth over the years. However, in 2009 and 2020 the world saw a -8.48 and -3.88 ratio of trade growth to GDP growth, respectively. This may be due to the world economic crisis that manifested itself in these years.

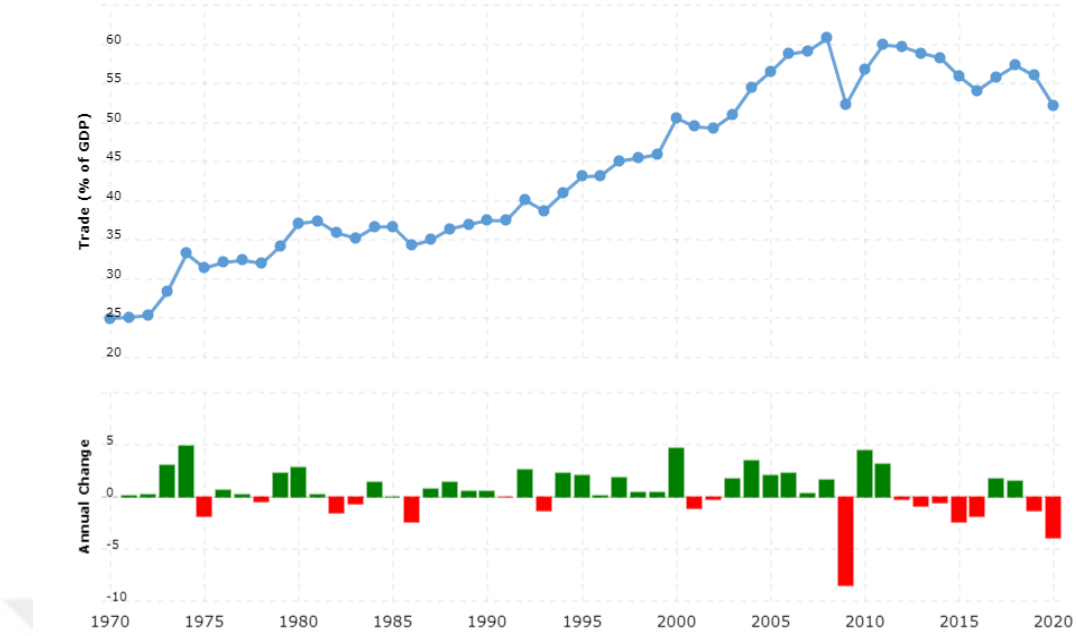


**Figure 2.1. The Ratio of World Merchandise to World GDP Growth (1970-2020)**

Source: World Bank, 2022

There have been mixed and inconclusive results in the theoretical literature concerning the relationship between gross domestic product and openness of trade. Nannicini and Billmeier (2011) explore how trade openness stimulates economic growth taking into consideration transition countries. Their research work seeks to provide an answer to the question; does openness to trade facilitates growth in transition economies that are open than that in transition economies that are closed? By employing a synthetic control method, it was evident that trade liberalization policies put in place by open economies have a positive influence on their economic output. Hence, transition economies when closed restrict economic growth. Consistent with Nannicini and Billmeier (2011), Al-Shayeb and Hatemi (2016)) in their research work, employ the asymmetric impulse response functions and asymmetric causality tests. Estimation results show that when trade openness experiences a positive shock, openness to trade has a positive impact on economic performance. Their findings also show that a negative shock on trade openness has no significant effect on the economic meltdown. Again, openness to trade is not affected during economic booms and recessions.

In the quest to reaffirm whether Trade openness has any link with growth, Sarkar (2008) conducts a panel data analysis on the effects of openness of trade and economic output from 1961 to 2002 in 51 less developed countries as well as a times series

analysis of individual country experiences. Like other studies, the findings from the analysis show that trade-centered countries have higher growth in total economic output. Furthermore, no positive long-term correlation between trade openness and growth in the 1961–2002-time frame was recorded for the majority of countries in the sample where East Asian countries dominated. Conversely, middle-income countries show a positive long-term relationship. In another empirical research, Rose Malefane and Odhiambo(2018) explore the influence of trade openness on economic output in South Africa. The study employs (ARDL) to investigate the dynamic effects of openness of trade on economic growth. To decipher their work from other works, they implement four different measurement methods for the openness of trade. Among the methods of trade openness measurement are; the summation of imports and exports divided by GDP, trade openness as imports divided by GDP, and Trade openness measured as exports divided by GDP. The latter takes into consideration the country's size and geography as an index for trade openness. Different outcomes were recorded for the proxies. Except for the first proxy, all other measurement approaches prove a negative influence of openness of trade on national output. However, in the short run, findings also show that the first three measurement approaches that are used to measure trade openness have a positive influence on GDP. Another similar research in the case of Pakistan was also conducted by Ali and Abdullah (2015a) spanning from 1980 to 2010. The study employs VECM, and Johnson multivariate estimation techniques and the results confirm that in the short run there exists a positive relationship between the openness of trade whiles a negative correlation was recorded in the long run in Pakistan.

Pilinkienė (2016) tests the effect of trade openness on GDP and competitiveness taking into consideration central and eastern European countries. The research work employs a panel data analysis for 11 Central and Eastern European countries with a research scope spanning from 2000 to 2014. In order to achieve the right results and estimates, the granger causality test and vector autoregression modelling techniques were administered. Test results prove that trade openness stimulates growth and competitiveness and also results in the growth of the economy in central and eastern European countries. Cephas and Saleem (2012) also tackle the same question by taking into consideration African countries. The study takes into consideration 38 African countries from the years 1980 to 2008. Using various panel models such as fixed and

random effect models. In the end, the outcome confirms that openness of trade accelerates economic efficiency and output. In the case of Nigeria, Muibi Olufemi (2011) finds a positive impact of trade openness on economic growth.

### 2.2. Trade Openness versus E-commerce

Despite being a new concept, e-commerce has gained remarkable attention in recent times, especially during the covid-19 pandemic. The potential of e-commerce has been the focus of many stakeholders and researchers. It has been stipulated that e-commerce will not only greatly increase output but reduce operational costs and increase the efficiency of economic operations as well as change our lifestyles. Hoq (2005) analyses the influence of e-commerce in reducing the overall cost involved in a trade. His paper also examines other factors that ensure successful e-commerce and how this helps boost the economy as a whole. In this section, various literature with respect to e-commerce and trade openness is highlighted.

Terzi (2011) theoretically analyses and investigates the influence of online trade on employment and cross-border trade. It was stipulated that e-commerce provides economy-wide advantages to both developing and developed economies. However, the benefits in the short period are saturated in more advanced countries as compared to developing countries which will have greater benefits in the long period. It was estimated that there will be a remarkable increase in foreign trade volumes through electronic commerce. Furthermore, it is likely that electronic commerce will create and destroy jobs at the same time. Campbell and Holland (2007) using panel data analysis investigate the degree of impact of electronic commerce on the extent to which electronic commerce affects trade openness among African countries. The study covers the period from 1990 to 2013. Among other several variables, E-commerce which represents the focus independent variable is measured as the summation of the total e-commerce index available in the countries under consideration. The study implements the fixed effects model analysis with other estimating techniques such as OLS and GMM. Results prove that e-commerce has a positive correlation with Trade openness in Africa.

Xing (2018) analyzes whether the internet and e-commerce applications influence the export efficacy of developing and least developed countries. The study takes into consideration twenty-one (21) developing countries and twenty-one least developed countries and thirty(30) other OECD countries. The study uses panel data analysis. The E-commerce variable which represents one of the main explanatory variables was measured by rating the extent of B2B and B2C use from 1 to 7 according to their readiness indices. The empirical outcome shows that ICT and e-commerce applications promote export from developing and least developed countries to developed countries. Lopez Gonzalez and Frencz (2018) in their article extensively explained the changes that have been brought to cross-border trade as a result of digitalization. Estimates on how an increase in digital connectivity influence trade is emphasized. Wang et al. (2017) evaluate the impact e-commerce across national borders has on China's trade openness. The study stretches from 2011 to 2015. With the exception of Macao, Taiwan, and Hong Kong, the study takes into account all other provinces in the People's Republic of China. The core variable which is e-commerce is measured as the volume of trade of e-commerce per capita. Panel data analysis was incorporated into the data analysis. The main outcome shows that cross-border e-commerce promotes international trade through the reduction of the cost involved in engaging in trade across national borders.

He and Wang (2019) in their studies, evaluate ASEAN countries with respect to determinants that influence cross-border e-commerce activities. The studies use a panel data analysis spanning from 1998 to 2016. Vector error correction model and dynamic ordinary least squares are also incorporated in the data analysis. Among the various variables used in this analysis were real exchange rate, population, terms of trade, GDP, and cross-border e-commerce trade. E-commerce cross-border trade is further divided into two segments. Export related cross-border e-commerce and import related cross-border e-commerce. This approach identifies the effect of selected regressors on e-commerce trade over national borders. The study applies ECM and DOLS estimation techniques in order to find the long-run equilibrium among the dependent and the independent variables. In the end, the outcome of the analysis shows a positive impact between GDP, terms of trade, and Population.

Moodley and Morris (2004) evaluate whether e-commerce(B2B) promotes trade among garment export manufacturers in South Africa. Results show a negative relationship between transaction cost as well as creating new global market opportunities. High profiled and senior managers of 28 garment exporting companies were selected and interviewed based on e-commerce's impact on foreign trade in the garment sector. Of the firms interviewed, 40.4% of export turnover was recorded. 82.1% of the companies were owned by South African nationals whiles a vast majority of the remaining were owned by Asians and only one firm was owned by a Mauritanian national. An open-ended, exploratory approach was implemented during the survey. 42.9% of firms were without websites. Results show that having e-commerce applications does not mean a company is capable of fulfilling each stage of foreign trade transactions over the internet. However, e-commerce prepares these companies for transactions. Elbeltagi (2007) researched how internet usage is influenced by different cultures. Secondary data is analyzed in this exploratory study. The studies conclude that though e-commerce has an impact in targeting foreign customers to trade globally it will depend on the cultural trait of the people. The habit of paying cash instead of using debit or credit cards in Egypt and the rest of the Arabian countries will hinder the expansion of buying and selling online.

Panova et al. (2019) study what factors characterize locations conducive for e-commerce enterprise development and which locations are conducive for omni channel shoppers' activities in China. The study differentiates between the most effective regions or provinces thriving well in e-commerce and others that are not thriving well using the general choice algorithm (GCA) approach. Again, the study uses other two cases to back the results. From the international level, among the prominent factors that promote e-commerce growth are a stable political atmosphere, natural resources, employment rate, exchange rate, rate of inflation, taxes on imports, and tax rates. While the local level is characterised by income levels, tariffs on transport, labour output, and business climate. Analysis was focused on 31 provinces in China in order to ditch out which locations proved conducive for omni channel shoppers' development. Results show that Guangdong, Hubei, Jiangsu, Henan, Zhejiang, Beijing, Fujian, Shandong, Shanghai, and Sichuan, constitute the most conducive locations. Provinces with high internet penetration, good infrastructural

logistics, advanced parcel delivery systems, and areas where retail trade proved delicate were the most performing provinces.

Zhao (2020) uses the trade gravity model to explore the factors impacting cross-border e-commerce volume between inland countries and China. Similar to the traditional form of trade, the findings of this research show that per capita income, groups of consumers, and other extra factors influence the scale of cross-border e-commerce substantially. It was also depicted that geographical distance greatly hinders the size of cross-border e-commerce transactions. Capineri and Leinbach (2004) analyze and throw more light on the link between transportation, globalization, trade, and e-commerce. Transport lift to a certain degree barriers to foreign trade, enhance new technologies, and promote global marketing of technologies. E-commerce widens the market from local to province and international. Savrul et al. (2014) evaluated SMEs' participation in the global business environment and the challenges associated with that and how e-commerce can be used to offset those challenges. Case studies prove that SMEs' electronic commerce implementation ensures value-added, more innovative ways of rendering services and creating new business models. Through e-commerce, electronic partnerships with large firms abroad are also made possible. Kinda (2019) evaluates the importance of e-commerce applications in building the Asian economy. Data was collected through a survey of individual country enterprises. Results show that e-commerce facilitates productivity in firms engaged in e-commerce and most of their revenue is generated from e-commerce cross-border sales as compared to firms not engaged in e-commerce. Firms engaged in e-commerce in Asia increased their total factor productivity by 30% and a 40% increase in export more than firms not involved in e-commerce.

Liu et al. (2019) analyze the impact of e-commerce in enhancing trade in turtles as well as facilitating the production of breeding houses for these animals. Turtle sales on China's C2C online trading platform are examined to determine the impact of e-commerce on turtle sales in China. Results show that e-commerce promotes the buying and selling of invasive turtle species in China. Nguyen and Willemsen (2016) assess online trade-in threatened wildlife over the internet. Online channels were monitored for half an hour a day over a 23-day period from Monday to Friday in June 2016. E-commerce sites were selected based on their level of online sales. In the monitoring,

180 advertisements were posted on 10 different wildlife products. Burinskienė (2011) explores e-commerce as a driving force in international trade. Obstacles with regard to e-commerce implementation in international trade are looked into. A model formulated is used to examine the efficiency of e-commerce applications in foreign trade. Research analysis demonstrates that firms with e-commerce applications have 2.25 times sales per employee. Firms with e-commerce applications recorded sales more than their traditional counterparts. Furthermore, e-commerce application reduces the cost of reaching international markets therefore a substantial increase in international trade.

### 2.3. Trade Openness versus Tariff

Tariffs are charges imposed by a country's government on imports of goods and services entering their national borders. Tariffs are sometimes levied in order to safeguard infant industries from giant industries in other countries. In an attempt to develop the woollen cloth industry in England in the 13th century, Henry VII embarked on trade policies such as increasing tax on the exportation of raw wool from England. Taxes imposed on imported goods and services serve as a source of revenue for governments to carry out developmental projects. However higher tariffs increase the prices of imported goods thereby triggering the increase of domestically produced goods by domestic producers. Figure 2.2 illustrates world trade in the presence of tariffs. When a government decides to cause an increase in the rate of tariffs, import volumes decrease as a result of an increase in prices. As evident in figure 2.2, an increase in prices (P* to P') triggers more production by domestic producers since prices have increased. Hence a rightward shift of Qd. This in return moves Qw leftward. This in general causes a reduction in imports, higher domestic production levels, and increased consumer prices.

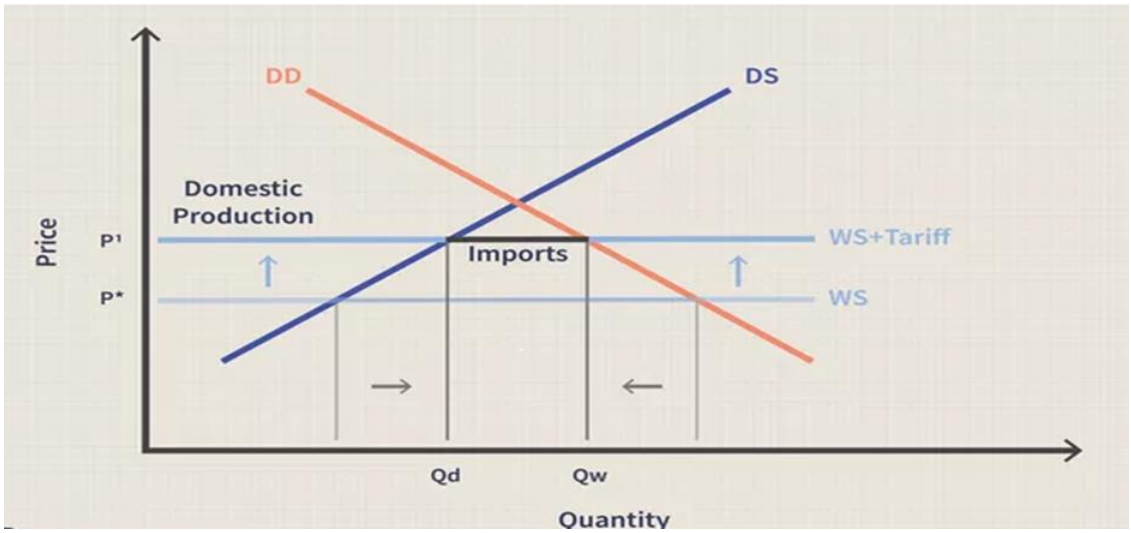


**Figure 2.2. World Trade in the Presence of Tariff Rates.**

Source: Investopedia (2022)

In figure 2.3, DS represents domestic supply and DD represents domestic demand. The domestic price is found at $P^1$, and the foreign price is located at $P^*$. At $P^*$. domestic consumers rationally will consume Qw goods. Because there are excess demand domestic consumers will import (Qw-Qd) the excess from other countries. Hence an increase in the volume of imports in the absence of tariff rates.

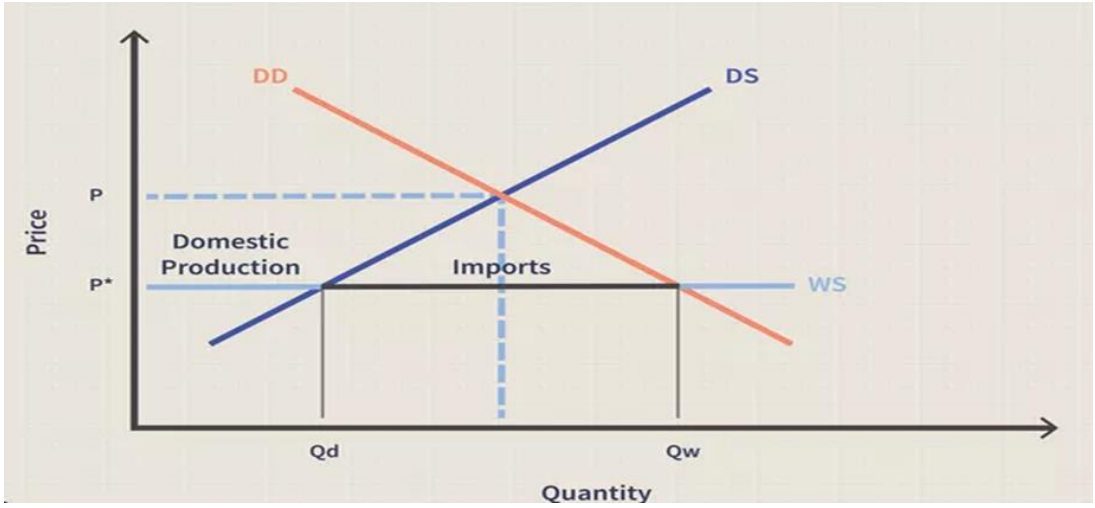


**Figure 2.3. World Trade in the Absence of Tariff Rates.**

Source: Investopedia (2022)

Since the 18th-century tariffs have been the oldest trade policy instrument. Debaere and Mostashari (2005) argue that the reduction in tariffs brings about an increase in the trade of new goods and tariff preference also decreases trade between the excluded

party. By applying a probit estimation technique, however, their results also show that the country and industry play a major role in deciding whether countries will trade in new goods and also stop trading with other countries.

### 2.4. Trade Openness versus Foreign Direct Investment

Foreign direct investment has been the focus of many researchers and economic analysts for so many reasons. Amongst the reasons is the extent to which foreign direct flows are growing. Globally, it was estimated that foreign direct investments went up from $47billion in 1895 to $139 billion in 1988. Yet another reason is that foreign direct investment provides an avenue as well as facilitates the transfer of goods and services across national borders. Therefore, there is a myriad of studies that examines and analyses the impact of such kinds of investments.

Liargovas and Skandalis (2012) use 36 developing countries from 1990 to 2008 to examine how trade openness can help fast-track foreign direct investment. The study tests the causality among the variables. At the end of the empirical analysis, results prove that trade openness exerts a positive impact on the inflow of FDI among emerging countries. Omojolaibi (2009) employs Toda-Yamamoto non-causality and ARDL cointegration econometric analysis to examine the causality and long-run correlation between foreign direct investment, trade openness, and economic growth in Nigeria. The study proves a long-run relationship among the variables. Among the variables inculcated in the study are Output, Capital, foreign direct investment, labour, and openness of trade. A unidirectional causality runs from foreign trade to output. Again, the analysis proves a unidirectional causality running through. In overall, there exists a positive relationship between foreign direct investment and openness to trade. Hence the growth in economic output in Nigeria. Constant (2010) also analyzes and examines the relationship between trade openness and foreign direct investment and the general impact on economic growth in Cote D'Ivoire. The study takes into consideration the years from 1980 to 2007. The study applies the bound test for cointegration, and block Exogeneity Wald test. The study shows that there exists a long-run correlation among the variables such as trade openness, FDI, and economic growth. Results also testify, that trade openness and FDI has a great impact on growth in national output in Cote D'Ivoire. Sakyi et al. (2015) conduct similar research in the

case of Ghana taking into consideration the years 1970 and 2011. Their results also show that FDI through the openness of trade greatly impacts economic output. Seyoum et al. (2014) apply panel data analysis. The study takes into consideration 25 African countries in the sub-Saharan region. The analysis span from the years 1977 to 2009. The study determines the causality link between foreign direct investment and trade openness in the region. Results show a causal link that is bidirectional between foreign trade and trade openness in the sub-Saharan region. Klasra (2011) also takes into consideration the case of Turkey and Pakistan. By applying the ARDL cointegration approach, findings show that in the long run trade openness has a positive impact on economic output in Pakistan. However, empirical findings show that exports boost economic output in the case of Turkey. Baharom et al.(2008) test the interrelationship between FDI, trade openness, and economic growth in Malaysia. The study covers the years 1975 to 2005. By applying the bound test, results show that FDI has a positive impact on economic growth in the short run. Whiles in the long run FDI has a negative impact on economic output.

Khamphengvong et al. (2017) reaccess the link between foreign direct investment, trade openness, and economic output in the Lao PDR economy. Their research scope takes into consideration the years from 1990 to 2015. By applying econometric techniques such as the ARDL cointegration test as well as the VECM test, results reveal a positive impact on foreign direct investment and trade openness, and economic output. uz Zaman et al. (2018) provide a new analysis of the relationship between trade openness and foreign direct investment for some selected Asian countries such as Pakistan, Iran, and India. Fixed effect model, and pooled OLS models under Panel data analysis techniques were used in exploring the relationship between trade openness and foreign direct investment among these Asian countries. Their research scope covers the years 1982 to 2012. Their results notwithstanding prove that higher trade openness positively and significantly impact inflows of foreign trade investment.

Tshifhiwa Victor (2011) test the effect of openness of trade on foreign direct investment in fifteen (15) emerging market economies from 1992 to 2006. Panel data analysis results show that indeed openness of trade can strongly increase foreign direct investments in emerging economies.

## 2.5. Trade Openness versus Exchange Rate

The exchange rate and its risks to the volume of international trade have received considerable attention over the years. Many are of the view that higher exchange rate volatility leads to a fall in foreign trade volumes. According to Dell'ariccia (1999), in situations where exchange rate volatility is not well anticipated, an increase in the exchange rate means higher risks therefore risk-averse investors tend to shift their resources toward the domestic market.

There has been a continuous debate as to which exchange rate regime positively impacts foreign trade volumes and which exchange rate regime negatively impacts foreign trade volumes. Klein and Shambaugh (2004) in their paper try to resolve the dispute. Their results significantly declare large support for fixed exchange rate regimes on bilateral trade flows between a base country and another country that pegs it.

Proponents of a fixed exchange rate regime argue that a flexible exchange rate has the propensity to reduce imports and exports because it is characterized by unforeseen and higher exchange rate volatilities hence reluctance on the part of traders to trade. At the same time, proponents of flexible exchange rates also argue that flexible exchange rate regimes can increase trade openness to an extent greater than fixed exchange rates. Proponents of a flexible exchange rate regime insist that speculation in the exchange rate market is so destabilizing and therefore not profitable hence exchange rates will move in response to the changes in the fundamental determinants of foreign trade. Again, proponents of flexible exchange rates argue that governments in an attempt to stabilize the exchange rate resort to other trade barrier policies which do not reflect the income of the people and other fundamental trade determinants. In spite of the efforts by economists to find answers to this paradox, the impact of exchange rate uncertainties on bilateral trade remains unanswered. Ozturk (2006) provides an extensive survey of the literature on exchange rate uncertainty and trade. Other academic works since 1978 were examined and compared. Due to the difference in the sample period, the different model specifications used, countries, and the various method used in measuring the exchange rate volatility have made the comparison of

other studies not concise and difficult. Clearly, both theoretical and empirical findings regarding the issue have been mixed.

Brada and Mendez (1988) empirically investigate the issue to find out which exchange rate regime increases trade volume flexible exchange rate regime or the fixed exchange rate regime. In order to determine the bilateral trade flows between two countries, the gravity model is incorporated into the studies. Results of the empirical analysis show that a flexible exchange rate has the tendency to increase trade volume more than a fixed exchange rate regime. Results also show that exchange rate volatility reduces trade volume but the reduction in trade volume is not too severe as commercial trade barriers by governments of fixed exchange rate countries will reduce trade volumes.
Dell'ariccia (1999) through the use of the gravity model and panel data analysis explores the effect of exchange rate volatility on bilateral trade flows among some selected western European countries. In the end, results show that there exists a negative link between foreign trade and higher bilateral volatility in exchange rates Erdal et al. (2012) examine the impact of real effective exchange rate volatility on both agricultural exports and imports in Turkey. The study considers the years 1995 to 2007. To test the long-term relationship between the various variables, the Johansen cointegration test is applied. The studies also apply the Generalized Autoregressive Conditional Heteroscedasticity model (GARCH) (1,1). The outcome of the empirical analysis shows a positive long-term relationship between real effective exchange rate volatility and Agricultural export variables. In the case of agricultural import variables and real effective exchange rates, a negative long-term relationship is recorded. A unidirectional relationship between agricultural import and export was tested. Fogarasi (2011) also takes Hungary into consideration, The study empirically dives into the impact of exchange rate uncertainties on Hungarian agricultural exports between the years 1999 and 2008. The gravity model employed shows that nominal exchange rate volatility has a positive and significant impact on agricultural exports in Hungary. This finding suggests that dealers in Agricultural export products in Hungary are less reluctant to join the EU bloc.

Campa (1991) examines the degree of elasticity of the export supply of a country to exchange rate dynamics. Furthermore, the paper also seeks to quantitatively measure the importance of exchange rates through the changes in the number of exporters. The

paper shows that sunk cost hysteresis in entry and exit plays a major role in determining export market participation but not exchange rate volatility risks. There is a higher sunk cost in participating in a market than pulling out from the market. Findings from the studies also show that the magnitude of the effect of exchange rate depreciation on trade volumes is less. Hence a 10% decrease in the value of a home currency causes just a 1.5% increase in export volumes due to the increase in the number of exporters.

Cushman (1983) provides an extension to the empirical analysis of the impact of exchange rate volatility risk on trade volume by following Hooper al.(1976) framework. The empirical analysis covers the United States and other five industrialized countries that have a bilateral trade flow with the United States. Findings show that in cases of long-run expectation the rise of real exchange causes a rise in trade. Whiles cases of increased exchange rate uncertainty will cause a fall in trade volume. Abrams (1980) analyzes the level of impact of bilateral exchange rates on bilateral trade flows and also investigates the macroeconomic trade volumes among developed countries. Empirical findings provide evidence of a decrease in trade volume due to exchange rate uncertainty. The findings also show that countries with similar features tend to have more bilateral trade flows. Adam et al. (2007) apply a new version of a gravity model to examine the exchange rate regime's effect on bilateral trade flows. Findings show that participation in a common currency trade union fast-tracks trade. Furthermore, exchange rate regimes characterized by low exchange rate uncertainties and cost in transactions also have a significant impact on international trade.

Arize et al. (2008) examine the influence of exchange rate risks on export flows taking into consideration 8 Latin American countries using quarterly data from 1973 to 2004. Various econometric techniques such as error correction, and cointegration applied during the data analysis also support the large literature that exchange rate uncertainty suppresses export demand among these eight Latin American countries. Arize et al. (2000) again conducts similar research on thirteen less developed countries (LDCs) using quarterly data from 1973 to 1996. Johansen multivariate is applied in order to find the cointegrating relation among variables whiles the error correction model is estimated to find the short-run dynamics. In the end, results also prove a negative

impact of exchange rate volatility on export demand in the economies of the thirteen less developed countries (LDCs). In yet another paper, Arize (1997) applies the error correction and cointegration models of foreign trade and examines exchange rate risk in the G-7 countries. Empirical analysis shows a negative short-run and long-run impact of exchange rate on export depending on each of the G-7 countries.

Kearns and Patel (2016) argue that apart from exchange rate volatility affecting trade channels, financial channels also play a role in offsetting bilateral trade flows. Their argument further goes to prove that in terms of currency depreciation, banks and non-banks that have foreign currency liabilities have a valuation effect which means tightening in domestic financial conditions. Therefore, financial channels have a minute impact on trade channels in the case of emerging economies. Whiles in the case of developed countries the magnitude is higher. Onafowora (2003) cross-examines the impact of exchange rate volatility on three Asian countries including Malaysia, Indonesia, and Thailand in their bilateral trade with the USA and Japan. The studies apply Vector error correction model estimation as well as cointegration analysis. Results show a short-run curve effect. This means when exchange rates depreciate, trade balance deterioration occurs which lasts for four quarters but improves and normalizes during the long run. Using a meta-regression analysis, Ćorić and Pugh (2010) further explore the link between exchange rate instability and foreign trade. The meta-regression analysis is applied to help explain the mixed outcomes in the literature. The MRA confirms that the effect of exchange rate volatility on foreign trade is highly conditional. The MRA identified factors in relation to why other works recorded a significantly positive effect of exchange rate instability on trade whiles other works recorded a significantly negative effect of exchange rate instability on international trade volume. MRA tests little proof of publication bias. Moreover, MRA results throw support for the positive effects as a more robust and authentic effect of exchange rate volatility on trade volume.

Nicita (2013) re-accesses the effects of exchange rate misalignment on foreign trade volumes and trade policy. The studies make use of a fixed effect panel data model analysis comprising 100 countries from 2000 to 2009. Results from the panel data analysis show that exchange rate uncertainties in the short run have no effect on trade volume. Hence exchange rate volatility substantially affects international trade flows.

Again, results show that currency undervaluation is found to stimulate exports and suppress imports. In the context of the global financial crisis and the growth of global and regional value chains, Kang et al. (2018) examine the link between cross-border trade and exchange rate misalignments. The study covers 72 economies spanning from 2001 to 2015. By applying the gravity model estimation, results show that in the pre-global financial crisis export volume has a positive correlation with exchange rate levels.

Choudhry et al. (2015) investigate how real exchange rate volatility has contributed to UK's real imports from South Africa, Brazil, and China. These countries represent the three major developing economies with which the UK trades. The paper uses monthly data from January 1991 to December 2011. By running an ARDL regression analysis, the result implies that exchange rate misalignments stimulate trade. Results also show the effect of the 2008-2009 financial crisis on UK imports. Furthermore, there exists a significant causal link between exchange rate misalignments and UK imports. In another work, Kim (2017) examines USD/KRW exchange rate misalignments in seaborne imports in Korea. After the ARDL analysis, results show that there is a negative impact between Korea's seaborne import and USD/KRW exchange rate misalignments. Furthermore, in order to find the causality, the VECM analysis is applied, and the results show a short-term unidirectional causality of USD/KRW exchange rate misalignments on imports and real income.

Using the nonlinear auto-regressive distributed lag model (NARDL), Augustine et al. (2017) inspect the effect of a real effective exchange rate on the trade balance. The studies use a sample of eight countries. NARDL approach used in the paper as compared to other approaches used in other papers provides more reliable short-run and long-run coefficient estimates. In an asymmetric model, results show that depreciation when separated from appreciation significantly improves the balance of trade. On a commodity level, Sharma et al. (2018) explore exchange rate uncertainties between India and its main trading partners such as Japan, Germany, the US, and China. The studies use autoregressive condition heteroscedasticity-based models to estimate the exchange rate volatility of the normal exchange rate. Pooled mean group estimates were used in order to find the short and long-run relationships. Results show

that exchange rate volatilities have a dampening significant impact on İndia's export flows to the US, Germany, and China together with imports from US and China. Whiles mixed results were recorded for İndia's imports and exports in the short run.

# CHAPTER III

# RESEARCH METHODOLOGY

This chapter explains the scope of this study. The procedure used in collecting the data is explained. In addition, this chapter covers and explains the variables and descriptive statistics of the data. Finally, data analysis and regression model are specified.

## 3.1. Research Scope

The scope of this research study makes use of a quarterly data set ranging from the year 2009q1 to 2020q4 after the global financial crisis with respect to 14 European countries. This study examines the level of impact of e-commerce on trade openness among developed and emerging European countries. Furthermore, the studies investigate the impact of e-commerce on trade openness in the case of developed European countries and developing European countries. Our exclusive focus on European countries stems from the availability of data and the fact that European countries are ranked top when it comes to logistics, average revenue per shopper, total market revenue, percentage of the population shopping online, number of online shoppers, percentage of cross-border shoppers, and number of cross-border shoppers.

## 3.2. Methodological Approach and Data Collection

The paper applies a quantitative approach. Secondary data variables at the country level from the world bank database, Eurostat, and United Nations Conference on Trade and Development Database (UNCTAD) are employed. The studies follow three different steps in the data collection process. To begin with, dependent, independent, and control variables are selected. Secondly, we choose the time frame from 2009q1 to 2020q4 in order to observe the trends after the global financial crisis. Thirdly, the countries to be included are determined. Table 3.1 shows according to IMF classification the list of developed European countries and developing European

countries. Lastly, the data set is filtered. After the filtering, variables and sample countries that do not have complete data are omitted.

**Table 3.1. IMF Classification of Developed European Countries and Developing European Countries**

| Developed European Countries | Developing European Countries |
|---|---|
| Netherland | Croatia |
| France | Hungary |
| United Kingdom | North Macedonia |
| Belgium | Poland |
| Italy | The Czech Republic |
| Spain | Turkey |
| Germany | Bulgaria |

In table 3.2 data and its sources are presented. Variables are divided into three different groups. Namely dependent, independent, and control variables. Trade openness constitutes the dependent variable, and E-commerce represents the independent variable whiles gross domestic product, exchange rate, industrial size, tariffs, and foreign direct investment represent the control variables for determining trade openness.

**Table 3.2. Variables and Data Sources**

| Variables | Abbreviation | Frequency | Source | Time Interval |
|---|---|---|---|---|
| **Trade Openness** | TO | Quarterly | UNCTAD | 2009q1-2020q2 |
| **E-commerce** | E-COM | Quarterly | Eurostat | 2009q1-2020q2 |
| **Exchange Rate** | EX | Quarterly | WDI | 2009q1-2020q2 |
| **Gross Domestic Product** | GDP | Quarterly | WDI | 2009q1-2020q2 |
| **Tariffs** | TAFF | Quarterly | WDI | 2009q1-2020q2 |
| **Industrial size** | INDUS | Quarterly | WDI | 2009q1-2020q2 |
| **Foreign Direct Investment** | FDI | Quarterly | WDI | 2009q1-2020q2 |

Data for our analysis are quarterly data collected from the World bank's World Development Indicators Database (WDI), Eurostat, and United Nations Conference on Trade and Development Database (UNCTAD).

### 3.3. Limitations of the Study

This research covers 14 out of 44 European countries. Therefore, the first limitation of this work is the number of countries. The research covers quite a small-time frame from 2009q1 to 2020q2. Future studies can cover a larger time frame in order to depict a more reliable trend and results depicting a more realistic situation.

### 3.4. Variable Definition and Measurements

The main focus of this study is to examine and compare the level of impact of e-commerce on trade openness in the case of developed and emerging European countries. However, apart from our target independent variable, several other control variables are included in the model in order to account for individual country differences and also avoid model misrepresentation due to omitted variables. The choice of variables selected is based on economic theory as well as the availability of data.

### 3.5. Dependent Variable

- **Trade Openness:** Trade openness represents our dependent variable in this study as we seek to find out how it is being influenced due to changes in other variables, especially e-commerce. There has been a significant number of works of literature that cross-examine trade openness's relationship with the level of government consumption, regional development, returns of the stock market, environment, inflation, corruption, and the like. Various methods and approaches have been devised to measure trade openness. The three widely used approaches are M/GDP, X/GDP, and (X+M)/GDP. However, the latter is the most widely used approach in the literature (Squalli & Wilson, 2011). Hence our measurement of trade openness will be based on this approach thus the sum of export and import divided by GDP.

### 3.6. Independent Variable

E-commerce is the key variable selected to enable us to proceed with the objective of fulfilling our research objective.

- **E-commerce:** This variable represents the most important variable among several other variables incorporated in this study. It is measured as the percentage of enterprises with at least 1% e-commerce sales turnover. This is a unique measurement approach since such an e-commerce measurement has not been used in the literature which is evident from the literature review conducted above. However, other works with various approaches to e-commerce measurement have tested the relationship between e-commerce and trade openness. Campbell and Holland (2007), Terzi (2011b), Wulansari and Parwanto (2020), and Xing (2018) have proven that there exists a positive relationship between e-commerce and trade openness in different regions. Moreover, Elbeltagi (2007) asserts that though e-commerce has the potential of targeting foreign consumers it will depend on the cultural traits of the people.

### 3.7. Control Variables

In this study, we employ additional variables that may play a role in influencing trade openness. Below are the 5 control variables employed in this study.

- **Gross Domestic Product:** Gross domestic product as a main economic indicator shows the level of a country's productivity. Higher growth in productivity may result in output surpluses for export abroad. Therefore, higher growth in GDP has the capacity to increase trade openness among countries. Furthermore, higher exports by a country lead to a substantial increase in economic output. There is a mixed as well as inconclusive results in the empirical literature with respect to the relationship between gross domestic product and trade openness. Keho (2017), Pigka-Balanika (2013), Ramzan et al. (2019), and Sikwila et al. (2014) posit a positive relationship between trade openness and GDP. This is in line with the acknowledgments of Adam Smith (1937) and David Ricardo (1973). However, Ali and Abdullah (2015b), test a

negative relationship between trade openness and economic growth. The negative impact may be a result of raw material export instead of value-added exports. GDP is measured as gross domestic product divided by midyear population according to WDI.

- **Exchange Rate:** Aside from being commonplace in macroeconomics, the exchange rate is regarded as the important price in an economy (Broz et al, 2008). This is because it has the tendency to increase or decrease all other prices in an economy. The exchange rate is fundamentally determined by the supply and demand forces of a foreign currency. Exchange rates have a substantial impact on trade openness. Frankel (1993) writes in favour of the fact that the floating exchange rate brings about an era of liberal trade by reducing protectionism. However, there has been an ambiguity in the literature regarding the impact of exchange rates on trade openness. Pigka-Balanika (2013) in her studies emphasizes the major impacts exerted on trade openness by exchange rates. As established in the literature an appreciation of a country`s local currency against other foreign currencies stimulate import and vice versa. Export is promoted and import is hindered through currency undervaluation. Marquez and Schindler (2007) find that a 10% real increase in the value of the renminbi results in an almost 1% decrease in the share of aggregate Chinese exports. Meanwhile, the estimation regarding imports was negligible and also not precise. Nicita (2013) posits that exchange rate misalignment, in a substantial manner has an impact on foreign trade flows.

- **Foreign Direct Investment (FDI):** Foreign direct investment refers to the establishment of a business entity in another country by a corporate entity. Such an investment is done by setting up a new wholly-owned or through the acquisition of a local company or through a joint venture with a local company in the receiving country. FDI has a significant impact on the national output and welfare of the host country. One significant impact worth mentioning is the diffusion of technology. There is a quite voluminous literature on the impact of FDI on trade precisely the export and import of a country. Some argue whether FDI and trade are substitutes or complements. Some have also tested the causal linkage between FDI and trade whether FDI triggers foreign

trade or the other way round. A study conducted by X. Liu et al. (2001) shows that China's flow of inward FDI to a country will increase as China's import from that particular country increases which in return will lead to more export from China to the home country. However, X. Liu et al. (2001) also find a bi-directional causal relationship between FDI and exports in China. Chunlai (1997) also recorded a positive and significant impact of FDI on trade either between provinces or across borders in China. The empirical result of Seyoum et al. (2014) shows that the causal relationship between trade openness and foreign direct investment in sub-Saharan economies is a bidirectional one. As established by the theory FDI has a positive multiplier effect on trade. Calegário et al. (2014) test the impact of FDIs on Brazilian foreign trade volumes in the long run and if the firm's FDI strategy improves the firm's foreign trade activities. The study uses 11 Brazilian industries spanning from the year 1996 to 2009. Various econometric research techniques such as moderated multiple regressions coupled with generalized linear regression models. Findings show that in the short run exports increase due to increased foreign direct investments. Whiles, in the long run, only export-oriented firms benefit from foreign direct investment.

- **Tariffs:** Tariffs are a kind of excise tax that is imposed on goods manufactured in a foreign country at the time of import. Such a tax levied on goods produced outside a country inflates the prices of imported goods hence shifting consumption towards locally produced goods (York, 2018). The benefits of tariffs may be short-term as it is intended to shield local industries. However, it could be harmful to the economy in the long run. Consumption of goods under the imposition of tax implies consumers have less to spend on other goods. Therefore, one industry is patronized to the detriment of the other. This brings about a misallocation of resources and finally slower growth of the economy. In line with the literature, Brandt and Morrow (2017) reveal that amendments to trade policies with respect to input tariff cuts resulted in an increase in the gross export of Chinese domestic content at the industry-province level. Hoekman et al. (2002) also assert that granting least developed countries full duty and quota-free access in the Quad for peak-tariff products

has the tendency to increase their total yearly exports by approximately 11% or around $2,5billion.

- **Industrial Size:** Trade is more likely to be boosted by advancement in industries but to be curtailed by an industry that is unsophisticated or primitive. Such an advancement increases a country's chance of exporting at a profit. Industrial leadership is usually followed by large cross-border trade (Crowson, 1985). Onakoya et al. (2012) investigate the effect of trade openness on the performance of the manufacturing sector in Nigeria through time series data spanning from 1975 to 2010. The study indicates that trade openness positively correlates with the performance of the manufacturing sector in Nigeria. However, there was a negative relationship between the sector's performance with respect to the exchange rate and inflation rate.

### 3.8. Data Analysis

This study employs panel data analysis. It is a more suitable data analysis methodology to use since our data consist of cross-section and time-series data as well. Panel data methodology is more reliable, efficient, and comprehensive since it combines two data sets: a horizontal cross-section sample unit (N) and a corresponding cross-sectional vertical time dimension (T) (Baltagi 2001). This study explores the correlation between e-commerce and trade openness of countries (N) over 12 years (T) quarterly. Panel data refers to the pooling of observations on a cross-section such as companies, countries, schools, etc over a time series. Panel data can be referred to as longitudinal, multidimensional, or pooled data analysis (Gujurati,2003). Panel data are further classified into macro and micro panels. A macro panel is when we have larger time series as compared to the sample size. Whiles micro panel data is when we have a larger cross-section as compared to the time series. In this study, we have the number of observations(N(countries)) =14 and a time period of 12 years (T= 2009q1-2020q4). Therefore, our data is a typical example of macro panel data.

Though there are other limitations, many other writers Hsiao (2003) and Sakyi et al. (2015) agree that panel data has several advantages as compared to other econometric

methodologies. The advantages and limitations of using panel data are summarised below.

- Panel data controls the differences in individual cross-sections. Panel data account for the heterogeneous characteristics in countries, firms, schools, etc.
- Panel data provide more informative data, therefore, more reliable estimates. It also controls for multicollinearity and heteroscedasticity because panel data increases the degrees of freedom.
- Contrary to a pure cross-section or pure time-series data, Panel data better study the duration of economic situations. Hence dynamics of adjustments are better studied with Panel data.
- As compared to time-series data, panel data allow more complex behavioural models to be constructed and tested.
- Effects that are not easily identified and measured in pure cross-section and time series analysis are better identified and measured in panel data.
- Variables measured under micro panel data tend to provide a more accurate measure as compared to variables under macro panel data.

Even though panel data has more advantages vis-a-vis other methodologies, Baltagi (2003) figures out some other limitations related to panel data.

- Problems may arise during the designing and gathering of data in panel surveys. It is difficult to gather data in panel surveys due to the irresponsive nature of respondents or surveys not accounting for the whole population.
- High possibility of faulty measurements due to distortions in feedback through surveys, questionnaires, or interviews.
- Cross-section dependence in panel data may result in inaccurate and misleading inferences.
- The short time-series dimension increases the computational difficulty for limited dependent variable panel data models.

Balanced and Unbalanced panel data constitute the two types of panel data sets. When all countries have data for all years as in (n = N x T), then the data set is termed a balanced panel. On the contrary, unbalanced panel data is characterised by the absence

of data for at least one year (n < N x T). Figures 3.2 and 3.3 proves that we have strongly balanced panel data for all individual entities.

panel variable: Developed (strongly balanced)
time variable: YEAR1 2009q1 to 2020q2
delta: quarterly

**Figure 3.1. Balanced Panel Data of Developed European Countries**

panel variable: Emerging (strongly balanced)
time variable: YEAR1 2009q1 to 2020q2
delta: quarterly

**Figure 3.2. Balanced Panel Data of Emerging European Countries**

The next step tests which panel data regression model that is more appropriate to use. Equation 10 below represents a simple linear regression panel model. $y_{it}$ represents the dependent variable. $X_{it}$ represents the independent variable. β constitutes the coefficients. Panel data decomposes the error term ($\varepsilon_{it}$) into $\alpha_i$ and $v_{it}$. $\alpha_i$ represents time constant observable or unobservable individual specific effect. $v_{it}$ also represent the idiosyncratic error term.

$$y_{it} = \beta_0 + \beta X_{it} + \alpha_i + v_{it} \quad , \qquad i = 1, 2,\ldots,N \ , t = 1, 2, \ldots\ldots\ldots, T \qquad (10)$$

$$\varepsilon_{it} = \alpha_i + v_{it} \quad , \qquad i = 1, 2,\ldots, N \ , t = 1, 2, \ldots\ldots ,\ldots\ldots T \qquad (11)$$

A model selection test is conducted in order to choose the best fitting model estimator for testing the hypothesis. As stated by Baltagi (2005), the Hausman test determines which model estimator best fits whether the Random Effects model or the Fixed Effects model. Hausman specification as a statistical approach has been widely applied in order to choose between Random Effect (RE) and Fixed Effect (FE) Models. Hausman (1978) assumes that the coefficient $\beta$ for the FE and the RE models are consistent with the null hypothesis. However, the FE model is inefficient. The

coefficient $\beta$ is only consistent in the FE model and inconsistent in the RE model in the alternative hypothesis.

In a FE regression model, the unobserved variation in the individual units is discarded or relaxed. FE relaxes the effect of time-invariant individual characteristics on the predictor variables so that the predictors' net effect can be determined. In a more general term, a linear fixed-effect model equation is specified below in Equation 12.

$$Y_{it=}\beta_{0it} + \beta_{1it}X_{it} + \beta_{2it}X_{it} + \beta_{it}X_{it} + \beta_{kit}X_{it} + u_{it} \quad (12)$$

Where:

$u_{it} = \alpha_i + \varepsilon_{it}$

$\beta_{1it} = \beta_1 ; \beta_{2it} = \beta_2 ; \dots ; \beta_{kit} = \beta_k$

Contrary to the fixed effect model, the RE regression model assumes that the individual time-invariant heterogeneity among individual units is random. A random effect is deemed appropriate if we have every reason to believe that the individual characteristics across units have some effects on the regressors. In a more general term, a linear random-effect model equation is specified below in Equation 13.

$$Y_{it=}\alpha_{0it} + \beta_{1it}X_{1it} + \beta_{2it}X_{2it} + \beta_{3it}X_{3it} + \beta_{kit}X_{kit} + \mu_{it} + V_{it} \quad (13)$$

Where:

$\mu_{it} = \mu_i + e_{it}$

$\mu_i$ stand for unobserved individual-specific effect, and $e_{it}$ stands for the white noise. It is worth noting that $\mu_i$ plays a crucial role in differentiating between FE and RE models. $\mu_{it}$ measure the unobserved individual characteristics among individual units. When the unobserved factors are correlated with the independent variables FE model best fits. However uncorrelated heterogeneity with independent variables recommends applying the RE model.

Estimating the model under the fixed effects assumption eliminates $\alpha_i$ (unobservables) from the error term and, consequently, eliminates all endogeneity problems relating to it. In other words, Fixed Effect model estimation provides a remedy for omitted

variable bias since one can never be sure that all the relevant control variables are included in a plain OLS model. Fixed effect model regression will eliminate omitted variable bias with the assumption that these unobserved individual characteristics are constant over time. FE eliminates the effect of those time-invariant characteristics so we can assess the actual effect of the predictors on the estimated variable. For instance, the process of investigating the effect of e-commerce on foreign trade flows includes 1 dependent variable and 5 control variables over the period 2009q1-2020q4.

**Table 3.3. Results of Hausman's (1978) Test on Developed European Countries**

Null Hypothesis: Random effect model is appropriate

| Test Summary | Chi-Sq Statistic | Chi-Sq. d.f | Prob. |
|---|---|---|---|
| Cross-section random | 18.313016 | 5 | 0.0026 |

**Table 3.4. Results of Hausman(1978) Test on Emerging European Countries**

Null Hypothesis: Random effect model is appropriate

| Test Summary | Chi-Sq Statistic | Chi-Sq. d.f | **Prob.** |
|---|---|---|---|
| Cross-section random | 1450.605660 | 6 | 0.0000 |

In Tables 3.3 and 3.4 probability value is less than 0.05 in both developed and emerging European countries. Since the probability value is less than 0.05 the null hypothesis that the RE model is preferred is rejected. Based on the Hausman test we conclude that the effect of e-commerce on trade openness should be measured by fixed effect model estimation.

In order to measure the impact of e-commerce on trade openness, we specify our final fixed effect model as shown in equation 14:

$$TO_{it}=\alpha_{0it}+\beta_{1it}E-com_{it}+\beta_{2it}GDP_{it}+\beta_{3it}TAFF_{it}+\beta_{4it}FDI_{it}+\beta_{5it}INDUS_{it}+\beta_{6it}EX_{it}+u_{it_{it}} \quad (14)$$

where:

$i$ denotes the $i$th country ($i$= 1 … 7), $t$ denotes the $t$th year (t= 2009q1 … 2020q2). xit – independent variable with respect to country i and year t. β – parameters that explain the effect of the various variables on trade openness. $\beta_{1it}E-COM_{it}$ measures e-

commerce volume of *i* country. $\beta_{2it}\mathrm{GDP}_{it}$ measures the gross output produced in country *i*. $\beta_{3it}TAFF_{it}$ measures trade flow restrictions through a simple mean applied tariffs on all traded goods by individual countries *i*, $\beta_{4it}FDI_{it}$ measures the net outflows of direct investments from *i* to the rest of the world, $\beta_{5it}INDUS_{it}$ measures industry value added as a percentage of GDP, $\beta_{6it}EX_{it}$ measures the value of the currency of *i* countries against several foreign currencies.

Eviews 12 is used in carrying out test analysis and estimating the final model. Eviews is a statistical software package. It is widely used by academics and researchers during econometrical and statistical research analysis.

Since T>N, the FGLS estimator is applied in order to mitigate autocorrelation and heteroskedasticity issues in the data and also to produce optimistic Standard error estimates. In order to avoid a spurious regression of our model, the data has to meet certain conditions. Through a series of tests, these conditions are verified. The series of diagnostic tests conducted before the final estimation of our model also helps us to know the nature of the data or variables we are dealing with. These tests are explained and summarized as follows.

### 3.9. Descriptive Statistics

Descriptive statistics analysis provides an x-ray picture of the kind of dataset we are dealing with. Hence this analysis provides information on the central tendency, and dispersion, and measures the normality of the data.

### 3.10. Correlation Analysis

Correlation analysis describes the strength and direction of the linear relationship between two variables. A positive or negative correlation coefficient signifies a positive and negative correlation, respectively. A zero-coefficient value shows no relationship between the two variables. The value of the coefficient determines the strength of the correlation. Higher and lower value shows stronger and weaker correlation, respectively. A higher correlation of 0.8035 and 0.6714 between GDP and

Industry among developed European countries in table 4.3 may be a result of industries contributing to the higher percentage of GDP in Developed European countries as compared to the lower impact of industries on GDP among emerging European countries.

### 3.11. Cross-Sectional Dependence Analysis

A cross-sectional dependency test is carried out so as to ascertain the level at which the countries under study are interdependent among each other. There is a spillover among countries that are interdependent through economic or political shocks. A shock in one country is expected to extend to another country with which they have a strong economic or political tie. This test is very vital as fitted estimators are generated and it also helps to determine the kind of unit root test to apply whether first-generation or second-generation unit root test. When there exists a cross-sectional dependency, the second-generation unit root is preferred. The second-generation unit root test relaxes the individual difference assumption and accounts for dependence among the individual countries. Depending on the panel data structure there exist various cross-sectional dependency tests. When T>N Breusch-Pagan 1980 is preferred whiles other tests are performed when T<N. Among the various cross-sectional dependence tests are Breusch-Pagan LM, Pesaran scaled LM and Bias-corrected LM test. Therefore, in this study, various Cross-section dependency tests are applied. The various tests reject the null hypothesis that there exists cross-sectional independence.

### 3.12. Panel Unit Root Test

This analysis is carried out to determine the stationarity of the variables. As mentioned earlier the type of unit root test to apply depends on the cross-section dependency test outcome. A first-generation unit root is applied if the variables are cross-sectionally independent whiles a second-generation unit root is applied if variables are cross-sectionally dependent and account for cross-section dynamics. In this study, Bai, and Ng (2001, 2004) second generation panel unit root test applied for shows that there exists a unit root among all the variables considered in this study. The second generation unit root test considers cross-section dependence among the cross-section.

# CHAPTER IV

# EMPIRICAL FINDINGS

Panel data analysis is presented in this chapter. We first provide descriptive statistics, Correlation analysis, Cross-Sectional Dependency test, and Unit Root Test, and then the results for the final model estimation are given.

## 4.1. Descriptive Statistics

It is important to conduct descriptive statistics in order to determine the summary of our data set before proceeding with our regression analysis. The summary statistics of the data are presented in Tables 4.1 and 4.2. Gross domestic product and E-commerce have the highest value of Mean which is 114093.5 and 14297.97 respectively in the case of developed European countries and emerging European countries. Among developed European countries, Industry has the lowest Mean whiles Tariff has the lowest Mean among emerging European countries. Trade openness and foreign direct investment have the Maximum and Minimum values respectively in the case of Developed European countries. On the other hand, E-com has the maximum and minimum value among emerging European countries. Gross domestic product in the case of developed European countries again has the highest Standard Deviation of 72258.57 from the sample Mean as compared to 38.06863 standard deviations in the case of emerging European countries. It is clear from the skewness that none of the series pertaining to developed European countries and emerging European countries are distributed normally. As the skewness of a normal distribution is zero. Among Developed European countries, with the exception of Trade openness, exchange rate, and Industrial size, all other series are negatively skewed implying that long left tail. Whereas with the exception of Trade openness, all other series are positively skewed among emerging European countries. All the series among developed and emerging European countries are leptokurtic because they have a positive kurtosis. A normal distribution has a kurtosis value of 3. A lower probability of less than 0.05 leads to the rejection of the null hypothesis of a normal distribution.

**Table 4.1. Descriptive Statistics (Developed European Country)**

| STATISTIC | TO | E-COM | GDP | EX | TAFF | INDUS | FDI |
|---|---|---|---|---|---|---|---|
| **Mean** | 100.9575 | 19.50000 | 114093.5 | 3.739244 | 25.77808 | 2.034137 | 35.99369 |
| **Median** | 85.12273 | 20.09375 | 159725.7 | 0.816500 | 32.98056 | 1.950000 | 45.90555 |
| **Maximum** | 166.7388 | 31.25000 | 159730.7 | 25.16420 | 50.34476 | 7.440000 | 88.93491 |
| **Minimum** | 42.19421 | 3.843750 | 1.000000 | 0.604338 | 0.100800 | 1.060000 | 0.033864 |
| **Std. Dev.** | 43.41231 | 6.754704 | 72258.57 | 7.246909 | 14.54686 | 0.629466 | 24.49200 |
| **Skewness** | 0.261349 | -0.564591 | -0.948683 | 2.100323 | -0.723998 | 31.74941 | -0.245458 |
| **Kurtosis** | 1.298633 | 2.735638 | 1.900000 | 5.523085 | 1.915380 | 27.44452 | 2.057175 |
| | | | | | | | |
| **Jarque-Bera** | 44.35008 | 18.82914 | 67.34000 | 336.1593 | 45.82328 | 9102.345 | 15.81887 |
| **Probability** | 0.000000 | 0.000082 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000367 |
| | | | | | | | |
| **Sum** | 33921.74 | 6552.000 | 38335414 | 1256.386 | 8661.433 | 683.4700 | 12093.88 |
| **SumSq. Dev.** | 631350.6 | 15284.72 | 1.75E+12 | 17593.43 | 70889.78 | 132.7363 | 200952.5 |
| | | | | | | | |
| **Observations** | 336 | 336 | 336 | 336 | 336 | 336 | 336 |

**Table 4.2. Descriptive Statistics (Emerging European Country)**

| STATISTIC | TO | E-COM | GDP | EX | TAFF | INDUS | FDI |
|---|---|---|---|---|---|---|---|
| **Mean** | 113.4755 | 14297.97 | 27.18816 | 80.59053 | 2.098512 | 17.28182 | 56.13420 |
| **Median** | 110.5646 | 12.68750 | 23.98221 | 6.565798 | 1.960000 | 16.10049 | 52.64154 |
| **Maximum** | 168.7403 | 515625.0 | 160.2161 | 313.8172 | 7.460000 | 50.45377 | 165.0423 |
| **Minimum** | 45.68195 | 0.177083 | 1.695916 | 1.349197 | 0.990000 | 2.099238 | 1.000000 |
| **Std. Dev** | 38.06863 | 76362.44 | 17.51017 | 110.0826 | 0.780144 | 8.245537 | 21.62129 |
| **Skewness** | -0.051421 | 5.4128894 | 4.255473 | 0.988368 | 3.5973.814 | 1.689658 | 3.074985 |
| **Kurtosis** | 1.872885 | 31.56908 | 27.73519 | 2.200253 | 22.36431 | 6.689658 | 15.05075 |
| **Jargue-Bera** | 17.93350 | 13067.46 | 9579.724 | 63.65918 | 5973.814 | 350.3788 | 63.65918 |
| **Probability** | 0.000128 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **Sum** | 38127.78 | 4804118. | 9135.221 | 27078.42 | 705.1000 | 5806.690 | 27078.42 |
| **Sum Sq. Dev.** | 485489.0 | 1.95E+12 | 102713.1 | 4059588. | 203.8893 | 2277.28 | 4059588 |
| | | | | | | | |
| **Observations** | 336 | 336 | 336 | 336 | 336 | 336 | 336 |

### 4.2. Correlation Analysis

**Table 4.3. Correlation Analysis (Developed European Country)**

| | TO | E-COM | GDP | EX | TAFF | INDUS | FDI |
|---|---|---|---|---|---|---|---|
| **TO** | 1.0000 | | | | | | |
| **E-COM** | 0.518263 | 1.0000 | | | | | |
| **GDP** | 0.622753 | 0.652497 | 1.0000 | | | | |
| **EX** | 0.398010 | 0.398343 | 0.254326 | 1.0000 | | | |
| **TAFF** | -0.004380 | 0.176196 | 0.222187 | 0.361137 | 1.0000 | | |
| **INDUS** | 0.556662 | 0.596804 | 0.932438 | 0.225128 | 0.280848 | 1.0000 | |
| **FDI** | 0.602359 | 0.482680 | 0.886209 | 0.197566 | 0.162626 | 0.821823 | 1.0000 |

**Table 4.4. Correlation Analysis (Emerging European Country)**

| | TO | E-COM | GDP | EX | TAFF | INDUS | FDI |
|---|---|---|---|---|---|---|---|
| **TO** | 1.0000 | | | | | | |
| **E-COM** | -0.315019 | 1.0000 | | | | | |
| **GDP** | 0.019415 | 0.131443 | 1.0000 | | | | |
| **EX** | 0.825022 | -0.134665 | 0.059073 | 1.0000 | | | |
| **TAFF** | -0.344308 | 0.079419 | -0.056971 | -0.186419 | 1.0000 | | |
| **INDUS** | 0.230519 | 0.067180 | -0.094710 | 0.357558 | 0.026221 | 1.0000 | |
| **FDI** | 0.217722 | -0.041394 | -0.051029 | 0.357558 | -0.106991 | 0.220391 | 1.0000 |

Table 4.3. and Table 4.4. show the results of the correlation analysis. The results show that there is no linear correlation among the variables in the case of developed and emerging European countries. With the exception of Tariffs, all variables are positively correlated with Trade Openness in the case of developed European countries as evident in table 4.3. The negative correlation between trade openness and tariffs shows that higher tariffs result in higher prices for imported goods hence a reduction in trade openness and vice versa. A higher correlation of 0.8035 and 0.6714 between GDP and Industry among developed European countries in table 4.3 may be because of industries contribute to a higher percentage of GDP in Developed European

countries as compared to the lower impact of industries on GDP among emerging European countries.

In table 4.4, the correlation analysis shows that there exists a negative correlation between Trade openness, E-commerce as well as Tariff. The negative correlation between trade openness and e-commerce may be a result of underperforming firms or a lack of infrastructure to streamline e-commerce activities among developing European countries.

### 4.3. Cross-Sectional Dependency

**Table 4.5. Cross-Sectional Dependency (Developed European Country)**

**Null hypothesis: No cross-section dependence (correlation)**

| Variable | Breusch-Pagan LM | Pesaran scaled LM | Bias-corrected LM |
|---|---|---|---|
| **TO** | 698.8546 (0.0000)*** | 104.5952 (0.0000)*** | 25.97825 (0.0000)*** |
| **E-COM** | 311.5863 (0.0000)*** | 44.83843 (0.0000)*** | 8.404972 (0.0000)*** |
| **GDP** | 548.6346 (0.0000)*** | 81.41578 (0.0000)*** | 81.34132 (0.0000)*** |
| **EX** | 632.7497 (0.0000)*** | 14.16277 (0.0000)*** | 70.86349 (0.0000)*** |
| **TAFF** | 552.9136 (0.0000)*** | 82.07605 (0.0000)*** | 82.00158 (0.0000)*** |
| **INDUS** | 2739.627 (0.0000)*** | 103.8374 (0.0000)*** | 102.7465 (0.0000)*** |
| **FDI** | 103.1679 (0.0000)*** | 12.67878 (0.0000)*** | 12.60431 (0.0000)*** |

*** Null of no cross-section dependence rejected at 1% level of significance

**Table 4.6. Cross-Sectional Dependency (Emerging European Country)**

**Null hypothesis: No cross-section dependence (correlation)**

| Variable | Breusch-Pagan LM | Pesaran scaled LM | Bias-corrected LM |
|---|---|---|---|
| **TO** | 390.7316 (0.0000)*** | 57.05082 (0.0000)*** | 56.97635 (0.0000)*** |
| **E-COM** | 240.9700 (0.0000)*** | 33.94211 (0.0000)*** | 33.86764 (0.0000)*** |
| **GDP** | 72.55164 (0.0000)*** | 72.55164 (0.0000)*** | 7.880122 (0.0000)*** |
| **EX** | 752.5716 (0.0000)*** | 112.8840 (0.0000)*** | 112.8095 (0.0000)*** |
| **TAFF** | 294.2306 (0.0000)*** | 42.16040 (0.0000)*** | 42.08593 (0.0000)*** |
| **INDUS** | 148.8922 (0.0000)*** | 19.65973 (0.0000)*** | 19.65973 (0.00009*** |
| **FDI** | 123.0063 (0.0000)*** | 15.73991 (0.0000)*** | 15.66545 (0.0000)*** |

*** Null of no cross-section dependence rejected at 1% level of significance.

Table 4.5 and Table 4.6 display the outcome of the cross-sectional dependence tests. The various tests displayed in tables 4.5 and 4.6 reject the null hypothesis of no cross-section dependence. Hence a strong correlation between the cross sections under study.

### 4.4. Bai and Ng Second Generation Panel Unit Root Test

**Table 4.7. Bai and Ng Second Generation Panel Unit Root (Developed European Country)**

**Null Hypothesis: Retain Common factors (Unit Root)**

| | Bai and Ng | |
|---|---|---|
| **Variable** | **Intercept** | **Intercept + Trend** |
| **TO** | 0.89083 | 8.43411 |
| **E-COM** | 6.32476 | 7.6670 |
| **GDP** | 23.63797 | 57.75033 |
| **EX** | 19.14196 | 24.64760 |

**Table 4.7. (cont.)**

| | | |
|---|---|---|
| **TAFF** | 67.83661 | 85.36417 |
| **INDUS** | 116.34178 | 130.35308 |
| **FDI** | 29.70296 | 41.01649 |

**Table 4.8. Bai and Ng Second Generation Unit Root (Emerging European Country)**

**Null Hypothesis: Retain Common factors (Unit Root)**

| | **Bai and Ng** | |
|---|---|---|
| **Variable** | **Intercept** | **Intercept + Trend** |
| **TO** | -3.07702 | 10.23746 |
| **E-COM** | 20.92548 | 19.11524 |
| **GDP** | 83.25117 | 121.97203 |
| **EX** | 18.60578 | 197.04869 |
| **TAFF** | 37.90552 | 44.60011 |
| **INDUS** | 28.28783 | 45.70118 |
| **FDI** | 30.22807 | 53.09369 |

The results of the Bai and Ng second-generation unit root test with Intercept as well as the test with Intercept and Trend shown in Tables 4.7 and 4.8 above show that there exists a unit root in the series. Hence the null hypothesis cannot be rejected. In accordance with the results presented in tables 4.7 and 4.8, we undoubtedly conceive that panel non-stationarity does exist, so therefore we regard the variables as integrated of order one i.e. I(1). Hence cointegration may occur because of a long-run relationship between non-stationary variables, Zoltán et al. (2011).

### 4.5. Estimation Results of the Fixed Effect Model

We grouped our data into two categories: Developed and Emerging European countries. We run a panel data regression for each group following Fixed effect model estimation. Moving in tandem with our previous chapter, the Fixed effect model is used as our benchmark estimator to run our panel regression. Tables 4.9 and 4.10 show the results of the fixed effect model estimation to predict the effect of E-commerce and

other several control variables on trade openness among developed and emerging European economies.

**Table 4.9. Panel Data Analysis Results in Developed Countries**

| Variable | Coefficient | Std. Error | t-statistic | Prob.* |
|---|---|---|---|---|
| **C** | 4.126784 | 0.039540 | 104.3702 | 0.0000 |
| **L**E-COM | 0.027945 | 0.004516 | 6.187826 | 0.0000 |
| **L**GDP | 0.027833 | 0.004169 | 6.676277 | 0.0000 |
| **L**EX | 0.240153 | 0.034182 | 7.025791 | 0.0000 |
| **L**TAFF | -0.007693 | 0.001383 | -5.563903 | 0.0000 |
| **L**INDUS | 0.013784 | 0.005603 | 2.460255 | 0.0144 |
| **L**FDI | 0.002301 | 0.001258 | 1.829368 | 0.0683 |

Observation: 336 Adjusted R-Square: 0.998899 ***p<0.01, **p<0.05, *p<0.1

Table 4.9 shows the outcome of the fixed effect regression model to estimate the impact of dependent and control variables on Trade openness in seven developed European countries. The adjusted R-square of 99.8% suggests that the independent variables and control variables explain at least 99.8% of the independent and control variable's impact on trade openness. Furthermore, this confirms that our independent variables explain 99.8% of the variation in trade openness around the mean. This also implies that our linear model almost fits 99.8% of the set of observations.

**Table 4.10. Panel Data Analysis Results in Emerging European Countries**

| Variable | Coefficient | Std. Error | t-statistic | Prob.* |
|---|---|---|---|---|
| **C** | 4.074116 | 0.038674 | 105.3452 | 0.0000 |
| **L**E-COM | 0.002909 | 0.001245 | 2.337223 | 0.0200 |
| **L**GDP | 0.009233 | 0.001788 | 5.164890 | 0.0000 |
| **L**EX | 0.206428 | 0.012590 | 16.39619 | 0.0000 |
| **L**TAFF | -0.063405 | 0.010241 | -6.191304 | 0.0000 |
| **L**INDUS | 0.017987 | 0.001801 | 9.985590 | 0.0000 |
| **L**FDI | -0.005900 | 0.002741 | -2.152541 | 0.0321 |

Observation: 336 Adjusted R-Square: 0.987902 ***p<0.01,**p<0.05, *p<0.1

Table 4.10 shows the outcome of the fixed effect regression model to estimate the impact of the dependent and control variables on Trade openness in seven emerging European countries. The adjusted R-square of 98.7% suggests that the independent variables and control variables explain at least 98.7% of the independent and control variable's impact on trade openness. Furthermore, this confirms that our independent variables explain 98.7% of the variation in trade openness around the mean. This implies that our linear model almost fits 98.7% of the set of observations.

### 4.6. Regression Analysis Results for the Final Fixed Effect Model Estimation

The results of the estimation of the fixed-effect model for the two groups of countries as displayed in tables 4.9 and 4.10 show that e-commerce which is our focus for this research study has a positive and significant effect among developed European countries as well emerging European countries. Hence e-commerce has the tendency to increase trade openness or cross-border trade. However, the results show a higher and strongly significant coefficient ($\beta_1$= 0.027, p-value***p<0.05) of e-commerce impact on trade openness among Developed European countries as compared to a lower level of impact of e-commerce ($\beta_1$ = 0.0029, p-value, **p<0.01) on trade openness in the case of emerging European countries. The lower level of impact of e-

commerce on trade openness among emerging European countries may be a result of overly restrictive regulations and the lack of infrastructure and institutions to streamline the selling of goods and services across borders in emerging European countries. This result is consistent with the responses regarding the ease of engaging in cross-border e-commerce as indicated in the introductory part of this study. According to the report out of 148 responses, 69 responses show that regulatory barriers hinder firms mostly in emerging European countries from selling across national borders. Whiles other responses also show that it is not strategic, and some also believe that foreign markets are too competitive to venture into. Overall, the positive impact of e-commerce on trade openness proves to be consistent with the findings of many other authors (Terzi, 2011; Campbell & Holland, 2007; Xing, 2018; Wang et al., 2017; Moodley & Morris, 2004) and the like.

The relationship between tariffs and trade openness in developed European countries and emerging European countries is negative and significant at 1%. This relationship is expected because when governments increase the tariff rate, importing goods and other services into a country from other countries becomes more expensive. This increases domestic production by domestic producers. This reduces exportation and importation among countries. This may cause a decline in the openness of foreign trade with other countries. The finding is in line with that of Baier et al.(1997) and supports the argument of Krugman et al. (1995) that policy-induced bilateral trade policies through tariffs have a greater impact on trade flows than technology-led low transportation costs.

Industrial size has a positive impact on trade openness both in developed European countries and emerging European countries. This shows that industrial size plays a major role in determining the extent to which a country opens to foreign trade. This is evident from the coefficients and the significance of the P-values at 5% and 1% respectively. Trade is more likely to be boosted by advancement in industries but to be curtailed by an industry that is unsophisticated or primitive. Such advancements increase a country's chance of exporting at a profit. Therefore, an increase in trade openness and vice versa. Using an industry-level panel data set, Giovanni and Levchenko (2007) show that there exists a positive relation between international trade since higher volatility in a sector triggers higher foreign trade volume.

The exchange rate has a positive impact on trade openness among emerging European countries and a positive impact on trade openness in the case of developed European countries. This means a depreciation of the local currencies among emerging European countries makes importation more expensive therefore local producers receive high demand for goods and services. Furthermore, emerging European countries are characterized by high volatility in exchange rates because most of the countries fall outside the single currency union. This could help explain the relatively lower coefficient value between trade openness and exchange rates among emerging European countries. As evident from the results, a one-unit increase in exchange rate among developed European countries increases trade openness by a margin of 0.24%. Meanwhiles a 1% increase in the exchange rates among emerging European countries increases trade openness by a margin of 0.21%. An appreciation of local currencies means cheaper imports hence a stimulus to trade openness. Developed European countries are characterized by involatile currency hence investors are not faced with currency volatility uncertainties hence importers have not faced risks related to importing from other countries. Hence an increase in trade openness. This finding supports the argument of Balanika (2003).

The positive influence of GDP on trade openness in the case of both developed and emerging European countries did not come as a surprise as this is expected. This means higher growth in GDP has the capacity to increase trade openness among countries. Whiles lower growth means less surplus output to be exported abroad therefore lower levels of trade openness. However, the results show a higher impact of GDP on trade openness in developed European countries as compared to the impact of GDP on trade openness among emerging European countries. This simply depicts the higher growth of GDP in developed European countries in relation to the GDP growth in emerging European countries. Keho (2017), Pigka-Balanika (2013), Ramzan et al. (2019), and Sikwila et al. (2014) also recorded a positive relationship between trade openness and GDP. However, Ali and Abdullah's (2015), and Pigka-Balanika's (2013) findings contradict our results.

In comparison, results show a statistically significant positive impact of foreign direct investment on trade openness in developed European countries and a negative impact of foreign direct investment on trade openness in emerging European countries. This

disparity appears to make sense when one carefully investigates the sectors that benefit from FDIs among some of these emerging European countries. For example, FDI is predominantly centered around commodity exporting sectors such as oil, cash crops, and other precious metals like gold and diamond. FDI does not greatly impact trade openness because insufficient economic activities are generated from exporting goods in their raw state instead of processing them in industries before exporting.

# CHAPTER V

# CONCLUSION AND DISCUSSIONS

## 5.1. Conclusion

The phenomenon of e-commerce has attracted remarkable interest from researchers in the research arena, businesses, and the sphere of government. Today e-commerce plays an indispensable role in many economic activities as well as providing remedies in relation to some economic problems. E-commerce not only provides an efficient solution to the scarcity of resources among countries but also ensures an effective allocation of resources. E-commerce has the capacity to serve as the powerhouse of world economic growth and effectively sustain cross-border trade thereby stimulating economic efficiency. Yet today, its full potential is far beyond reach. This is partly due to some of the aforementioned obstacles mentioned in the introductory section.

This research employs quarterly data on E-commerce, trade openness, tariffs, exchange rate, foreign direct investment, industry size, and gross domestic product among 14 European countries grouped into emerging European countries and developed European countries for the period 2009q1-2020q4 to explore the impact of e-commerce on trade openness. The study makes use of dependent, independent, and several other control variables. Trade openness represents our dependent variable and E-commerce is our main dependent variable in addition to several other control variables such as GDP, industrial size, exchange rate, tariff, and foreign direct investment. In achieving the aim of the study, Panel data analysis through a feasible generalized least square estimation technique is implemented.

The results show that e-commerce has a positive and significant impact on trade openness among emerging and developed European countries. However, a relatively higher impact of e-commerce on trade openness among developed European countries is recorded. This is evident from the higher coefficient value and a strongly statistically significant P-value. This may be a result of readily available infrastructure and institutions which facilitate e-commerce activities in these developed European

countries as compared to the lack of infrastructure and proper measures to promote e-commerce activities in emerging European countries. The negative impact of tariffs on trade openness in both sets of countries follows the traditional theory of a negative relationship between tariffs and trade openness. GDP, foreign direct investment, and industry size have been a propeller propelling the wheels of trade openness hence a booster to foreign trade among European countries. The exchange rate positively impacts trade openness among developed European countries and developing European countries.

### 5.2. Implications and Recommendations

Lower coefficient figures show lower levels of e-commerce impact on trade openness in both developed and emerging European countries. Several factors and circumstances may have given birth to the lower levels of e-commerce impact on trade openness among these European countries. Burdensome legal frameworks, complicated tax systems, and problems pertaining to logistics and distribution among others constitute a few factors hindering e-commerce activities in Europe. Other barriers include online payments, language barriers, and customer relations.

On daily basis, merchants in e-commerce and those willing to enter cross-border e-commerce with other countries are faced with several other different sets of rules pertaining to each different country which they need to fulfil. These laws and rules turn to make operating businesses online very tedious and burdensome for online merchants. A typical example is the heterogeneous data protection and privacy laws, consumer, and contract laws, heterogenous tax rates, logistics, and distribution barriers facing the e-commerce industry across Europe. High bank transaction charges on online transactions coupled with language barriers facing countries across Europe.

In order to achieve higher efficiency and smooth operations in the e-commerce industry, and promotion of cross-border e-commerce, governments, and other policymakers are recommended to ensure common contractual policies through the relaxation of difficult rules pertaining to cross-border e-commerce sales. This will promote a single market with harmonized regulations that will streamline cross-border e-commerce sales in Europe. Harmonization of VAT rates would greatly promote the

development of cross-border e-commerce. Notwithstanding, a common European VAT threshold will promote the inclusion of SMEs in cross-border trade. The VAT threshold also referred to as the VAT registration threshold is the limit to the amount of turnover that can be made for SMEs to register for VAT. Hence a common VAT threshold facilitates cross-border supplies by sparing SMEs and startups the hustle in the registration of VAT in the consumer's home country.

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# APPENDIXES

## APPENDIX A

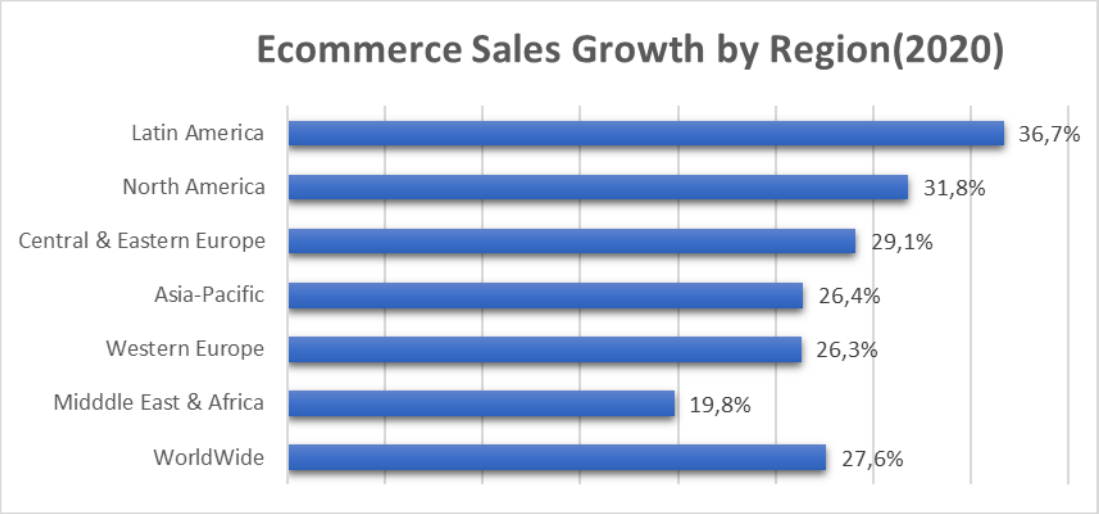


**Figure A.1. E-commerce Sales Growth by Region (2020)**
(Oberlo, 2020)

# CURRICULUM VITAE

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2009 – 2013 Senior High School, Adventist Senior High School, Ghana

2014 – 2018 BSc in Economics, Erciyes University, Turkey

2016 –2017 BSc in Economics, International Balkan University (Erasmus Exchange), North Macedonia

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