TITLE:

The Relationship Between FDI And Environmental Policy, And Their Interaction Effect On Population Health And Employment In EU Countries.

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A thesis submitted in partial fulfilment of the requirements of Nottingham Trent University for the degree of Doctor of Philosophy

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Copyright Statement

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ABSTRACT

FDI is a significant source of economic development, but concerns about its environmental impact persist. The pollution haven hypothesis suggests that industries may relocate to areas with weaker environmental policies. This thesis examines the relationship between EU environmental policy and direct investment inflows using macroeconomic secondary data from 2003 to 2019. The research uses various empirical models, including the two-way fixed effects model, Driscoll-Kraay robust standard errors, bootstrap quantile regression, panel vector autoregression model, impulse response functions, forecast error decomposition, feasible generalised least squares method, and the fully modified ordinary least squares method. The thesis aims to provide a more comprehensive understanding of the relationship between environmental policy and FDI in 28 EU countries before January 2020.

The main findings indicated that there is a pollution haven in the relationship between EU environmental policy and GFDI, while the relationship with M&As supports the pollution halo hypothesis. Furthermore, we observed unidirectional Granger causality in the relationship between the EU environmental policy and aggregate FDI, while the relationship between environmental policy and the two FDI modes of entry is bidirectional. Hence, endogenous pollution haven was supported in the relationship between environmental policy and the two modes of entry. Implying that foreign investments influence the strictness of EU environmental policy and vice versa. Finally, the results confirm that the EU's environmental policy significantly influences the impact of the two FDI modes of entry on population health and employment. Moreover, for the highly developed 15 EU countries that joined the union earlier or by 1995, the moderation effect of environmental policy reduced the negative effects of both GFDI and M&As on employment and infant mortality while also reducing the positive effects on life expectancy from birth to total years. Furthermore, the moderation effect of environmental policy reduced the magnitude of the negative effects of both GFDI and M&As on life expectancy at birth to adult years while reducing the magnitude of the positive effects on infant mortality rate and employment for the comparatively less developed 13 EU countries that joined the union from 2004 to 2013. The policy implication is that the EU's strict environmental policy can serve as a useful mechanism to deter polluting industry while promoting population health and employment opportunities.

Keywords: Environmental policy, Foreign direct investment (FDI), Greenfields investments (GFDI), Mergers & acquisition sales (M&As), and European Union (EU).

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CHAPTER 1

General Introduction of The Thesis

1.1. INTRODUCTION

FDI has achieved recognition among learned economic researchers and governments as an important source for economic development. It is classified as active investment compared to other forms like portfolio investments and trade (Har et al. 2008; Borensztein et al. 1998; Turkson et al. 2015; Dinh et al. 2019; Osei and Kim, 2020). Din et al. (2019) asserts that FDI is a means to address the disparity between savings and investment, while also facilitating the acquisition of technology to produce advanced products or services. Dorakh (2020a) also assert that FDI plays a vital role in the development of economic integration, as it facilitates economic growth with long-term advantages and interconnections across diverse countries. Other scholars have extensively studied the several positive spillover effects that FDI can have on an economy. These studies provide that FDI not only serve to diversify the capital structure of the host economy, but it also yields favourable externalities in the form of technological diffusion, knowledge transfer and jobs creation (Blomström et al., 1994; Newman et al. 2020; Lin et al. 2021; Zoltán and Gábor, 2022). In addition to this, studies like Bosworth et al. (1999) argue that in the short-term, the influence of FDI on economic growth exhibits a negative effect, but in the long-term the relationship becomes significantly positive to the host country. In the current period of globalisation, characterised by the diminishing of economic, commercial, and technological obstacles, countries usually prioritise FDI due to all the forementioned advantageous outcomes (Demirsel et al., 2014).

However, a recurrent concern linked to FDI is its possible deleterious effects on the environment (Cole et al. 2011; Zhu et al. 2016; Zang et al. 2019). In other words, the positive spillover from receiving larger volumes of FDI may be counteracted by the potential environmental damage that could occur concurrently. Existing literature suggest, FDI may enter into host countries in two main modes which are Greenfields investment (GFDI) and Mergers and acquisition sales (M&As) (Hennart and Park, 1993; Harzing, 2002; Dikova and Van Witteloostuijn, 2007; Slangen and Hennart, 2008; Marinescu, 2016; Jaworek et al., 2018; Alon et al., 2020; Nguyen, 2023). GFDI implies foreign company starting or building their subsidiary from scratch in a country that is not their home country, whereas M&As imply foreign investors buying or acquiring shares from established domestic firm of a country that is not their home (Alon et al., 2020; Nguyen, 2023). Among the two entry modes, some researchers argue that FDI in the form of GFDI are more deleterious towards the environment of the host country compared to FDI in the form of M&As (Harms and Méon, 2018; Ashraf et al. 2020). However, Cole et al. (2011) also contends that the adverse environmental impacts of FDI may be easily dismissed due to its economic advantages.

1.1.1. Government Control Measures Towards FDI Polluting Activities

To avoid the potential cost of FDI to the host country's environment, local governments or policy makers result to strict environmental policy to manage the operations of FDI activities and endeavour to promote FDI's that utilises advance technologies to ensure sustainable economic development (Golub et al. 2011; Demena and Afesorgbor, 2020). The European Union (EU) is popularly known for spearheading this strict environmental policy to protect its environment, ensure quality health for its citizens and simultaneously achieve sustainable development. In fact, the EU environmental legislation (2024) explains that the European Green Deal is strategized to ensure the EU transition to a modern, resource-efficient and competitive economy that achieves zero net emissions of greenhouse gases by 2050 and facilitate economic growth that does not rely on natural resource use.

Yet, existing literature examining the effects of these strict environmental policies on multinational companies' location decisions have argued that such actions discourage and render the host country unattractive to receive direct investments (Becker and Henderson, 2000; Greenstone, 2002; List et al. 2003; Fredriksson et al. 2003; Mulatu, 2017; Yoon and Heshmati, 2021). This view is popularly referred to as pollution haven theory and have several implications. It partially elucidates the rationale behind FDI flows from developed to developing countries. Additionally, it highlights how global capital movements have reconfigured the international division of labour. Thus, allowing developed countries to focus on direct investments with favourable environmental protection capabilities by driving out their polluting industries, whereas developing countries draw in these polluting industries due to their weak environmental regulations (Cole, 2004). Proponents of the pollution haven theory also notes that this new equilibrium, while beneficial for both parties, comes with certain drawbacks. The actions of developing countries contribute to the race-to-the-bottom (RTB) hypothesis, which presents a global risk and carries significant policy implications (Rudolph and Figge, 2017; Balsalobre-Lorente et al. 2019). Wherefore, pollution havens established through this framework of reducing environmental standards to increased FDI inflow, exacerbate global environmental pressures.

Notwithstanding, the pollution haven theory have seen opposing views that are more optimistic that enforcing strict environmental policy will encourage multinationals to invest in environmentally friendly technologies that can ensure both high profits for the investors in the long run and simultaneously improve environmental quality (Iršová and Havránek, 2013). Therefore, the strict environmental policy will not demonstrate decreasing effect on FDI inflows in the host country but rather ensure its rise. This hypothesis known in the FDI environment literature as pollution halo hypothesis is supported by studies like (Mohr, 2002; Iršová and Havránek, 2013; Petroni et al. 2019).

In addition to the pollution haven and pollution halo hypothesis, another theoretical discussion that has gain the attention of economic and environmental researchers is the endogenous pollution haven theory. Proponents of the endogenous pollution haven theory like Cole et al. (2006) argue that while environmental policy has seen large empirically examination on its impact on FDI, there is also a possible reverse effect from FDI on the strictness of host country's environmental policy. They explain endogenous pollution in this manner, that as a country increases in the amount of FDI attraction, multinationals can join with domestic firms to lobby corrupt government of poor and developing countries for weaker environmental policy (Cole et al. 2006; Ferrara et al. 2015). While in developed countries the increase in FDI will rather instigate uncorrupted government officials to enact stricter environmental policy to control multinational production activities which are deleterious to the environment (Cole et al. 2006). For example, Ferrara et al. (2015) assert that in developed countries the incentive to protect the environment become higher compared to economic benefit when FDI activities poses higher threat to the environment.

Further insight into the environmental risks potentially associated with FDI, is demonstrated by the studies of Herzer and Nunnenkamp (2012) and Nagel et al. (2015) who contend that an increase in FDI activities may negatively impact the health of the host country's population. For instance, the European Environmental Agency (EEA) (2020) reports that, despite the decrease in air pollution, within the past decades about 300,000 people experienced premature death due to air pollution. The EEA further explains that for every eight deaths recorded in the EU one is related to environmental polluting activities and claim that air pollution, water pollution, chemical exposure, and noise pollution is linked to 13% of all deaths in the EU. This demonstrates how serious any activity that encourages environmental pollution like some polluting FDI activities are a major concern for the Union. The proponents of the institutional based theory like Xiao and Park (2018) and Slesman et al. (2021) also argue that the effects of FDI activities in host country is contingent on the institutional policies enacted by the local government. In other words, host country's government policy interventions can mitigate the negative spillovers and or promote positive spillover effects associated with FDI inflows in the host country. Likewise, Davies and Mazumder (2003) and Landrigan and Goldman (2011) proposes that institutional, or government policy intervention is crucial in protecting the environment from polluting activities and consequently ensuring quality population health for citizens. Despite these arguments, the discourse regarding the impact of increased FDI on the environment and public health in host countries has yielded mixed results and remains inconclusive (Jorgenson, 2009a; 2009b; Alam et al. 2016; Demena and Afesorgbor, 2020; Bai et al. 2020). While governments of host countries continue to face the dilemma of losing the economic advantages that accompany FDI inflows like the creation of employment opportunities if enforcing stricter environmental policy measures end up creating deterring effect on foreign investments.

1.1.2. Research Objective and Questions

Based on the fundamental objective of this thesis to examine the relationships between EU strict environmental policy and the direct investment inflows to member countries, the following research questions are set to be answered.

1. What is the effect of EU strict environmental policy on direct investments into EU countries?
2. What direction of causality exist between EU's environmental policy and direct investments into EU countries?
3. What is the impulse response relationship between EU's environmental policy and direct investments into EU countries?
4. Does the EU's environmental policy play moderation role in the effects of direct investments inflows on population health and employment rates?

1.1.3. Summary of the Overall Research Findings

The research results indicate that stringent environmental policies in the EU deter foreign direct investment through GFDI while encouraging foreign investments through M&As. Also, the results support bidirectional relationship and endogenous pollution haven relationship between the EU's environmental policy and the two modes of FDI entry. The increase in both GFDI and M&As initially leads to a decline in environmental policy, which subsequently becomes significantly stricter in later years. Conversely, when EU policymakers or local governments tighten environmental policies, the subsequent effect is a decline in GFDI over the following years before it stabilises, while M&As increase in the early years and decrease in the later years. The thesis results indicate that, broadly across EU countries, stringent environmental policies enhance children's health by regulating the operational activities of foreign firms. In less developed EU countries, strict environmental policies enhance adult health; in developed countries, such policies diminish the positive impacts of foreign investments on adult health. The marginal effects of environmental policy on public health are generally positive across all EU countries, while also promoting overall employment or inducing employment shifts among various sectors. The results indicate that EU countries should maintain stringent environmental policies to foster sustainable development and enhance public health. In summary the results indicated that EU's strict environmental policy is crucial in deterring inflows of potential polluting FDI in the form of GFDI and also moderating FDI inflows to promote both population health and employment opportunities in member countries.

1.2. RESEARCH CONTRIBUTIONS

This Thesis contribute to existing literature in the following ways. First, this thesis utilises several proxies for environmental policy and examine their effects on direct investments into the EU countries. These environmental policy proxies include, environmental taxes, energy taxes, overall environmental stringency index, emissions limit value nitrogen oxide (NOx), emissions limit value sulphur oxide (SOx), and emissions limit value particulate matter. These include both markets based, and command based environmental policy instruments. By employing these varied variables as proxy for environmental policy, this thesis seeks to address the argument presented by Xing and Kolstad (2002), Fredriksson et al. (2003), and Ge et al. (2020) that existing research yields inconclusive results due to biases in the selection of environmental policy measures and the use of varying environmental variables as proxies across different studies.

Secondly, this research relies extensively on the two FDI modes of entry because of its ability to address the heterogeneous characteristics of the total capital flow. Previous research has relied on aggregate FDI or industrial data to examine the relationship between environmental policy and direct investments FDI (see e.g., Xing and Kolstad, 2002; Fredriksson et al. 2003; Kirkpatrick and Shimamoto, 2008; Jugurnath et al. 2017). However, this practice has been criticized by Harms and Méon (2018) and Ashraf et al. (2020) arguing that aggregate FDI is unable to account for the inherent heterogeneity issues within the variables and so utilising the two FDI modes of entry provide better insightful results that can effectively enhance policy making. They further argue that, relying on the aggregate FDI can misled policy makers when devising strategies to promote investment while concurrently preventing the direct investments which are characterised as deleterious towards the environment. Moreover, while Harms and Méon (2018) and Ashraf et al. (2020) examining the heterogenous effects of the two FDI modes of entry on the environment, economic growth and factor productivity. This research differs by analysing the effects EU strict environmental policy on these modes of entry in addition to the aggregate FDI.

Thirdly, this thesis is inspired by the work of Cole et al. (2006) and Ferrara et al. (2015) which is among the few studies that have examined the endogenous pollution haven effect of environmental policy on FDI. These studies suggest a reverse causality in the relationship between environmental policy and FDI. Implying that while environmental policy demonstrates effects on the direct investments, it is also likely that increase in direct investments could influence the strictness or weakness of environmental policy in the host country depending on the level of corruption in the institutions. This thesis complements these studies by investigating the direction of causality between the EU's environmental policy and direct investment inflows which are the aggregate FDI and the two FDI modes of entry. In addition to this, further analysis is provided to reveal the impulse and response relationship between environmental policy and direct investments flow into the EU countries.

Finally, this thesis distinguishes itself from existing literature by examining how environmental policy moderates the effects of two FDI modes of entry on population health and employment in the host country. This illustrates the extent to which EU environmental policymakers influence the impact of direct investments on citizens' health and the employment rates in member countries.

1.3. STRUCTURE OF THE RESEARCH.

The remainder of this study is organised as follows. Chapter 2 sets out a background about the formation of the EU and discuss the unique characteristics of the EU that motivated the selection of the region for this thesis. Chapter 3 also define FDI, discuss the components, measurement method, the advantages and disadvantages and finally discuss the theoretical foundations of FDI. Chapter 4 of this thesis conducts the first empirical analysis to investigate the impact of EU's environmental policy on FDI inflows into the member countries. The analysis for this chapter helps to address the research question 1 of this thesis. Chapter 5 also examines the direction of causality between EU's FDI and environmental policy while further considering the impulse and response of the two variables. The results from this chapter will further provide answers for research question 1 and answer research question 2 and 3 of this thesis. Chapter 6 examines whether environmental policy plays a moderation role in the effects of the two FDI modes of entry on the population health and employment rates of EU member countries. Chapter 7 provides the overall conclusion of the thesis by summarising the results and discussing the policy implication of the results.

CHAPTER 2

The Unique Characteristics of The Region of Study

2.1. INTRODUCTION

European integration in its current form was not entirely predetermined. Regardless of the rhetoric, European leaders were naturally opposed to sharing national sovereignty (Guzzetti, 1995; Dinan, 2004). National leaders shared sovereignty in supranational organisations because they believed it was in the best interests of their countries and thus their own. In May 1948, nearly 600 notable Europeans from sixteen countries met in The Hague for the Congress of Europe to revive the European Union movement (Dinan, 2004). After that, The Schuman Declaration of 1950, led to six European countries notably Belgium, France, Germany, Italy, Luxembourg, and the Netherlands signing the Treaty of Paris to become the founding members of the European Coal and Steel Community (ECSC) (Milward, 2003). This happened in Jean Monnet's French economic planning office (Dinan, 2004). It was a creative solution to rapid German economic growth under growing East-West war that met United States, French, and German needs (Dedman, 2006). The coalescence of European and national ambitions enabled sharing sovereignty appealing for prominent French and German politicians and put in motion a lengthy, unexpected, and exciting sequence of economic and political integration (Guzzetti, 1995).

Continuing from the Treaty of Paris, they tried to establish the European Defence Community. In 1952, the pact for Common Security and Defence Policy (CSDP) was formed with the intention of allowing West Germany to rearmament under the control of a single European military command (Guzzetti, 1995; Dinan, 2004). This was a draught treaty for a European Political Community expected to establish a political federation to maintain democratic control over the new European army but was thwarted because of the French Senate's rejection of the idea (Guzzetti, 1995).

Notwithstanding, due to reliance on foreign oil and the ongoing depletion of coal reserves, an atomic energy community was proposed with Monnet preferring a separate Community rather than merely extending the ECSC's authority, as suggested by the Common Assembly (Dinan, 2004). Germany, on the other hand, was interested in a single market, as were the Benelux nations (Belgium, the Netherlands, and Luxembourg). Both Communities would be built to harmonise the two concepts. As a result, the six countries went on to sign the Rome Treaties in 1957, which led to the creation of the European Economic Community (EEC) and the European Atomic Energy Community (Milward, 2003; Dinan, 2004; Makhavikova, 2018). These communities' institutions were eventually to be combined, giving rise to the term “European Communities” (EC) for the group which is later replaced by the “European Union” (Dinan, 2004).

Since the formation of the EU, the union has gone through 7 series of membership enlargement with many Central European countries completing the accession process to attain membership status (see Table 2.1.; Dedman, 2006; Milward, 2005; Rezler, 2010; Hillion, 2014; Baun, 2018; Makhavikova, 2018; Olsen, 2020). Many years after being a member, the UK held a referendum in 2016 popularly known as “Brexit”, in which 51.9% of voters chose to leave the EU (Bloom et. al. 2019; Olsen, 2020). On January 31, 2020, the UK formally severed ties with the EU, which was its closest and largest trading partner. To give themselves ample time to agree on the details of a new trade agreement, all parties decided to keep many things the same until the end of 2020. On December 24, they ultimately came to an agreement after a difficult and regular contentious dialogue (European Union, 2023). Currently about eight countries which are Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia, Türkiye, and Ukraine are candidate countries negotiating to join while integrating EU laws into their national laws (Dursun-Özkanca, 2022; European Union, 2023). Also, countries such as Georgia and Kosovo have made application but are yet to achieve candidate status.

The remaining part of this chapter is meant to provide insight into the unique integrating policies of the EU that make the region very interesting for this research activity. In addition to this, the various environmental policy programs that the EU have undertaken for the past decades will be explored to demonstrate their consistency in achieving sustainable economic development. Moreover, the attractiveness of the EU in FDI attraction compared to countries like the United States and China who are the largest recipients of foreign investments are also discussed. The difference in economic levels and the amount of FDI received by members that joined latest by 1995 and those that joined from 2004 to 2013 have also been elucidated to appreciate the heterogenous capabilities of the member countries in attracting FDI. Lastly, the EU’s economic position is also discussed.

Table. 2.1.

The Enlargements of the European Union Membership (European Union, 2022)

	Founders In 1951	1st Enlargement 1973	2nd Enlargement 1981	3rd Enlargement 1986	4th Enlargement 1995	5th Enlargement 2004	6th Enlargement 2007	7th Enlargement 2013
1	Belgium	Denmark	Greece	Spain	Austria	Czech Republic	Romania	Croatia
2	France	Ireland		Portugal	Sweden	Estonia	Bulgaria	
3	Germany	United Kingdom			Finland	Hungary		
4	Italy					Latvia		
5	Luxembourg					Lithuania		
6	Netherlands					Poland		
7						Slovakia		
8						Slovenia		
9						Malta		
10						Cyprus		

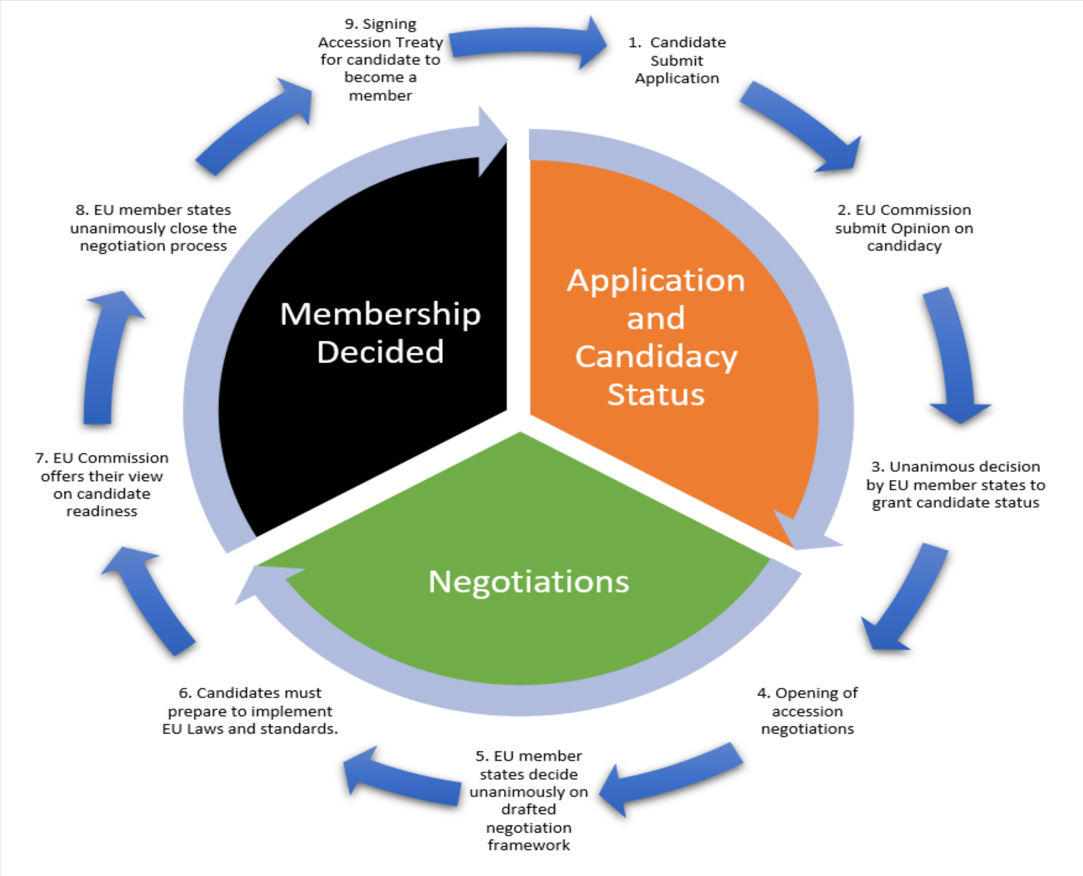
Note: The United Kingdom exited the EU in 2020.

2.2. EU PRINCIPLES FOR INTEGRATION AND MEMBERSHIP NEGOTIATION.

The EU membership process is directly aimed at completely integrating candidate nations into all the shared ideals that binds Member States together through negotiations (Dursun-Özkanca, 2022; Penker et al. 2022). The EU enlargement policy is also considered the union’s geostrategic investment in Europe's stability, peace, protection, and economic development (European Union, 2022; Dursun-Özkanca, 2022). It is founded on the principles of equitable and stringent requirements along with individual country merits. It demands candidate nations to put into effect complicated reforms in numerous fields, including the enforcement of rule of law and economic policies, while demonstrating efforts that oppose any form of corruption, and implementing strict policies against organised crimes (Baun, 2018; Makhavikova, 2018; Olsen, 2020). Candidate nations are anticipated to develop their systems of government concurrently with regional cooperation, reconciliation, and decent external relations which are of the critical importance. Fig. 2.1 shows the steps involve in achieving membership status.

Fig. 2.1.

Steps Towards EU Membership.



Source: Author's work based on European Commission (2022a).

Despite the appearance of nine steps, the process for a potential country to attain membership status can be clustered and categorised into three major steps of integration. Which include Application and candidate status, Negotiations, and finally the Membership decision. Among these three, the negotiation stage can take several years relative to candidate nations (Dursun-Özkanca, 2022; Penker et al. 2022). This is because it is the crucial stage where the candidate nation is going through the process of adapting to all the EU shared principles (Makhavikova, 2018; European Commission, 2023). Only, after a unanimous decision by EU Member States to offer candidacy status to applicant nation can negotiations of the unique principles of the union commence (Dursun-Özkanca, 2022). When opening the accession negotiations, the EU commission proposes a draft negotiating framework as a basis for the talks. Accession negotiations formally start once Member States agree on the negotiation framework and applicant becomes ready to align to EU laws and standards (Makhavikova, 2018). The negotiations are undertaking in a structured framework that covers the following six chapters: Fundamentals, Internal market, Competitiveness and inclusive growth, green agenda and sustainable connectivity, Resources, agriculture and cohesion, and External relations (European Commission, 2022).

2.2.1. The Fundamentals

The EU Fundamentals which candidate nation must align during negotiation include the Justice and fundamental rights, public procurements, statistics, and financial controls (European Union, 2023). The Justice and Fundamental Rights ensures that all EU citizens enjoy personal, civil, economic, political, and social liberties, protection of their private data, equitable treatment laws, and borderless travel in most EU countries (Blauberger and Van Hüllen, 2021). It covers the European arrest warrant which protects EU residents in all member states and allows culprits to be pursued across borders and returned home (Van den Brink, 2012). There is also European Union's Judicial Cooperation Unit (Eurojust) that helps judicial authorities across the EU acknowledge and implement legal judgements issued in one nation (Van den Brink, 2012; Blauberger and Van Hüllen, 2021). Usually, the EU fundamentals is the first step to open and the last to be closed (European Commission, 2022).

2.2.2. The Internal Market

The negotiations on the EU internal market ensures free movement of goods, workers, and capital to any Member State (Barnard, 2022). In other words, goods, workers, and capital from one Member State to another is giving free entry with no discrimination. Also, the right to establishment and freedom to provide services, movement of businesses and professionals within the EU are guaranteed (Cherchye, 2007). The right of establishment consists of the right to engage in and carry out activities as a self-employed person, as well as the right to establish and manage enterprises for long-term, permanent, and as ongoing activity, under the same conditions provided by the Member State's rules for its own nationals (Dunning, 1997; Barnard, 2022). Moreover, the freedom to provide services pertains to all payment-based services, as conditioned by regulations governing the free movement of goods, capital, or people (Barnard, 2022). To do so, the provider of a "service" may temporarily pursue their activity in the Member State where the service is offered, under the same conditions as nationals of that state. Other internal market laws that the candidates negotiate to integrate with the EU before attaining membership status include company laws, intellectual property laws, competition policy, financial services, and consumer and health protection laws

(European Commission, 2022). The internal market integration creates a larger EU market that make the EU an attractive supranational bloc for foreign and domestic investments (Makhavikova, 2018).

2.2.3. Competitiveness and Inclusive Growth

The policy model for EU competitiveness and inclusive growth aims to ensure that, in the face of a downturn in public support for globalisation and other global crises such as pandemics and wars in Europe and abroad, EU Member States are supported equally to achieve sustained and inclusive economic recovery by protecting businesses, jobs, and citizens livelihood (Gardiner et al. 2012). Some of these policies include customs unions, education and culture, science and research, enterprise and industrial policy, social policy and employment, economic and monetary policy, taxation, information, and society and media (European Parliament, 2020). During the process of negotiations, candidate countries are required to align these policies into their national policies to qualify as a Member State (Makhavikova, 2018; European Commission, 2022).

2.2.4. Green Agenda and Sustainable Connectivity

This cluster of the discussions also focuses on environmental and climate change policies, trans-European networks, energy policies, and transport policies (European Commission, 2022). Countries must be connected to each other in a globalised world for a variety of reasons, including trade, transport, international relations, and people mobility. As international relationships deepen, developing sustainable means for attaining social, environmental, and economic growth becomes a must (Ekins, 1999; Doytch and Ashraf, 2022). The goal of EU sustainable connectivity is to connect EU members and other countries in a way that helps them achieve their long-term economic expansion goals. The work of the EU Joint Research Centre on sustainable connectivity also assists the EU in understanding the relationship between connectivity and sustainable development (European Commission, 2022). Furthermore, it promotes international dialogue and policymaking through events such as the Asia-Europe Meeting and the EU's Connectivity Strategy.

2.2.5. Resources, Agriculture and Cohesion

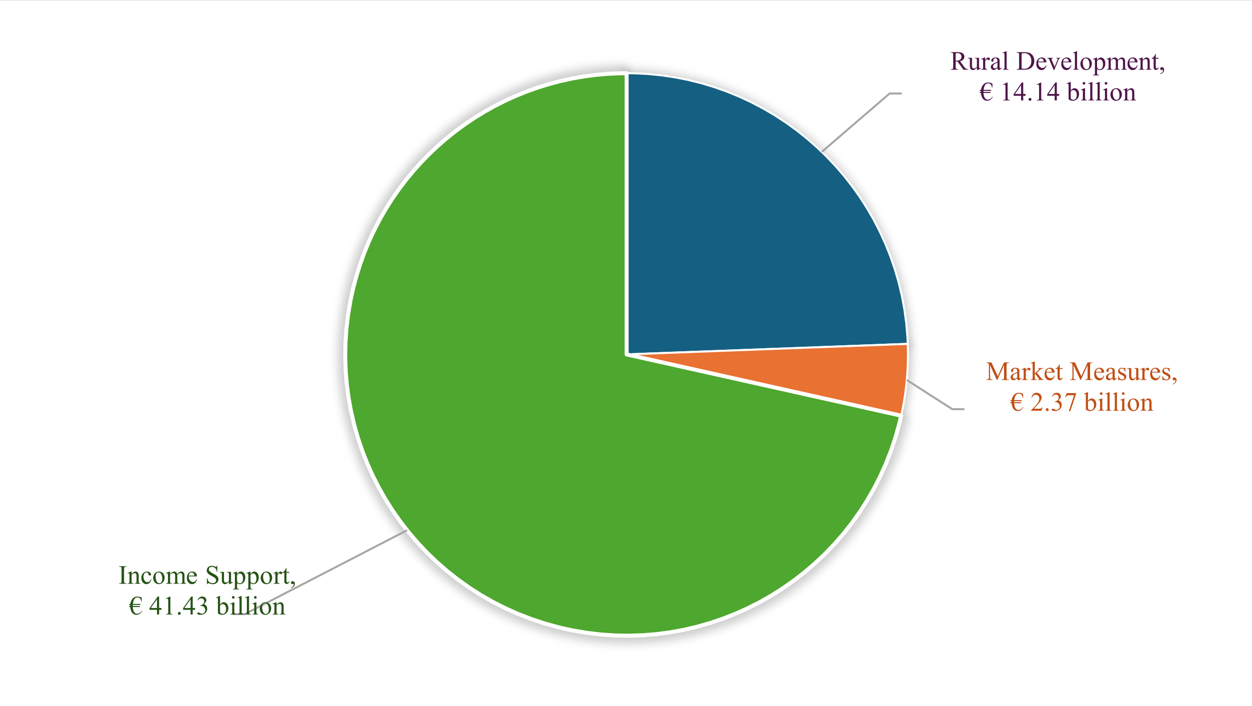
The candidate country is integrated into various EU policies like the agriculture and rural development policy, Food safety, veterinary & phytosanitary policy, Fisheries, Regional policy & coordination of structural instruments, and financial budgetary provisions (Darvas et al. 2019).

These policies have existed and been practiced by the EU members for several years. For instance, in 1962, the EU common agricultural policy (CAP) was initiated, and it is a collaboration between agriculture and the community, as well as Europe and its agricultural producers (Milward, 2003; Dinan, 2004; Makhavikova, 2018). The CAP is a shared policy among all EU members and very key to the union. It is administered and funded with EU budget resources at the European level. It aims to achieve the following objectives (European Commission, 2023):

1. Ensure a steady supply of inexpensive food by assisting producers and enhancing agricultural productivity.
2. Protect the means of subsistence of European Union producers.
3. Help combat climate change and ensure responsible utilisation of natural resources.
4. Save rural areas and landscapes throughout the European Union.
5. Maintain the rural economy by encouraging employment in agriculture, agri-food industries, and other related industries.

To the EU's CAP objectives, the union reported massive financing support to farmers in the union in 2019. This was in areas of income support, market measures and rural development measures (see Figure 2.2. below). The income support is administered through direct payments, which ensures income stability and compensates farmers for farming practices that are environmentally responsible while providing social services, such as maintaining the countryside which are not typically compensated by the market (European Commission, 2022). The income support formed about 72% of the total financing support to EU farmers in 2019. In addition to national and regional initiatives, the rural development support assists in addressing the distinctive necessities and hardships of rural areas. It was the second largest support to farmers in the CAP financing scheme in 2019. The CAP's financing support for market measures also seek to address challenging circumstances in the market, such as an unexpected decline in consumer demand due to an outbreak of illness or a drop in prices due to a short-term excessive supply on the market. As reiterated earlier, it is very crucial and cannot be bypassed by candidate countries to be a Member State of the EU, until full integration into the resources, agriculture, and cohesion policy of the union.

Fig. 2.2.
EU CAP financing support for farmers in 2019



Source*:* Author's work based on European Commission, CAP Financing (2023)

2.2.6. The EU's External or Foreign Relations

The Union additionally underscores its strategic interests and aims by means of its foreign endeavours which are enshrined in the United Nations Charter and International legal frameworks (Knodt and Princen, 2003; Costa, 2019). The Union pursue expansions and strengthens its political and trade affiliations with other nations and areas across the globe (Niţoiu, 2014). This is undertaking by the organisation during periodic summits with key strategic partners, including but not limited to the United States, Japan, Canada, Russia, India, and China (Wessel, 2021). Furthermore, it aids with the advancement of development, collaboration, and political discourse with nations situated in the Mediterranean, the Middle East, Asia, Latin America, Eastern Europe, central Asia, and the western Balkans (European Parliament, 2023).

Furthermore, the Union's external relations encompass several key areas, including the pursuit of a common foreign and security policy, the establishment of external commercial contacts, the implementation of development policies, expansion of the Union's influence in Europe, and building relations beyond their immediate geographical boundaries (Den Hertog and Stroß, 2013; European Parliament, 2023).

The purpose of the Common Foreign and Security Policy is to foster growth by means of treaties that uphold peace, bolster global security, encourage international collaboration, and reinforce democratic principles, the rule of law, as well as the protection of human rights and fundamental freedoms. The single market policy, as outlined in Article 207 of the Treaty on the Functioning of the European Union, designates the Union as the sole authority responsible for external trade relations (European Parliament, 2023). To address restrictions on trade and promote fair competition for its firms, the Union engages in various negotiations for various free trade agreements (FTAs), given the significance of commerce in its open economy (Wessel, 2021).

2.2.7. Summary

The EU evolved into a significant economic bloc globally, owing to its market size, international economic power, favourable trade policies for member states, and robust democratic and judicial institutions that reduce corruption. Also, the EU's common integrating policies provide a fundamental strength that the union has leveraged to influence international commerce, enhance global environmental rules, and foster investments and innovations across member states. This renders the union an appealing economic bloc for foreign investment and important for investment related studies.

2.3. EU ENVIRONMENTAL POLICY

Environmental policies are usually a combination of environmental targets with some specific instrumental means to achieve those targets. These environmental policy instruments are measures taken by local governments to manage pollutants of air and water bodies, solid waste, and degradation of natural resources (Mickwitz, 2003; Liao, 2018). The policy instruments are the backbone of green technological innovation and driving force of sustainable development. Previously, environmental policy instruments were classified into two main groups, namely, command-and-control instruments, and market-based instruments (Lindeneg, 1992). Until the 1980s, environmental policy was usually dominated by command-and-control instruments such as laws or regulations.

2.3.1. Command and Control Instruments

The command-and-control instruments are local governments environmental governance measures in the form of laws, regulations or standards which are meant to prohibit or impose limits on pollutant emission levels or manage production activities and behaviours of manufacturers (Stavins, 2003; Bergquist et al. 2013). This kind of environmental policy instrument is punishable by law should firms or enterprises violate them. It demonstrates a compulsory characteristic, with clear layout production process standards for firms to adhere without excuse. These clearly laid out production standards could be in the form of technology-based and performance-based (Stavins, 2003). Technology-based control standards spell out specifically the acceptable technology or industrial equipment for production process or firms and enterprises (Bergquist et al. 2013). Whereas the performance-based standards specify uniform emission targets for enterprises with little freedom in meeting requirements. The command-and- control instruments promise effective reduction in pollution and environmental degradation by forcing enterprises to responsibly share in the pollution management burden (Lindeneg, 1992). It does so with almost no regard to associated production cost to firms. Such cost can be disproportionately expensive between firms, making competition and growth difficult for smaller enterprises (Lindeneg, 1992; Bergquist et al. 2013; Liao, 2018).

A crucial aspect of EU environmental policy is the unequivocal establishment of its authority at the union level (Wallace, 1996). During the initial phase of the EU, this was not true regarding environmental policy. Nonetheless, the Single European Act and the Treaty on the EU have provided the ability for environmental policy to be established at the European level (Grant et al. 2000). Another significant element of EU environmental policy is that the directives are enacted and regarded as laws requiring compliance, making them possible to affect the operational activities of enterprises, despite enforcement standards differing among member states (Wallace, 1996; Grant et al. 1999). The European Court of Justice also play a crucial role in shaping the extent and relevance of the environmental policies and legislation (Grant et al. 2000; Wallace et al. 2020).

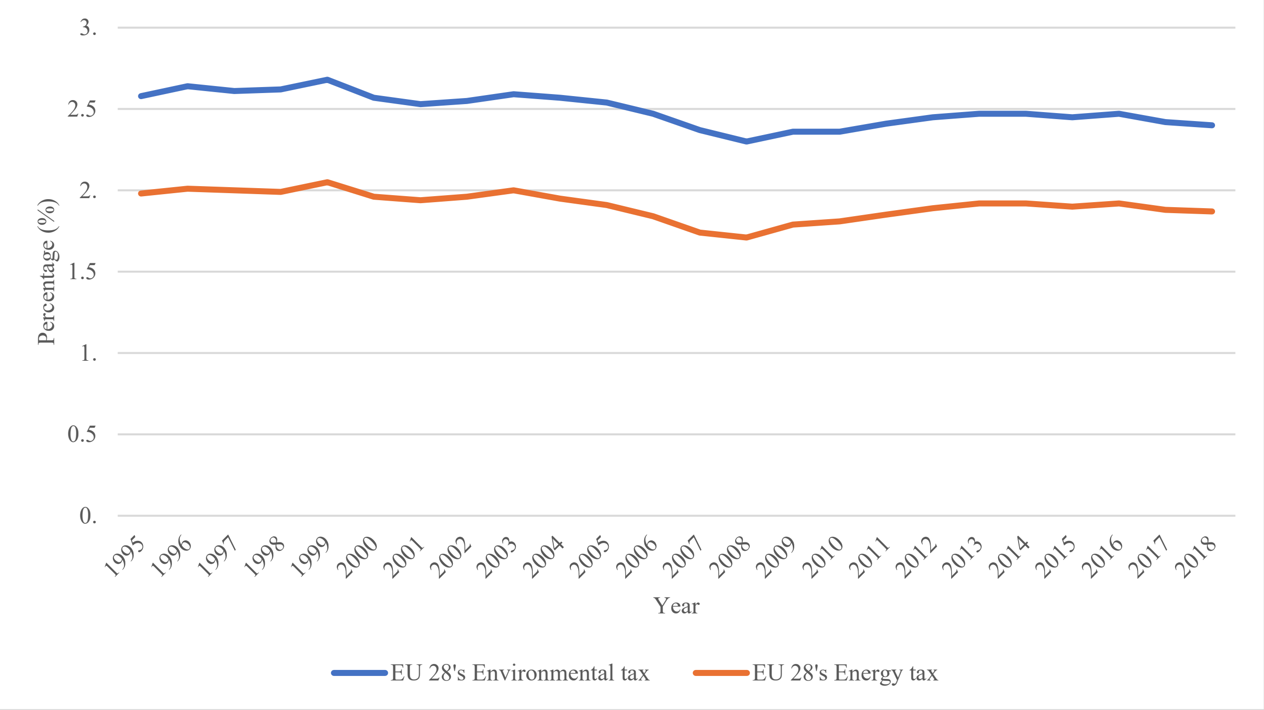
2.3.2. Market-based Instruments

After the 1980s, governments or local authorities of member countries in the EU have increasingly demonstrated interest in market-based instruments (Ekins, 1999). The market-based instruments use cost measures such as taxes to manage environmental pollution. In other words, market-based instruments capture the market failure that exist between achieving economic gains through investments and related environmental externalities, thus internalising externalities as additional production cost to be incurred by firms and or individuals (Liao, 2018). These instruments are aimed at encouraging sustainable growth behaviour by treating environmental externalities as implicit cost with market signals, rather than relying on explicit legal controls to manage the pollution levels or methods (Stavins, 2003). It is suggested that a well developed and implemented market-based instruments have potential to achieve desirable levels of pollution mitigations at the lowest possible cost to firms (Liao, 2018). Unlike the command-and-control instrument that set uniform targets to all firms, market-based instrument allocate pollution control cost effectively and uniquely among sources (Hemmelskamp, 1997). Also, the market-based instruments offer better incentives to invest in green technologies than command-and-control instruments (Hemmelskamp, 1997; Tews et al. 2003). Firms can compare pollution taxes likely to be incurred with the cost of acquiring a less expensive but more environmentally efficient method or equipment (Hemmelskamp, 1997; Requate, 2005; Bergek et al. 2014).

Despite the increasing interest of EU member states in market-based environmental regulation, such as tax revenues. Their environmental and energy taxes exhibit a marginal decline from 1995 to 2018, as illustrated in Fig. 2.3 below. The overall decline can be ascribed to the effects of worldwide economic crises (Burns and Tobin, 2016; Burns et al. 2020; Melidis and Russel, 2020; Lazzini et al. 2021). These include the early 1990s (global recession), 2000 to 2002 (dot-com or stock market bubble), and 2003 to 2011 (oil price bubble, US housing bubble, and global financial crisis). Nonetheless, revenues from both EU environmental taxes and energy taxes rise during economic recovery periods, acting as a deterrent to polluting activities and promoting environmentally sustainable development for holistic growth (Burns and Tobin, 2016).

Fig. 2.3

EU 28's Environmental and energy taxes as % of GDP from 1995 to 2018.



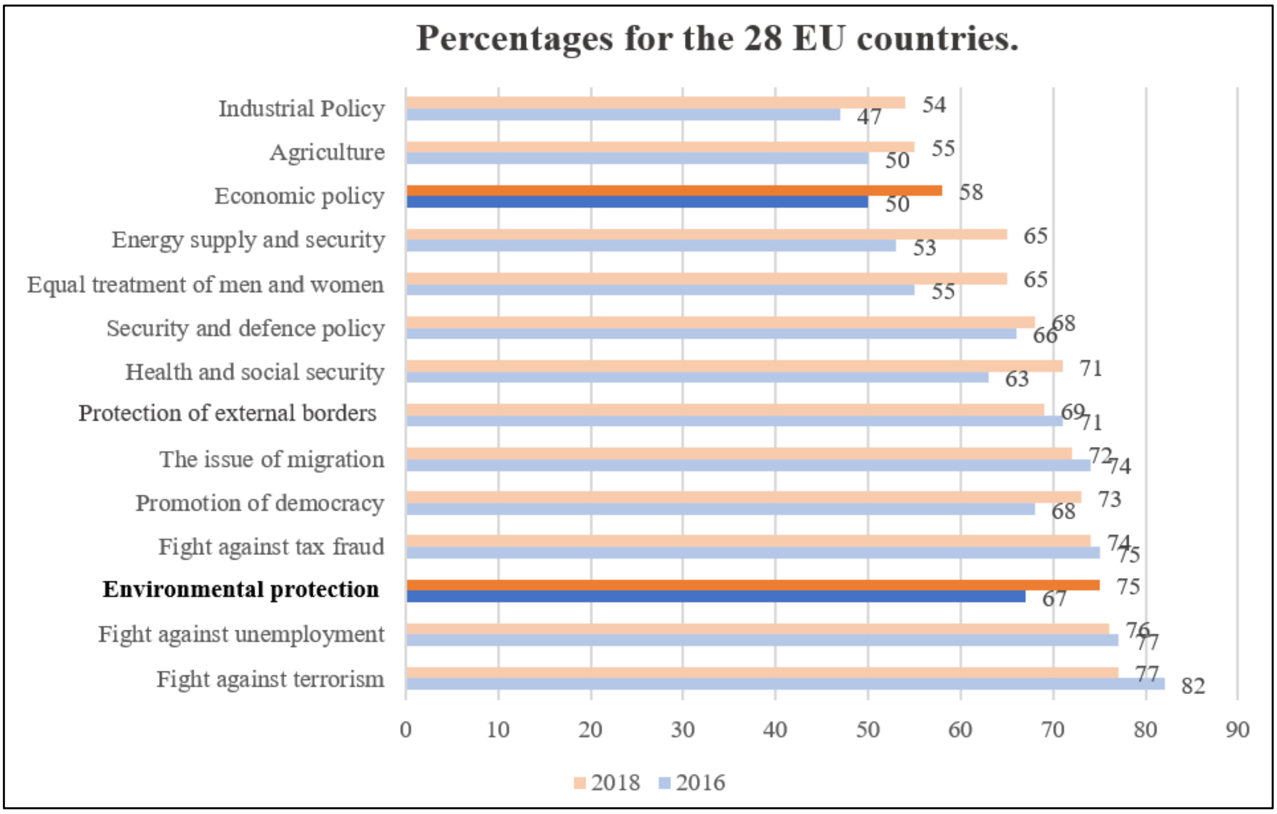
Source: Authors work based on Eurostat (2020) dataset.

2.3.3. Public Wilful Participation in EU Environmental Policy

Another form of environmental policy instrument recently emerging is called Public wilful participation policy (Stavins, 2003; Requate, 2005; Wurzel et al. 2013; Liao, 2018). The public wilful participation is where government make it a requirement for firms to provide pollution or environmental threat reports to both government and the public. This allows the public to get involve as environmental stakeholders and watchdogs to exert reasonable pressures on firms to meet environmental standards (Stavins, 2003; Mickwitz, 2003; Liao, 2018).

For instance, the EU parliament came under pressure from its citizens to enforce more stringent environmental measures during the 2018 Eurobarometer survey. The Eurobarometer survey conducted for the EU parliament reported that EU citizens demonstrated higher support for EU participation in stringent environmental policies (EU Parliament, 2019). Basically, environmental protection fell behind only fight against terrorism and fight against unemployment in the 2018 survey (see Fig 2.4 below). Other important issues like fight against tax fraud, promotion of democracy, issues of migration, protection of external borders, health and social security, security and defence policy, equal treatment of men and women, energy supply and security, economic policy, agriculture and industrial policy all fell behind environmental protection in the 2018 survey for citizens perception and expectations for future interventions by the EU parliament.

Fig 2.4.
Citizens Perceptions and Expectations for future interventions of EU Parliament action: Comparison of 2016 and 2018 results.



Source: Author's work based on Eurobarometer Survey 89.2 of EU Parliament (2018).

Specifically, the public perception and expectation of environmental protection increased from 65% in 2016 to 75% in 2018. Also, though public interest in economic policy and environmental protection all increased by additional 8% of 2016 results. The citizen's concern on environmental protection has been among the highest concerns since 2016 beyond interest in economic policies comparatively. Furthermore, the Members of EU Parliament (MEPs) called for the blacklist of tax haven in 2016 which is used to offer incentives to attract MNCs. This request was approved by 514 votes ''for'' to 68 votes ''against'', with abstentions of 125 (EU Parliament, 2018). All these show the high level of importance both citizens and governments of EU countries accord to environmental protection.

2.3.4. The EU Environmental Programmes.

In recent decades the European Union has been at the forefront of enforcing both command-and-control, and market-based environmental policy to mitigate the negative spill overs that accompany foreign investments into member countries (Levinson and Taylor, 2008; Kelemen, 2010). The EU has consistently devised Environmental Action Programmes (EAP) to improve the environmental standards and wellbeing of its members since 1972 (see Table 2.2. below; Hey, 2005; Haigh, 2015). Hence, citizens of the EU countries enjoy some of the most stringent environmental standards globally.

Table 2.2.
EU EAP starting from 1970s.

Action	Programme title	Introduction period
1st	Programme of Action of the European Communities on the Environment	1973 - 1976
2nd	European Community Action Programme on the Environment	1977 – 1981
3rd	Action Programme of the European Communities on the Environment	1982 – 1986
4th	EEC Fourth Environmental Action Program	1987 – 1992
5th	Community Programme of Policy and Action in Relation to Environment and Sustainable Development	1993 – 2000
6th	The 6th Community Environment Action Programme	2002 – 2012
7th	The 7th Community Environmental Action Programme	2014 – 2020
8th	The 8th Environmental Action Programme	2021 – 2030

Source: EU Parliament (2019) and WECOOP (2022)

2.3.1.1. *The 1st EU EAP*

The first EAP was ratified by the European Council in November 1972, covering the timeframe from 1973 to 1976. The inspiration for creating the program stems from the first United Nations Conference on the Environment convened in Stockholm in 1972 and the growing public and scientific interest in environmental protection (Hey, 2005). The conventional scientific reasoning supporting the program posits that enhanced economic development is interrelated or directly linked to environmental degradation (Andersen, and Liefferink, 1997). The idea struck a chord with many people in the EU, which led to environmental protection being seen as an important step to reduce the negative effects of growing economies. The objectives outlined in the first EU environmental protection program include the following (Hey, 2005).

1. To ensure prevention, minimisation and containment of damage to the environment.
2. To preserve the ecological balance.
3. To rationalise the use of natural resources.

The first environmental program established the initial strategy for setting targets for accomplishing environmental objectives (Popeanga, 2013; Hey, 2005). In order to avoid negative consequences, it also became necessary to conduct a full study of the implications of the environmental policies on other policy actions. Waste management and water and air protection were the strategy's main priorities (Hey, 2005).

2.3.1.2. *The 2nd EU EAP*

The second EAP was a significant extension of the first EAP, created for the period from 1977 to 1981 (EU Parliament, 2019; WECOOP, 2022). Likewise, the subsequent environmental initiative also promoted the preservation of nature by prioritising the maintenance of high-quality water and air (Popeanga, 2013). The evaluation of the second environmental action program during the initial phase was crucial. Nonetheless, its significance diminished throughout economic recessions from 1975 to 1978 and from 1981 to 1983 (Hey, 2005).

2.3.1.3. *The 3rd EU EAP*

The third EAP was approved by the European Union for the period of 1982 to 1986 and it highlighted considerable shift in the environmental policy approach by significantly focusing on the internal market compared to the previous EAPs (Haigh, 2015). The new aspects of the third EAP emphasised redefining the generalised environmental strategies and actions to consider preventive policies towards environmental degradation and not controlling mechanism. In other words, the potential dangers and advantages of environmental policies to the internal market formed the basis for developing the third EAP (Popeanga, 2013).

The third EAP emphasised the necessity of standardising emission regulations to prevent distortions in industry competitiveness and the economic advantages derived from environmental policy implementation, particularly in terms of beneficial impacts on the labour market (Hey, 2005; Jordan, 2012; Haigh, 2015). A significant element in the historical development of environmental policies at the EU level was the passage of the Single European Act in 1986, ratified in 1997, which ensured the legal incorporation of environmental policy into the EC Treaty (Treaty of Rome, 1957). The Single European Act was incorporated into the Treaty of Rome under Title VII "Environmental Policy," which delineated specific objectives, including the preservation, safeguarding, and enhancement of the environment, safeguarding of health, and the judicious use of natural resources (Hey, 2005; Popeanga, 2013). The Single European Act stipulates that environmental policy must be included in other community policies, and member states are required to implement more sustainable environmental initiatives.

2.3.1.4. *The 4th EU EAP*

Yet, the Fourth EAP (1987–1992), moved towards implementing the Articles single provisions, made it much more obvious that there was a choice to take on distinct duties at the community level and to take a horizontal approach to environmental concerns (Popeanga, 2013). The year 1987 is considered a pivotal moment in European environmental policy, as it was the year when the environment was incorporated into its own chapter in the Treaty of Rome (Hey, 2005). Nonetheless, from a practical perspective, it seems that despite the elevated status of environmental policy, continuity prevails over apparent change, as the principles and fundamental elements of environmental policy were established in the treaty and earlier policy documents.

The Fourth EAP signifies a shift in the methodology of environmental policy. The deficiencies of the prior EAP (e.g., quality policy, emissions focus) were acknowledged, and for the first time, the environment was seen not as an ancillary consideration but as an integral component of the entire process of production (Popeanga, 2013; EU Parliament, 2019). This idea arose from an aspiration to diminish energy usage, reduce the consumption of materials, and close manufacturing cycles to minimise waste streams. Consequently, the fourth performance assessment method (PAM4) developed "sectoral approaches" by evaluating the environmental effects of strategic economic sectors (Hey, 2005). This program introduced incentive-based instruments for the first time, including taxes, subsidies, and tradable emission allowances.

The a significant aspect of the program is the improvement of the community environmental policy and ensuring the European integration model demonstrate that protecting the environment doesn't have to be at odds with economic goals (Popeanga, 2013). In fact, it was anticipated to be used to make the economy more viable and competitive, which are important for growth and prosperity. This represented a preliminary devotion to the strategic redirection of environmental policies inside the European Union, occurring progressively from 1989 to 1994 (Barnes and Barnes, 2000; EU Parliament, 2019). The core principles of the fourth EAP were further refined in subsequent years. Consequently, this initiative has transformed environmental policy from an ancillary consideration to a fundamental component of economic decision-making (Hey, 2005). Since 1990, the notion of "sustainable development" has progressively emerged as a normative benchmark for EU environmental policy. All EU community initiatives encouraged environmental mainstreaming and systematic pursuit of "no regret strategies" (Hey, 2005; Popeanga, 2013). Also, mutually advantageous win-win scenarios were identified where ecological and economic aims may align and yield reciprocal advantages. Several external factors facilitated the progression of innovative strategies in environmental policy. Key elements included the establishment of new global framework, arrangements for the 1992 UNCED conference, widespread backing for economic devices, and the rise of a new ecological lifestyle in Europe (Hey, 2005).

2.3.1.5. *The 5th EU EAP*

Constructed concurrently with the Rio Conference (1992) and the introduction of Agenda 21, the fifth EPA (1993-2000), titled "Towards Sustainability," was when extensive dedication was made by the EU community to adopt the sustainable development model (Popeanga, 2013). The environment is one of the three pillars of sustainable development and is especially significant for the disadvantaged, who are more susceptible to pollution and natural disasters. The interplay between economic growth, social integration, and conservation of the environment underscores the necessity of recognising the environment as an essential foundation of sustainable development.

The Fifth Environmental Action Programme contained several noteworthy and innovative components (Hey, 2005; Popeanga, 2013), including:

- The Brundtland Report's definition of sustainable development as its primary objective.
- Allusion to the sectoral strategy, which incorporates an environmental dimension into the most polluting sectors (transport, energy, agriculture, etc.), and the constraints of traditional

end-of-pipe methods. In contrast, the action programme advocated for structural reform that would prioritise energy efficiency, waste prevention, and public transport.

- The focus on new instruments, particularly market-oriented instruments like tax incentives or optional instruments, which bolster the interests of producers and consumers in environmental decision-making.
- The new consensus-oriented approach recognises the critical role of non-governmental actors and local/regional the government in defending the general interest of the environment. This has the potential to foster the development of innovative ideas, increase awareness among the public, and enforce the execution of EU directives.
- The establishment of intermediate and long-term targets for lowering of certain pollutants, along with the proposed instruments for accomplishing these targets.

Therefore, the Fifth Environmental Action Programme contained all the essential components of a policy that was designed to bring about "ecological structural change" in its philosophical component.

2.3.1.6. *The 6th EU EAP*

The sixth EAP which was formulated for the period of 2002 to 2012. This European environmental policy initiative is amidst a trend of diminishing support for assertive environmental policy (Hey, 2005). New member states' developmental priorities, deregulation associated with European governance discussions, and economic factors shaped the political agenda (Popeanga, 2013). The sixth EAP aimed to address persistent environmental challenges such as climate change, biodiversity loss, and resource overconsumption through a holistic approach. It provided a set of fundamental principles and goals, which will be further defined through thematic approaches (Hey, 2005). The sixth EAP used a careful strategy, focusing on collaborative methods in environmental policy formulation, such as integrated product policies, expanded standardization for environmental regulations, voluntary agreements, and partnerships with member states' expert forums (Popeanga, 2013). However, the complexity of policy methods and the need for more funding and resources placed limitations on the effectiveness of the collaborative management.

2.3.1.7. *The 7th EU EAP*

Based on the WECOOP (2022), the seventh EAP which was formulated for the period from 2014 to 2020 has been a very useful mechanism that has contributed to shaping the projected 2050 environmental policy among member countries. It has effectively achieved firm international connections with swifter and more proactive coordination. Also, the seventh EAP has encouraged the transformation of EU environmental policymaking by promoting climate and environmental protection as the significant instruments for delivering green growth, and quality health conditions in the planet. The three key objectives of the union for the seventh EAP were stated as follows (Popeanga, V., 2013; WECOOP, 2022).

1. Protect, conserve, and enhance the Union's natural capital.
2. Transitioning the Union into a resource-efficient, green, and competitively low-carbon economy.
3. Protecting the Union's citizens from environment-related pressures and risks of health and wellbeing.

These objectives were driving by what the Union call, the four enablers which include better implementation of legislation, better information by improving the knowledge base, increase prudent investments for environmental and climate policy, and full integration of environmental requirements and considerations into other policies (European Environmental Agency, 2019; WECOOP, 2022).

2.3.1.8. *The 8th EU EAP*

Having vehemently pursued the 7th EAP with strict environmental measures. The Union has just introduced the 8th EAP which started in 2021 and is to end until 2030. The purposes of the 8th EAP are to facilitate the environment and climate action objectives of the European Green deal. The European Green Deal was presented by the European Commission on 11th December 2019 as environmental protection roadmap for structural response in promoting economically, resource-efficient, and socially sustainable economy for the EU (WECOOP, 2022).

The report of WECOOP (2022) stated 6 objectives of the European Green Deals, which include the following:

1. Achieve the 2030 greenhouse gas (GHG) emission target and climate neutrality by 2050.

2. Enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change.

3. Advancing towards a regenerated growth model, decoupling economic growth from resource use and environmental degradation, and accelerating the transition to a circular economy.

4. Pursuing a zero-pollution ambition, including for air, water, and soil, and protecting the health and well-being of Europeans.

5. Protecting, preserving, and restoring biodiversity, and enhancing natural capital (notably air, water, soil, and forest, freshwater, wetland, and marine ecosystems).

6. Reducing environmental and climate pressures related to production and consumption.

While combining domestic policies with international collaboration, the EU legislation sets an intermediate goal to achieve climate neutrality by 2050, reducing net greenhouse gas emissions by 55% by 2030. In addition, the EU is promoting low-carbon technologies and adaptation strategies across various policy areas, including transport and energy to protect natural habitats, maintain air and water quality, and promote efficient waste management (EU environmental legislation, 2024). Particularly, their environmental policy aims to protect natural capital, transform the EU into a resource-efficient, environmentally sustainable, and competitive low-carbon economy, and safeguard citizens from environmental pressures and health risks (European environmental agency, 2019).

2.3.5. Summary

The EU's dedication to enhancing environmental quality while fostering economic growth through environmental initiatives has positioned it at the forefront of environmental advocacy. The citizen's deliberate participation has also contributed to the consensus typically reached by member states about the enforcement of stringent environmental standards. Although the rigours of environmental policy enforcement differ among member states, the union's integrated judicial system provides robust support for environmental rules that all domestic and international investment firms must adhere to. These unique characteristics of the EU makes the region interesting for examining how their strict environmental policy influence the location decisions of multinational companies involved in direct investments.

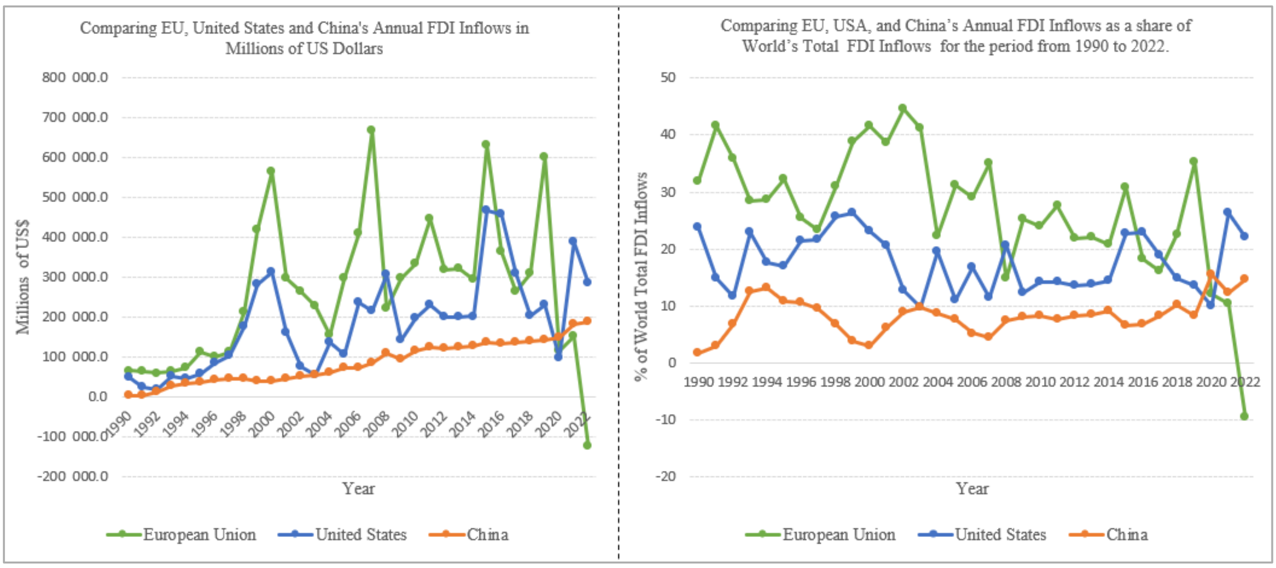
2.4. EUROPEAN UNION FDI INFLOWS

2.4.1. EU FDI Inflows Compared with United States and China

Over the course of several decades, the EU has received the largest share of global FDI. Until 2020, Fig. 2.5 below demonstrates that, relative to the United States and China, the EU dominated in terms of its share of the world's total FDI inflows, both in terms of its share and in current US dollars. Prior to 2020, only 2008 and 2018 both of which saw significant global financial crises and led to the EU's share of FDI inflows fall to second place behind the United States (UNCTAD, 2009). The value of EU FDI inflows decreased from approximately 670 trillion U.S. dollars in 2007 to approximately 230 trillion U.S. dollars in 2008 (Elsa and Radoslav, 2011). Consequently, the proportion of the EU's global FDI inflows declined from approximately 36% to 15%. In contrast, the United States' value for FDI inflows increased from approximately 216 trillion US dollars in 2007 to approximately 307 trillion US dollars in 2008, giving the United States the highest proportion of the world's total FDI inflows at approximately 21%, up from approximately 12% previously. Despite China's increase from 84 trillion US dollars in 2007 to 109 trillion dollars in 2008, the increase was so small that China maintained its position as the third-largest recipient with a share of approximately 9 percent.

Fig. 2.5.

Comparing FDI inflows of the EU to the United States and China



Source: Estimated by the author based on UNCTAD (2023) reported statistics.

Following a decline in the EU's FDI inflows, the Union's share of the world's total FDI inflows moderately recovered in 2009 to around 26% due to an instantaneous increase in equity capital and reinvested earnings (European Commission, 2022). In 2009, the United States share of the world's total FDI inflow decreased to 12%, while China's share remained at 9%, making them the second and third highest recipients, respectively. Over the past 33 years, from 1990 to 2022, the EU has maintained the highest share of the world's FDI inflows for 27-year periods, and the second highest share for 4-year periods and trailed the United States and China in 2021 and 2022 due to the COVID-19 pandemic and Brexit issues with the United Kingdom (European Commission, 2022). Therefore, according to Dorakh (2020a), it can be argued that EU membership plays a crucial role in attracting higher levels of FDI.

2.4.2. Patterns of Annual FDI Inflows in Millions of US$ Among EU Member States.

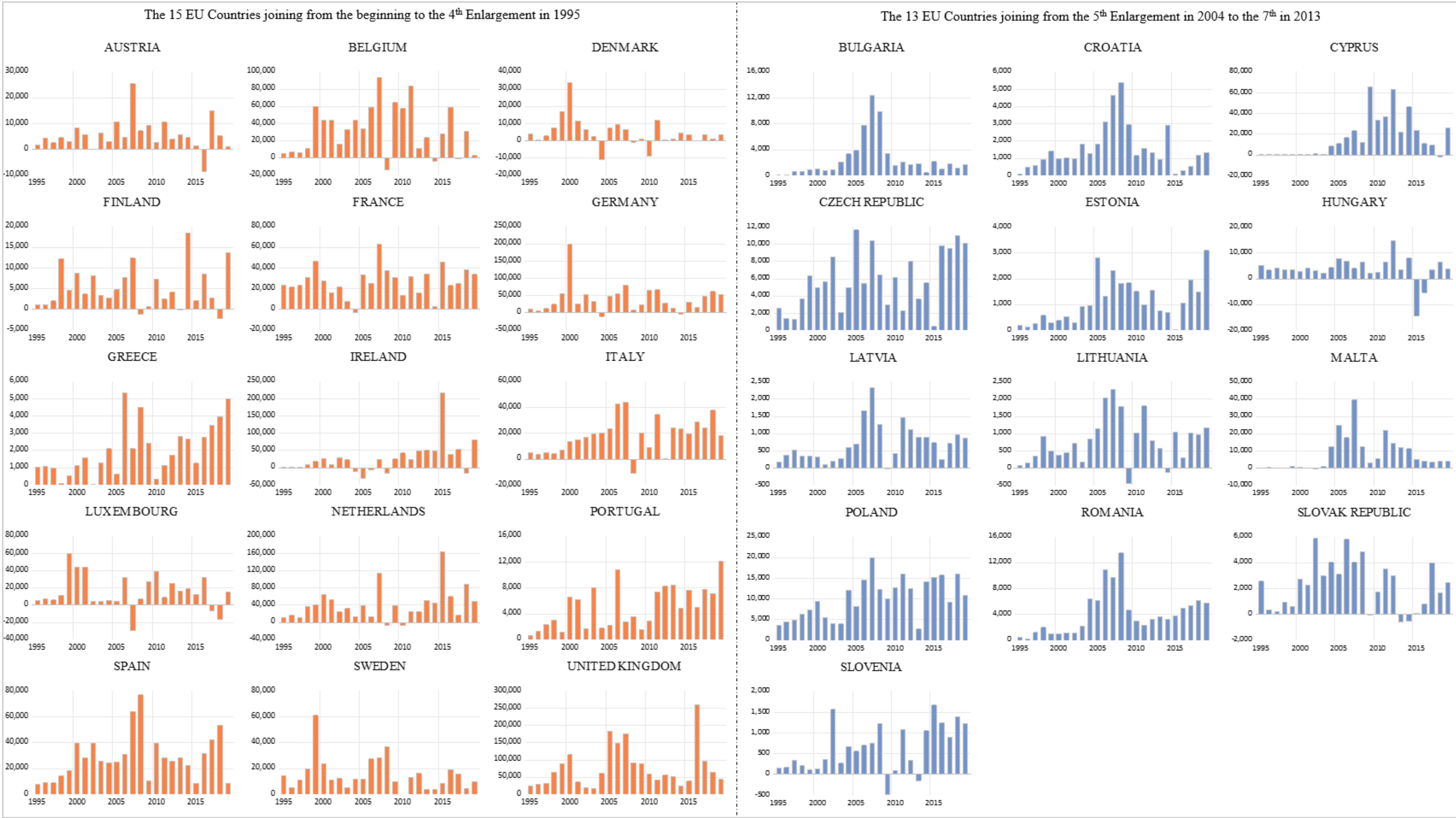
The pattern of FDI inflows among the Member State can be explained better by taking into consideration the year of accessions. In that Fig 2.6 below classifies the EU countries into two groups which are the 15 countries that were part of the EU before 2004 and the 13 countries that joined from 2004 to 2013. Based on UNCTAD (2022) FDI report for these two groups, it is evident that the annual volumes of FDI inflows in US$ are larger for most countries that were members before 2004 than those that joined from 2004. Notwithstanding, among the 15 countries that were members before 2004; Austria, Denmark, Finland, Greece, and Portugal are the few that usually receive on average not more than 10 billion US $ over the period of 1995 to 2019 which is similar to that of the 13 countries that joined from 2004. Not to be wrongly interpreted, at peak times Austria for instance increased from around 3 billion US$ in 2004 to 11 billion US$ in 2005. Following this increase, Austria’s FDI inflows decreased to around 5 billion US$ in 2006 but recovered from the fall and achieved a massive FDI inflow of around 26 billion US$ in the following year in 2007. Such fluctuations in the amount of FDI inflows continues over the subsequent years for Austria. Lomachynska et al. (2018) attributes the increase in the values of FDI inflows to Austria from 2005 as positive shock resulting from the EU enlargement that occurred in 2004. While the lack of sustainability in the increase in the amount of FDI inflows, they attributed to Austria pursuing a position of donor and not recipient of foreign capital. Likewise, Denmark, Finland, Greece, and Portugal all had increase after the enlargement but the value of FDI received were basically below 10 billion US$ and unsustainable for these countries.

In contrast, the remain 10 countries that were members before 2004 received larger volumes of FDI inflows usually over 10 billion US$ both before and after the expansion in 2004. Belgium from 1999 to 2001 received not less than 40 billion US$ worth of FDI inflows. Though the amount declined in 2002, it recorded 17 billion US$ that year and recovered from the fall and increased consecutively to approximately 34 billion US$ in 2003, 44 billion US$ in 2004 (during enlargement) and saw its highest of 94 billion US$ in 2007. In the years after 2004 also saw large amount of FDI inflow received by Belgium. France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, and United Kingdom. Specifically, the United Kingdom is a major dominant recipient recording as much as approximately 116 billion US$ in the year 2000, 183 billion US$ in 2005, 148 billion US$ in 2006, 177 billion US$ in 2007 and a record high of 260 billion US$ in 2016. The UK became the second largest to the United State in the year 2016 because of various megadeals the country achieved in that year (Serwicka and Tamberi, 2018). However, after the Brexit referendum in 2016, the years after having seen very large decrease in the amount of FDI from 2017 to 2019 (Khan, 2023).

Though, there was a general increase in FDI inflows across Member States after the 2004 enlargement. The amount of increase experienced in the 13 new countries joining from 2004 to 2013 was significantly lower compared to older Member States. Except for Cyprus, Poland and Malta which increased in most cases after joining the EU beyond the amount of 10 billion US$, majority of the new Member States increased but usually below 10 billion US$. While Poland recorded its largest amount of around 20 billion US$ in 2007 and Malta received approximately 40 billion US$ in 2007. Cyprus also received around 66 billion US$ in 2009, 64 billion US$ in 2012 and though it reduced subsequently the amount are quite significant compared to other new Member States. In general Fig 2.6 shows that usually the accession of new Member States results in huge amounts of FDI inflows into the EU with old members benefiting the most from FDI inflows.

Fig.2.6.

EU Countries' FDI Inflows Millions of US$ from 1995 to 2019



Source: Author's work based on UNCTAD (2022) data sets.

2.4.3. Patterns of Annual GDP and FDI Inflows % of GDP Among 28 EU Member States.

Table 2.3.

The EU Countries Annual GDP in Billions (constant 2015 US$) from the year 2014 to 2020.

By Accession	2014	2015	2016	2017	2018	2019	2020
I5 Countries joining from beginning to 1995							
Austria	378.13	381.97	389.57	398.37	408.03	414.22	387.49
Belgium	453.09	462.34	468.19	475.77	484.31	495.26	468.70
Denmark	295.74	302.67	312.50	321.32	327.71	332.60	325.97
Finland	233.27	234.53	241.13	248.83	251.66	254.74	248.75
France	2,412.34	2,439.19	2,465.91	2,522.41	2,569.46	2,616.81	2,413.10
Germany	3,308.23	3,357.59	3,432.46	3,524.46	3,559.04	3,596.65	3,463.69
Greece	196.07	195.68	194.73	196.86	200.14	203.91	185.55
Ireland	234.60	291.78	297.63	324.43	352.10	371.26	394.22
Italy	1,822.45	1,836.64	1,860.39	1,891.42	1,908.93	1,918.16	1,745.92
Luxembourg	58.74	60.07	63.06	63.89	64.67	66.17	65.64
Netherlands	750.86	765.57	782.35	805.13	824.13	840.25	807.60
Portugal	195.88	199.39	203.42	210.55	216.55	222.36	203.91
Spain	1,151.94	1,196.16	1,232.49	1,269.17	1,298.16	1,323.92	1,173.98
Sweden	483.40	505.10	515.56	528.80	539.11	549.82	537.89
United Kingdom	2,866.27	2,934.86	2,998.40	3,071.67	3,124.04	3,174.16	2,824.03
13 Countries joining from 2004 to 2013							
Bulgaria	49.14	50.83	52.37	53.82	55.26	57.50	55.22
Croatia	49.49	50.74	52.55	54.34	55.86	57.77	52.82
Cyprus	19.25	19.91	21.22	22.43	23.70	25.01	23.92
Czechia	178.42	188.03	192.80	202.77	209.30	215.64	203.77
Estonia	22.47	22.89	23.61	24.98	25.93	26.90	26.75
Hungary	120.70	125.17	127.93	133.39	140.55	147.38	140.70
Latvia	26.24	27.26	27.91	28.83	29.98	30.75	30.08
Lithuania	40.61	41.44	42.48	44.30	46.07	48.20	48.19
Malta	10.12	11.09	11.47	12.72	13.50	14.45	13.20
Poland	457.08	477.11	491.20	516.45	547.15	571.50	559.96
Romania	172.43	177.88	182.97	197.96	209.90	217.99	209.97
Slovak Republic	84.53	88.90	90.63	93.29	97.05	99.49	96.17
Slovenia	42.18	43.11	44.48	46.63	48.70	50.38	48.21

Source: World Development Indicators (WDI), (2023) Statistics.

To discuss the annual FDI inflows as percentage of GDP for each EU Member States, it is very important to also understand the size of these countries' economy. In Table 2.3 above, it is observed that based on WDI (2023) report almost all the 15 countries in the EU that joined before the year 2004 achieve huge GDP above 100 billion US$ for each selected years with the exception of Luxembourg that falls behind. Noticeably, the GDP of Italy and Spain are over 1 trillion US$, France is over 2 trillion US$, the United Kingdom is also around 3 trillion during periods of economic expansion and Germany is over 3 trillion US$ for each reported year. Compared with the 13 countries that joined the EU from the year 2004 to 2013 only four countries have their GDP greater than 100 billion US$. These countries include Hungary is also around 120 to 140 billion US$, Czechia and Romania with each countries' GDP around 200 billion US$, and Poland with the largest GDP around 450 to 550 billion US$ from the year 2014 to 2020. All the remaining 9 countries have their GDPs below 100 billion US$ with Malta having the least for each selected year which is between 10 to 15 billion US$.

Despite Italy, Spain, France, the United Kingdom, and Germany receiving substantial amounts of FDI inflows, as shown in Figure 2.6 above, their FDI inflows as a proportion of their respective GDP have typically remained below 10% from 1995 to 2019 (see Fig 2.7 below). This is obviously because their GDPs are very large and are less dependent on foreign capital. This does not necessarily imply that FDI inflows do not foster economic expansion in these countries as the evidence appears to be mixed in existing literature. For instance, Khan (2023) while testing about the effects of decreasing amounts of FDI inflows to United Kingdom on the GDP due to the Brexit referendum in 2016 found a negative impact at 1% significant levels. But in the case of Spain, Bermejo Carbonell and Werner (2018) finds that FDI inflows plays no significant role in promoting GDP growth based on their empirical results. Also, for the entire European countries, Pegkas (2015) finds FDI inflows as significantly useful in increasing their GDP.

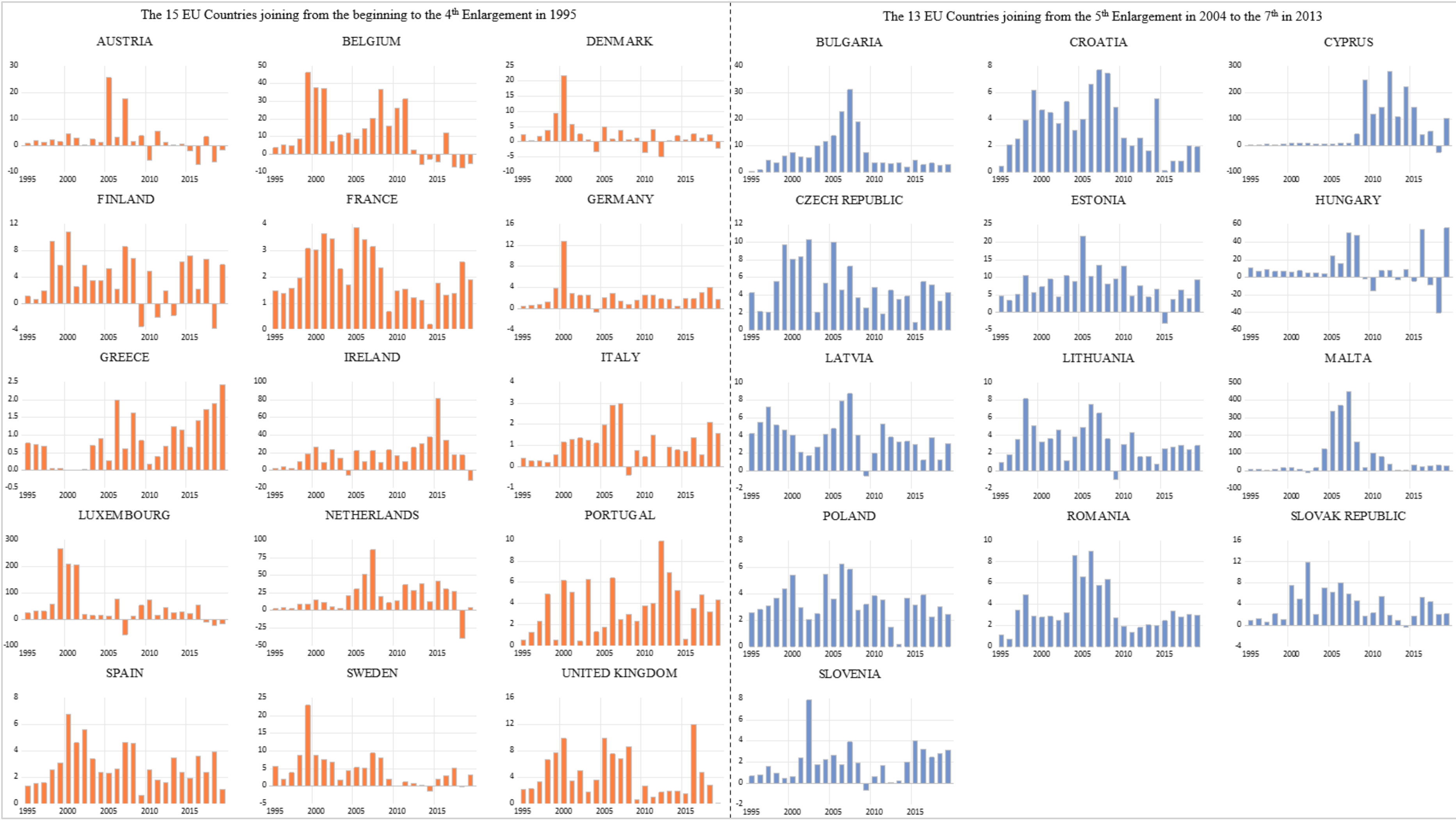
Also in Fig 2.7 below, older Member States like Austria, Denmark, Finland, Greece, and Sweden also usually have their FDI inflows as percentage of GDP below 10%. But Greece's FDI Inflows percentage of GDP is very small and usually below 2.5% due to the small amount of FDI inflows the country receives. Vlachos et al. (2018) says they conducted a primary data collection in 2018 from Chief Executive Offices of MNCs operating in Greece and found higher ratings for barriers to FDI inflows in Greece and lower ratings for attracting FDI Inflows. Moreover, the amount of FDI inflows received forms more than 10% of the GDP of Belgium, Ireland, Luxembourg, and the Netherlands over the period of 1995 to 2019.

Furthermore, the countries that joined the EU from 2004 to 2013, most of them also have their FDI % of GDP usually below 10% except for Bulgaria, Cyprus, Estonia, Hungary, and Malta. These 5 countries experienced larger amounts of increase in their FDI Inflows after joining the EU that the foreign investments started forming larger shares of their smaller sized economies. Like Malta whose GDP for the year 2004 is around 7.1 billion US$, 2005 is 7.4 billion US$, 2006 is 7.6 billion US$, 2007 is 7.9 billion US$, and 2008 is 8.2 billion (WDI, 2023). However, Malta received FDI inflows for these same years of approximately 12.7 billion US$ in 2004, 25.1 billion US$ in 2005, 17.7 billion US$ in 2006, 39.7 billion US$ in 2007, and 12.7 billion US$ in 2008. This resulted in Malta experiencing high FDI inflows as % of GDP of approximately 122.5% in 2004, 339.8% in 2005, 369.4% in 2006, 449.1% in 2007, and 163.3% in 2008. Similarly, Bulgaria, Cyprus, Estonia experienced huge rise in their FDI inflows % of GDP for the same reasons as Malta. In general, membership to the EU has enhanced attractiveness of Member States to receiving large amounts of foreign capital inflows. Fig 2.8 below also makes it clear that mergers and acquisition sales are the most common means for foreign investors to enter the 15 countries that joined the EU before 2004. While greenfield investments are the main way for foreign companies to get into the 13 countries that joined from 2004 to 2013.

Lastly, despite the significant amount of FDI received by the EU annually. To the best of the author's knowledge the region is yet to receive significant empirical account on the relationship between its FDI inflows as well as mode of entries and their market-based environmental policy variables. This paper will contribute to the theoretical literature by providing insights to serve as a guide for local governments or Members of EU Parliament, and the Directorate-General for Environment who are responsible for the environmental related policies of the Union.

Fig. 2.7.

EU Countries' FDI Inflows % of GDP from 1995 to 2019



Source: Estimated by the author based on UNCTAD (2022) Statistics

Fig. 2.8.

EU Countries' Greenfields FDI (GFDI), and Value of Announced Mergers & Acquisition sales (M&A) in Millions of US$ from 2003 to 2019

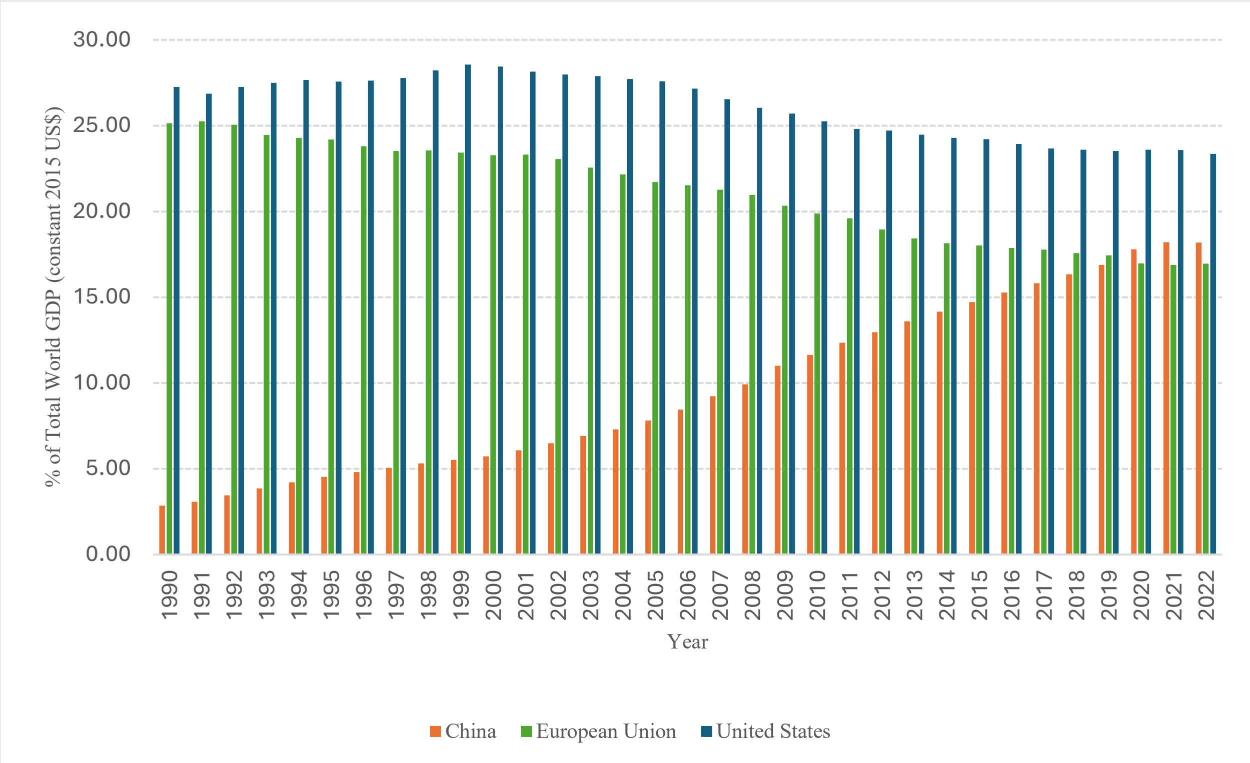
Source: Based on UNCTAD (2022) Statistics.

2.5.THE EU'S ECONOMIC POSITION IN THE WORLD.

Currently, as well as in preceding decades, the EU has gained recognition as one of the globe's major economies, alongside the United States of America (USA) and China. For example, according to the World Bank World Development Indicator (WDI) report of 2023, the EU's economy has been ranked as the second largest in terms of its proportionate contribution to the World's Gross Domestic Product (GDP) since 1990 to 2019. The United States holds the first position, while China has stayed behind until 2020. (See Figure 2.9 below).

Fig 2.9.

Comparison of the EU, United States and China's Share of World's Annual GDP in constant US$ From 1990 to 2022.

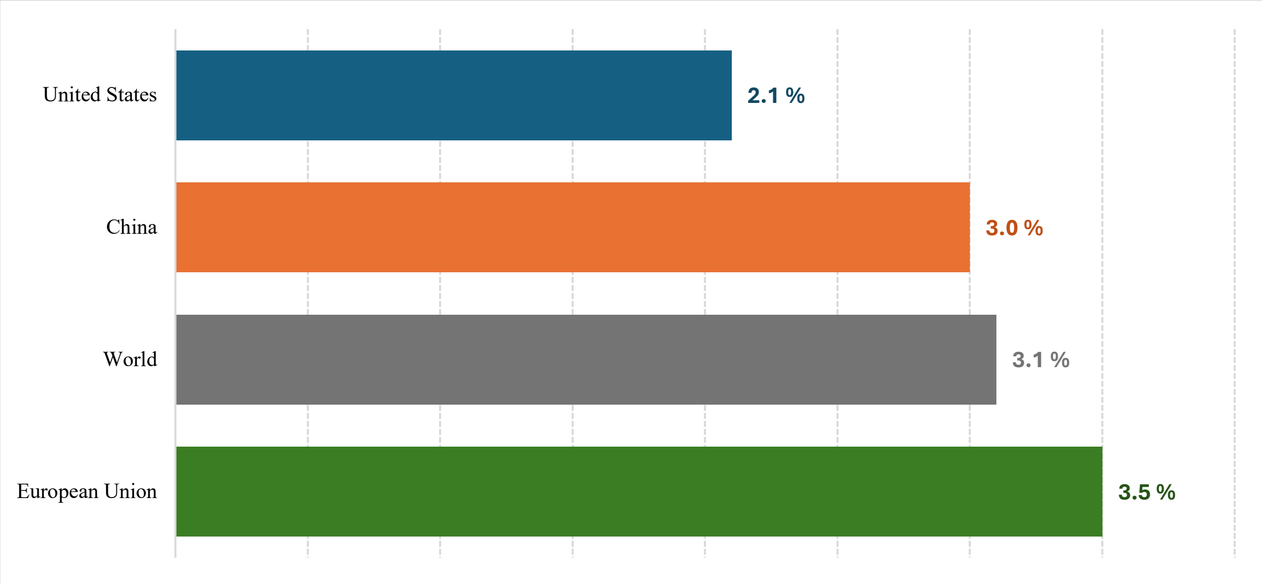


Source: Estimates by the author based on World Development Indicators (2023)

In the wake of significant global events such as the COVID-19 pandemic in 2020 and the withdrawal of the United Kingdom from the European Union (Brexit), China has since emerged as the world's second-largest economy, while the European Union lag at third position. This shift in economic position can be attributed to the aforementioned events, which occurred in the period following 2019. However, it is worth noting that the EU has consistently held a share of around 17% of the global GDP between the years 2020 and 2022. In comparison, China and the United States have contributed approximately 19% and 24% to the global GDP, respectively. Furthermore, it is worth noting that although the EU holds the third position in terms of global economic rankings, an analysis of the yearly GDP growth rate using WDI (2023) data report indicates that in 2022, the EU witnessed the highest growth rate of 3.5%. In comparison, the United States and China recorded growth rates of 2.1% and 3.0%, respectively (see Fig 2.10 below).

Fig 2.10.

Comparing 2022 Annual GDP Growth rate of the EU, United States, China, and the World.



Source: Estimated by the author based on World Development Indicators (2023) Statistics

Moreover, the EU has wielded considerable influence on the global trading system as a result of its longstanding economic prominence, due to its huge GDP of around 15.21 trillion US$ in 2022, and its fundamental commitment to market openness. For instance, the EU has made a significant contribution through its support for shaping the World Trade Organisation (WTO). The European Union has also experienced significant advantages as a result of its inherent economic openness. According to the European Parliament (2023), due to the Union's economic and investment attractiveness, international trade and FDI have led to the creation of more than 30 million jobs within the EU. Therefore, in compliance with the regulations established by the Union, it is crucial that the foreign relations policies of candidate nations are comprehensively integrated into the external relations policy framework of the European Union before being granted full membership status. This demonstrates that the EU has a very formidable economy and qualifies as an interesting economy to receive researchers' attention in various academic studies like their FDI attractiveness.

2.6. CONCLUSION

This chapter provided insights into the unique integrating policies commonly shared by EU member countries. It has also demonstrated the long commitment and consistency of EU to its environmental policy programmes and how they have evolved over time. For the past three decades, the EU has consistently ranked as one of the leading recipients of direct investments from multinational corporations. Thus, the region presents a compelling opportunity for examining the relationship between direct investments and environmental policy. The demonstration of uncompromising integration policies during membership accession processes also indicates that all member countries rigorously enforce their environmental policies to comply with the union's plans. The next chapter will explore the theories of FDI and environmental policy

CHAPTER 3

Definition and Theoretical Foundations of FDI

3.1. INTRODUCTION

This chapter seeks to describe the nature of direct investments and covers its components, measurement method, modes of entry into host countries, and the advantages and disadvantages. It also explains the theories underpinning FDI and provide clarity of which theory this thesis aligns with. The United Nations Conference on Trade and Development's (UNCTAD) Handbook of Statistics (2019) refers FDI as any investment made by a foreign investor, who is a resident of one country, and in an enterprise that is resident in another economy. This investment is characterised by the lasting interest and control exerted by the foreign direct investor. According to Bruno et al. (2023), the International Monetary Fund (IMF) describes FDI as a form of investment that occurs across national borders when an investor residing in one economy exercises total control or exerts a substantial level of influence over the management of an enterprise located in another economy. In addition, the official document on access to markets by the European Commission classifies investments into two distinct categories: foreign direct investments and non-direct investments which are also referred to as portfolio investments (European Commission, 2023). According to the Commission, foreign direct investments refer to the act of investing in another country's assets or acquiring ownership stakes in its enterprises by a company, multinational corporation, or individual from a different country. Typically, international expansion is achieved through either purchasing ownership in an established firm within a foreign country or establishing a subsidiary to facilitate the expansion of an existing enterprise in that country. In contrast, overseas portfolio investments occur when firms, financial institutions, or individuals acquire ownership interests in companies listed on foreign stock exchanges. The objective of this particular investment is not to obtain a majority stake in the company that issues it. This form of investment is commonly characterised by its short-term duration, as it is strategically undertaken to capitalise on advantageous fluctuations in currency exchange rates or to generate immediate profits from disparities in interest rates. This investment option offers investors the ability to diversify their portfolios and effectively handle the related risks. Foreign portfolio investment can also play a significant role in bolstering domestic capital markets by augmenting liquidity and contributing to the enhancement of their operational efficiency. Consequently, this will result in the efficient distribution of capital and resources within the domestic economy. The distinct characteristics of FDI that differentiate them from portfolio investments is their long-term objective and exercise of control in the foreign enterprise.

In essence, the three explanations elucidate FDI as the deployment of foreign capital by non-domestic investors into a host country. The term "FDI inflows" pertains to the influx of foreign capital into an economy as a result of the actions taken by foreign investors (Osei and Kim, 2020). On the other hand, "FDI outflows" denote the transfer of capital by local investors into a foreign country (Globerman and Shapiro, 2002; Sethi et al. 2003; Julio and Yook, 2016; Su et al. 2022). FDI stocks also refer to the overall aggregate worth of assets owned by foreign entities at a specific point in time, reflecting any disinvestment that may have occurred throughout the process (Makhavikova, 2018). Typically, FDI inflows are commonly represented as net flows (UNCTAD, 2023), which involve the deduction of reverse investments or disinvestments from the overall FDI intake. In certain instances, an economy may have negative values for FDI due to either disinvestments exceeding the overall inflows or the effects of significant repayment of inter-company borrowings could also be a cause (UNCTAD, 2023).

3.1.1. Components of Foreign Direct Investments

Diverse components may form part of FDI, and these may include equity capital, reinvested earnings, and other forms of capital (Makoni, 2015). Equity capital here refers to the acquisition of shares of a foreign company by a foreign direct investor (Hail and Leuz, 2006; Makhavikova, 2018). It encompasses the equity held in branches, the entirety of shares in subsidiary companies and affiliates, as well as diverse forms of capital investments. Various financial instruments, such as shares, stocks, participations, depositary receipts, or equivalent records, are typical representation for possessing equity capital (Hail and Leuz, 2006). Reinvested earnings refer to the portion of an investor's earnings or dividends that are reinvested into acquiring further shares (Makoni, 2015; Makhavikova, 2018). Because earnings from a direct investment of foreign enterprise are the income of the foreign investor, whether they are reinvested in the enterprise or paid to the investor, they are also classified as part of FDI. Intra-company loans encompassing both short-term and long-term credits established between parent firms and their foreign subsidiaries, branches, and associates are debt transactions that are considered components of FDI (UNCTAD, 2023).

3.1.2. Measurement Method for Foreign Direct Investment

Normally, the central statistical office of a country is responsible for gathering data pertaining to both inflows and outflows of FDI (Makhavikova, 2018). This information is sourced from the annual balance of payments data of the respective country, and it entails the recordings of the type of sources for the investment funding (Duce and España, 2003). In other words, the approaches to funding these foreign investments serve as important premise for documenting the FDI statistics. This should have meant that the value of FDI inflows and outflows at the global level must be equal, but this is not the case. The statistical problem resulting to this pertains to the utilisation of varied approaches in estimating and collecting the data across different countries (Makoni, 2015; Makhavikova, 2018). Even so, it is not common for the office of statistics on FDI to differentiate between Greenfield investments and mergers & acquisitions in their data. The database pertaining to these entry mode strategies is typically sourced from private research firms with a vested interest in gathering data on stock exchange sales and acquiring financial deals (Duce and España, 2003; Makoni, 2015). Therefore, a challenge arises in terms of the comparability of data between the total of the two-entry mode and the total of FDI data because they are usually different (Makhavikova, 2018).

However, it is worth noting that notable institutions such as the United Nations Conference on Trade and Development (UNCTAD), the International Monetary Fund (IMF) with its financial statistics, and the World Bank's database (WDI) have collected extensive annual data on foreign direct investment (FDI) flows in numerous countries over a significant timeframe (UNCTAD, 2023; WDI, 2022). Despite the aforementioned issues, academics researching FDI-related fields have embraced and used these data extensively to generate analytical and policy inference (e.g., Zang and Baimbridge, 2014; Marandu et al. 2019; Casella and Formenti, 2019; Handoyo, 2020; Paul and Feliciano-Cestero, 2021; Fang et al. 2021; Adeel-Farooq et al. 2021).

3.1.3. Entry Mode of Foreign Direct Investments

Multinational companies usually approach FDI in three strategic motives which include horizontal, vertical and conglomerate (Aizenman and Marion, 2004; Fukao and Wei, 2008; Beugelsdijk et al. 2008; Kohpaiboon, 2012; Kinda, 2013; Krautheim, 2013; Makhavikova, 2018; Camarero et al. 2021; Ahn and Park, 2022; Luckstead et al. 2024). Where the horizontal strategy refers to foreign investors or Multinational companies undertaking the production activities in a host country different from the country of the parent company. The vertical FDI strategy also refers to the situation where different production stage in the value chain is created abroad (Osnago et al. 2019; Shi, 2019; Milliou and Sandonis, 2020; Ahn and Park, 2022; Ahn and Park, 2023; Woodgate, 2023). This could be either creating a subsidiary abroad that becomes a supplier to the home company or a customer. The conglomerate strategic motive of FDI is where the home companies invest in a totally different business operation abroad. The conglomerate promotes internationalisation and diversification of economic operations (Makhavikova, 2018).

However, the term " FDI entry mode" is used to describe the approach or form that foreign enterprises adopt when entering or establishing their presence in a foreign market. The entry mode can be categorised into two main types: Greenfields FDI and Mergers & Acquisitions FDI (Hennart and Park, 1993; Harzing, 2002; Dikova and Van Witteloostuijn, 2007; Slangen and Hennart, 2008; Marinescu, 2016; Jaworek et al., 2018; Alon et al., 2020; Nguyen, 2023; European Commission, 2023). The term "Greenfield FDI" (GFDI) refers to a foreign company's strategic decision to launch new operations or fully owned subsidiaries in a foreign nation that is different from its country of origin (Hennart and Park, 1993; Alon et al., 2020; Nguyen, 2023). In other words, those multinationals that enter host country through GFDI does so by building their operations from ground up. Mergers and acquisitions (M&A) on the other hand encompass the process by which a foreign corporation acquires ownership stakes in an established domestic entity within a foreign nation (Alon et al., 2020; Nguyen, 2023). This can be achieved by several means, such as forming a joint venture with a local company, obtaining equity shares in an existing local entity, or purchasing the entirety of a company operating in the host country (Hennart and Park, 1993; Harzing, 2002). Foreign firms entering via M&As partner with existing indigenous firms in the host country through purchase of at least 10% shares (Görg, 2000). This type of investment is commonly referred to as Brownfield investments (Makhavikova, 2018).

Element-specific factors, such as the endowment and industry characteristics of the host country, frequently influence the entry mode of foreign investors or enterprises. In this vein, greenfield investments are commonly observed in businesses characterised by advanced technology as well as in nations that previously lacked domestic manufacturing capabilities in certain sectors prior to the arrival of international investors (Marinescu, 2016; Jaworek et al., 2018; Makhavikova, 2018). However, mergers and acquisitions are encouraged by various factors, such as attitudes towards takeovers, the state of financial markets, laws and regulations, the privatisation effort, regional integration, currency-related risks, and the involvement of investment banks or intermediaries who are diligently seeking opportunities and take the lead in initiating deals (Vermeulen and Barkema, 2001; Nguyen, 2023). FDI, whether it comes from greenfield projects or mergers and acquisitions, fosters globalisation and economic growth.

3.1.4. The Heterogeneous Nature of GFDI and M&As.

Comparatively, GFDI's are expected to promote increasing capital accumulation, whereas M&As implies transfer of ownership (Ashraf et al., 2020). González-Torres (2020) assert that M&As processes usually facilitate expansion of firms' product portfolios, accessibility into new market, opportunity to expand managerial specialisation and power, and increasing distribution geographically. Hence, economic promotion of M&As could only be a secondary effect rather than primary effect. This implies that countries may seek to promote either GFDI or M&As based on diverse motives and priorities (see Dunning, 1973).

Similarly, Harms and Méon (2018) and Zhou et al. (2021) argues that there are fundamental differences between how these two forms of FDI affect host countries in terms of capital accumulation, productivity, economic growth rates and environmental degradation. Some earliest view like Nock and Yeaple (2007) suggests that multinational companies entering the host country via M&As brings little positive effects to the host countries' economy compared to those entering via GFDI. Wang and Sunny (2009) also argue that GFDI accelerate more economic growth, whereas M&As is useful only when the host country's human capital development is very high. Moreover Zhou et al. (2021) emphasises that the heterogeneous effects of the two mode of entry is revealed to be dependent on host country specific characteristics and endowments such as financial development, human resources, macroeconomic factors and so on. Moreover, poorly developed countries are unlikely to benefit from M&As compared to developed countries like those in the European Union. This is because, it may require effective judicial system to enforce contracts and agreements which are often lacking in developing countries (Zhou et al., 2021).

Some recent studies have made efforts to contribute empirically to this discussion by examining the distinctive effects of GFDI and M&As on the environment of the host country. For instance, Doytch and Ashraf (2022) finds that GFDI is more prone to harm the ecosystem of the host country compared to M&As. Therefore, developing countries are more susceptible to suffer from environmental harm from both GFDI and M&As, while developed countries may suffer environmental effects from M&As if they are driven towards the export sectors of the economy. Moreover, Ashraf et al. (2020) claim that their empirical results affirms that the negative spillover effect of FDI inflows depend critically on the mode of entry and the host economic capacity.

Furthermore, their results revealed that GFDI have significantly added to environmental pollution in poorer countries but not developed countries. While M&As rather mitigate environmental degradation. This means that, different government policy interventions are required to deal with the heterogeneous effects of GFDI and M&As on the environmental well-being of host countries.

3.1.5. Advantages and Disadvantages of Foreign Direct Investments

FDI is widely considered to generate effects inside the host economy in diverse ways (Nair-Reichert and Weinhold, 2001; Alfaro et al. 2004; Azman-Saini et al. 2010; Pegkas, 2015; Adedoyin et al. 2020; Thompson and Zang, 2022; Raza et al. 2021). For example, direct investments facilitate the accumulation of capital in the recipient country by generating capital stocks or investments that contribute to the growth of global savings (Méon and Sekkat, 2015; Nemlioglu and Mallick, 2020; Adarov and Stehrer, 2020; Emako et al. 2023). In addition, FDI stimulates the economic growth process of the host economy by exerting positive effects on the host country's GDP, research and development, diffusion of innovations and new technologies, and increasing employment levels (Kuemmerle,1999; Ambos, 2005; Fu and Balasubramanyam, 2005; Jenkins, 2006; Todo et al. 2011; Rozen-Bakher, 2017; Amendolagine et al. 2019; Mishra and Palit, 2020; Hoang et al. 2021; Mkombe et al. 2021; Wu et al. 2023). According to Altenburg (2000) and Makhavikova (2018) FDI can serve as a catalyst for promoting exports, thereby enabling access to export credits from the most cost-effective source within the global financial market. In that, foreign investors establish connections with international suppliers, distributors, and consumers, leading to a further rise in export activities.

FDI in the host economy also plays a key role in the development of human capital, the enhancement of the national currency, and the expansion of national reserves (Kottaridi and Stengos, 2010; Dutta et al. 2013; Gittens and Pilgrim, 2013; Baranwal, 2019; Mohanty and Sethi, 2019). The advantages of training programmes and the prospective privileges for professional growth among local employees are closely linked to the presence of FDI in host nations. In addition to being seen as more stable than portfolio investments in facilitating economic growth, FDI does not contribute to the accumulation of external debt but serves as a favourable financial asset accumulation (Makhavikova, 2018). Apart from these advantages, research argues that FDI come with negative spillover effect into the host countries. Some of these negative externalities or spillovers that are being debated in sustainable development and international business literature include environmental degradation, crowding-out of domestic firms, and reduction in population health quality in host countries. The negative effects of FDI on the host country environment have been supported by studies like Harms and Méon (2018) and Ashraf et al. (2020). Herzer and Nunnenkamp (2012) and Nagel et al. (2015) also argue that FDI can have adverse effects on host country's population health quality. The crowding-out effect of FDI on domestic firms of host countries is also supported by studies like Jan Mišun (2002) and Morrissey and Udomkerdmongkol (2012) which argue that direct investments displace domestic firms even in countries with good governance.

3.2. THEORETICAL FOUNDATIONS OF FDI

The emergence of FDI is characterised by a certain level of ambiguity, as noted by Makoni (2015). Diverse opinions have offered various explanations for the FDI theories which are under consideration, so a definite theory that is universally regarded as superior to all others has not yet emerged. Notwithstanding, Smith (1937) acknowledged that Smith's (1776) work could be partially responsible for the development of FDI theories. Similarly, the work of Ricardo (1817) also deserves recognition (Makoni, 2015). The focus of these studies revolved around the theory of international specialisation in production. To this end, Smith (1937) puts out the theory of absolute advantage, in which he discusses how two countries will engage in trade if one of them is able to produce and export commodities using adequate amount of capital and labour that exceed that of the closest competitor. The caveat spotted in Smith's theory is the lack of information on what caused the rise in trade among countries where the partner did not engage in production operations (Makoni, 2015). This is where Ricardo (1817) explored by analysing FDI based on comparative advantage theory. However, the comparative advantage theory strictly focused on two distinct country situations, two products, and the assumption of perfect global factor movements which also demonstrate the limitation of the theory. Also, the framework aimed to elucidate the mobility of labour and capital within domestic boundaries while disregarding their mobility across national frontiers. Hence, this viewpoint has faced criticism from Kindleberger (1969) and Denisa (2010), who argue that international trade would dominate the global market in a scenario of perfect competition and efficient markets without any barriers. In the context of these theoretical debates, Boddewyn (1983) and Makoni (2015) emphasises that there have been further diverse viewpoints on FDI theories presented by scholars such as Mundell (1957), Hymer (1976), Grosse (1985), Rugman (1980), and Vernon (1992).

According to the scholarly works of Makoni (2015), Solarin (2017), and Paul and Feliciano-Cestero (2021), a notable observation has been made regarding the dominant theories utilised in various studies concerning FDI. These theories encompass (1) theory of internalization, (2) resource-based theory, (3) product life cycle (PLC) theory, (4) institutional theory (5) location-based theory, and (6) Dunning's eclectic paradigm.

3.2.1. Theory of Internalization

The proponents of internalization theory like Hymer (1976) hypothesise that the quest for firms to shift form market transactions to internal transactions result in the rise of FDI (Bajrami and Zeqiri, 2019). In other words, some operational costs of firms can be avoided or reduced by adopting some internalization processes. Earliest studies like Denisia (2010) postulates that internalization facilitates understanding of the expansion of multinational firms while offering further clarity to the rationale for FDI. In this theory, emphasis is given to the imperfections in intermediate product markets such that it explores firms' specific advantages and shows that multinational firms engage in FDI activities based on certain favourable conditions (Bajrami and Zeqiri, 2019). Some of these firm specific advantages could be firms' unique knowledge or technological capabilities realised through research and development for undertaking unique productions (Buckley and Casson, 2015; Makoni, 2015). It can also be firms' exclusive access to scarce components of productions or raw materials from a home production facility to a subsidiary in a host country (Paul and Feliciano-Cestero, 2021).

In addition, some other firm exclusive capabilities or assets like trademarks and patents which have the potential of minimising cost of production and offering multinationals competitive advantage over domestic firms in host country can also encourage internalization (Buckley, 2018; Paul and Feliciano-Cestero, 2021). In that, when it is more profitable for a firm to possess these ownership advantages, it will most likely prefer to use them internally than to engage in externalization by offer it to other foreign firms through sales, lease, licensing or management contracts (Makoni, 2015). The theory of internalization or market imperfections has been further supported by Kindleberger (1969) who looked at monopolistic advantages. Knickerbocker (1973) also examined the internalisation in the light of oligopolistic behaviours that incite all other firms to follow the leader in the market. Also, Dunning's (1973) eclectic paradigm is also built inclusively on how firm's specific advantages in the presence of imperfect market encourages the rise of FDI activities.

3.2.2. The Resource-Based Theory

The resources-based theory is quite like the internalisation theory, and it seeks to demonstrate that multinationals pursuing globalisation can gain competitive advantage in foreign countries (Paul and Feliciano-Cestero, 2021). This theory dominates in studies of outward FDI to developing economies (Bai et al. 2020; Beamish and Chakravarty, 2021). Wernerfelt (1984), Ghoshal (1987) and Barney (1991) are among the earliest studies that pioneered and applied the resource-based theory in international business research. In context, the theory encourages firms to focus internally to identify find exclusive capabilities that can offer them competitive leverage over foreign firms rather than focusing on external environment for competitive advantage (Wernerfelt, 1995; Barney et al. 2001; Armstrong and Shimizu, 2007; Lockett et al. 2009). These firm's exclusive capabilities are classified into tangible and intangible assets (Wernerfelt, 1984), and Barney, 1991). These tangible assets can be in the form of advanced technological machines or availability of funds and the intangible assets may include intellectual property rights or brand equity (Armstrong and Shimizu, 2007; Cui and Jiang, 2012; Deng, 2013; Delevic and Heim, 2017; Paul and Feliciano-Cestero, 2021; Davis, G.F. and DeWitt, T., 2021).

3.2.3. The Product Life Cycle Theory

Vernon (1966) also propagated the product life cycle (PLC) theory and explains that firms experience four production cycles which are innovations or introduction, expansion or growth, maturity, and lastly decline. Ver non (1966) PLC theory was inspired by the flow of FDI from multinational firms from United States manufacturing sector to Western Europe after the end of World War II. The fundamentals of this theory rest on innovative technologies and the growth of market size (Makoni, 2015). For instance, at the initial stage of production, firms will employ innovative technology to produce new products and sell them in an internal market. However, following successful sale of all the new products and dominating internal market the interest to penetrate new markets arise and therefore stimulating export activities. At this stage, the firm gets into transition period in the production cycle where it operates from growth to maturity. The maturity stage becomes very crucial as competitors now appear in the internal market and exerting pressure on the firm to identify a foreign market to establish production facility to serve the increasing demand of its product. After, the product standardisation, cost efficiency, lax regulations and other institutional flexibility become priority. Therefore, making any international subsidiary that maximises profit at significant minimum input cost or with lax regulations becoming favourable to receive increasing levels of investments (Contractor et al. 2020).

Finally, the foreign subsidiaries now undertake larger productions than the home firm and beginning supplying to the home firm which has decline from the role of exporter to importer (Paul and Feliciano-Cestero, 2021). Eventually, the production cycle begins again because the declined home firm creates the need to introduce a new innovative product at home to regain competitive edge (Brockhoff, 1967; Rink and Swan, 1979; Denisia, 2010; Cao and Folan, 2012; Makoni, 2015; Srinivasan and Jayaraman, 2021). Despite the significance of the PLC theory, studies like Boddewyn (1985) criticized it for lacking sufficient empirical evidence since the theory does not control for all other determinants of FDI and emphasizes solely on location advantage of foreign markets. Makoni (2015) also argues that the PLC theory assumes a problem free cycle with no interruptions or obstacles which is quite unrealistic and not practical even for industries that employ advanced technology for its innovation process.

3.2.4. The Institutional-Based Theory

The institutional theory of FDI was also made popular by Wilhelms and Witter (1998), and it asserts that when a country has institutional fitness to attract FDI flows, it offers the capabilities that facilitate absorbing and keeping the foreign investments and its accompanied spillover effects. The rationale is that the behaviour of firms and their structures are extensively affected by the influential factors within their surrounding environment (Child, 1997; Paul and Feliciano-Cestero, 2021). Hence, country's gain competitive advantage or FDI attraction leverage over other countries when they can flexibly adjust their policies to meet the internal and external expectations of multinationals and domestic investors (Makoni, 2015). This theory throws more light on the reason for unequal attraction of FDI flows among countries as well as differences in absorbing FDI spillover effects. Makoni (2015) summarised the fundamentals of the institutional theory using four main pillars which are government, market, education, and socio-cultural fitness.

Wilhelms and Witter (1998) consider government to be the most significant pillar among the others. In that, a country with healthy government related policies such as political stability, flexible regulations, taxation, economic openness, minimum intervention of trade and exchange rate, positive attitude towards eliminating corruption and promoting transparency or democracy and so on can make the country institutionally fit to attract larger amount of FDI and stimulate positive spillover effect (Popovici and Călin, 2014; Musonera et al. 2010; Deng, 2013; Adebayo and Gambiyo, 2020; Shahbaz et al. 2021). The second important pillar is the market, and it constitute physical assets and financial assets. Meaning that, a country with strong financial market development and credit availability becomes prospective location for multinationals location decisions (Makoni, 2015; Shirodkar and Konara, 2017; Desbordes and Wei, 2017). Education happens to be the third important pillar for creating an attractive environment for FDI (Wilhelms and Witter, 1998). This is because multinationals require well educated human capital to undertake research and development projects. However, the goal is not to achieve a higher education level but to possess the fundamentals for speaking, hearing and understanding, processing information, analysing, and performing instructions that impact productivity and efficiency of production activities that are relevant for FDI location decisions (Makoni, 2015). Finally, socio-cultural factors are considered by Wilhelms and Witter (1998) to be the lowest among the four pillars though they are also the earliest institution with many complexities.

3.2.5. The Location-based Theory

Proponents of the location-based theory also assert that the motives behind FDI location decisions by multinationals include pursuing natural resources, efficiency or strategic asset, and variations in the cost of factors of production across different geographic locations (Makoni, 2015; Bajrami and Zeqiri, 2019). In the context of this theory, favourable characteristics of potential host country offer incentives as prospective location for FDI location decisions (Popovici and Călin, 2014). Some of these country specific characteristics include labour availability, access to natural resources, the size of the market, infrastructural development, and the government policies regarding the use and management of natural resources (Makoni, 2015). For instance, the theory argues that countries that have relatively lower cost of labour achieve competitive advantage and succeed in becoming FDI preferred location. In addition to the lower labour cost, a superior human capital resource that can ensure productivity and efficiency is also preferred by multinational companies (Bajrami and Zeqiri, 2019).

A typical location-based theory approach is the gravity approach of FDI which asserts that countries with similar geographic location, institutions, economic and cultural characteristics are likely to increase engagement in FDI activities compared to countries with wide differences (Kahouli and Maktouf, 2015; Mishra and Jena, 2019; Dorakh, 2020b; Kox and Rojas-Romagosa, 2020; Warren et al. 2023; Kaur et al. 2024). Some location specific characteristics adopted as gravity variables include economic size, level of development and infrastructure, governmental institutions and policies for trade and investments, common language and distance (Makoni, 2015; Warren et al. 2023; Kaur et al. 2024).

Other important location specific advantages include lower resource reallocation cost, lower taxes, and regulations that require lower cost to adhere (Bajrami and Zeqiri, 2019; Singhania and Saini, 2021). For example, the proponents of the pollution haven hypothesis argues that countries with weak environmental regulations can possess competitive advantage in attracting FDI from polluting industries compared to countries with strict environmental regulations (Cole, 2004; Levinson and Taylor, 2008; Singhania and Saini, 2021). This is because strict environmental regulations may require investment in expensive environmentally friendly technology and equipment or pay higher environmental taxes that increases operating cost and reduces profit levels.

3.2.6. The Eclectic Paradigm

Among all the theories of FDI, the eclectic paradigm theory proposed by Dunning (1980) seems to be the most popular and used theory to establish the motivation for multinationals to engage in FDI. The eclectic paradigm seeks to combine the rationales behind the aforementioned theories which have already been discussed. The theory underscore three conditions as important for firms to engage in FDI (Makoni, 2015). The first condition requires firms to have exclusive or unique capabilities that offer them ownership advantages compared to domestic firms of the expected foreign market to penetrate. This condition is related to the expectations of the proponents of internalization theory and resource-based theory which requires firms to consider internal capabilities or assets like technology and innovative capability, intellectual property rights, trademark, experienced human resources and others (Hymer,1976). The second condition requires these firms' exclusive capabilities to possess the ability to contribute to the firms' profit maximisation and minimisation of operational cost while operating in the foreign country compared to franchising, leasing or selling of their capabilities to domestic firms in the foreign country (Wernerfelt, 1984; Boddewyn, 1985; Ghoshal, 1987; Barney, 1991). The last condition is that the foreign country should also possess some location advantages or country specific endowments that provides it with competitive leverage compared to other foreign countries and the home country. Some of these country specific endowments may include factors such as availability of raw materials or natural resources, production parts, human capital, cultural similarities, geographical proximity, flexible regulations and lower taxes (Popovici and Călin, 2014; Musonera et al. 2010; Deng, 2013; Adebayo and Gambiyo, 2020; Shahbaz et al. 2021).

Additional location advantages can be in the form of favourable business environment factors like high rate of return on capital employed, lower taxes, less government interventions in trade and investments, favourable regulations and laws, population size, size of the market economy, availability of credit, strong financial development and so on (Mina, 2007; Wilson and Baack, 2012; Jones and Temouri, 2016; Jugurnath et al. 2017; Wang and Kafouros, 2020; Kurtović et al. 2020; Loncan, 2021; Yoon and Heshmati, 2021; Wijaya and Dewi, 2022). Almost all these location advantages arise as a result institutional fitness and so aligns with the institutional theory of FDI (Wilhelms and Witter, 1998). These three conditions are summarised as Ownership, Location and Internalisation (OLI) paradigm. Due to the close interconnection of these three conditions, the eclectic OLI paradigm theory requires them to be occurring at the same time for FDI to be initiated (Makoni, 2015).

3.3. THEORETICAL LINKS BETWEEN FDI AND ENVIRONMENTAL POLICY

The last three decades have witnessed a renewed interest in the relationship between environmental policy and foreign investment flows (Cole et al. 2006; Elliot and Zhou, 2013; Bekun et al. 2021). The overarching theories relating to the relationship between environmental policy and FDI are the pollution haven hypothesis and the pollution halo hypothesis. Researchers who support the pollution haven hypothesis say that industries that pollute a lot will move their production from developed countries with strict environmental laws to developing countries with weak or no environmental laws in order to avoid the costs of cleaning up their pollution (Walter and Ugelow, 1979; Ge et al., 2020). Thus, because FDI has a negative impact on host countries' environment, governments and policymakers rely on stringent environmental policies as an effective means of reducing environmental deterioration by regulating the activities of polluting companies (Fredriksson et al. 2003; Demena and Afesorgbor, 2019; Demena and Afesorgbor, 2020; Bai et al. 2020). But the usefulness of the strict environmental policy to protect the environment and improve health conditions in the host country is argued to lead to a decline in the economic benefits that accompany direct investments, such as a decline in job creation opportunities (Herzer and Nunnenkamp, 2012; Nagel et al., 2015; Hale and Xu, 2016; Wang and Choi, 2021). This trade-off occurs as multinationals become discouraged from setting up FDI activities in the country with stricter environmental policy. The multinationals consider countries with stricter environmental policies unattractive locations for FDI to avoid potential incremental abatement costs that add to operational costs. This situation is argued to create the race to the bottom effect, where developing countries tend to lower or eliminate their environmental policy to achieve a competitive advantage over advanced countries with stricter environmental policy in attracting polluting industries (Bekun et al. 2021). The pollution halo hypothesis, in contrast to the pollution haven hypothesis narrative, posits that stricter environmental policies will incentivise firms to invest in more efficient and environmentally friendly technology, thereby promoting increased output and yielding more profit over time, rather than discouraging polluting firms from relocating to areas with lax regulations (Mohr, 2002; Petroni et al., 2019). The intense empirical debate among several researchers investigating the pollution haven hypothesis and pollution halo hypothesis has yet to yield conclusive results (Elliot and Zhou, 2013). Strong support for the pollution haven hypothesis was discovered by List et al. (2003), Cole and Elliott (2005), and several papers examined by Jeppesen et al. (2002). However, Eskeland and Harrison (2003) and Javorcik and Wei (2003) came to the conclusion that environmental regulations have little bearing on the location decision of an industry. McConnell and Schwab (1990) and Duffy-Deno (1992) also found that environmental regulation exerted no significant effects and sometimes significantly positive impacts on investment. Dean et al. (2009) found inconclusive results both for and against the pollution haven hypothesis.

Most early theoretical literature also tends to focus on the influence of environmental regulation differences on foreign investments, with these capital flows predicted to move from higher to lower regulation countries (Markusen et al., 1993; Baumol and Oates, 1988; Chichilnisky, 1994; Motta, 1994). Whereas in an open economy, the political economy literature shows that environmental policy can become too lax through the lobbying of multinational corporations and other domestic firms (Oates and Schwab, 1988; Hillman and Ursprung, 1992, 1993; Rauscher 1995; Fredriksson, 1997, 1999; Cole et al. 2006; Elliot and Zhou, 2013). Therefore, the literature suggests the existence of an reverse causality between FDI and the EU environmental policy. Cole et al. (2006) describe this relationship as an endogenous pollution haven. They used a political economy model with an imperfect product market competition to explain that both local and foreign firms undertake joint lobbying to influence corrupt local government to enact weak environmental policy. On the other hand, a host country’s environmental policy becomes stricter with increasing FDI inflows if the local government is not corrupt. Ferrara et al. (2015) followed the same theory of endogenous pollution havens and said that as FDI increases, the host economy's profit-shifting policy that encourages more multinational investments fades because it costs more to clean up the environment. Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) are among the empirical studies that also considered the relationship between environmental policy and FDI to be endogenous. This ongoing debate highlights the complexity of the relationship between environmental policy and industrial location decisions. As various studies yield differing conclusions, it becomes evident that factors such as the type of industry, regional characteristics, and the specific nature of the regulations play a crucial role in determining the overall impact on investment patterns.

3.4. CONCLUSION

This chapter highlights the unique integrating characteristics of the EU, which provide member countries with a competitive advantage in attracting foreign direct investment. Moreover, it is also noted that the EU engages in strict environmental policy programs that are theoretically supposed to regulate operational activities, but they may also have deterrent effects on the relocation decisions of multinational companies. The various theories underpinning the FDI location decisions as well as the relationship between environmental policy and FDI have been explored.

Hence, to achieve the objective of this thesis, which is to investigate the relationships between environmental policy and FDI, some of the theories previously discussed serve as the underlying theories. Based on these debates about the effects of strict environmental policy on FDI, we will empirically examine evidence of pollution havens or pollution halos in EU countries as part of our initial analysis. This exercise is conducted in Chapter 4, and additional analysis is provided in Chapter 5 of this thesis. The findings will answer Research Question 1.

Second, according to a few studies (Cole et al. 2006; Ferrara et al. 2015; Millimet and Roy, 2016; Kathuria, 2018), FDI can alter host countries' environmental policies, causing them to become less strict initially and stricter over time. This thesis will investigate the evidence for the endogenous pollution haven theory in the context of the link between EU environmental policy and FDI coming into the EU region. The empirical exercise, which addresses research questions 2 and 3, takes place in Chapter 5 of the thesis.

Thirdly, several studies have shown that the institutional characteristics of the FDI receiving country also play a role in how FDI activities impact the host country (e.g., Islam et al., 2020; Odidi and Jagong'o, 2020; Acquah and Ibrahim, 2020; Singhania and Saini, 2021). In other words, the transferable advantages and disadvantages of FDI are contingent on the moderating role of the government institutions or policymakers. The third empirical analysis will test whether the introduction of strict environmental policies by government institutions in EU countries significantly moderates the effects of FDI by ensuring improved environmental quality and population health. In addition, the empirical analysis will examine whether these protective policies could hurt the economy of the EU countries by reducing jobs (Cole et al. 2006; Demena and Afesorgbor, 2020; Bai et al. 2020). So, the empirical analysis will investigate whether the EU's environmental policy, which acts as an institutional intervention, lessens the effects of FDI on the health and employment rates of its citizens. This exercise is conducted in Chapter 6 of this thesis, and it answers the research question 4.

The author of this thesis hopes that it will complement existing literature and provide a holistic perspective on the relationship between environmental policy and FDI, with a focus on the EU as a case study.

CHAPTER 4

Empirical Examination of the Effects of Environmental Policy on FDI in EU Countries: Testing the Pollution Haven and Halo Hypothesis.

4.1. INTRODUCTION

This chapter of the thesis seeks to address the first research question, which is to understand the effects of the EU environmental policy on the direct investment inflows. The EU has been competitively dominant in FDI attraction since the early 1990s as previously discuss in section 2.3.1 of this thesis. Obviously, the significant EU FDI share of World total can be attributed to three possible reasons. First, EU countries have reasonable amount of competitive advantage on the global stage because of its single market economy that allows free trade among member countries(refer to section 2.2). In other words, MNCs find EU countries as very attractive to set-up new branches (GFDI) or buy 10% or more shares (M&As) from the local firms (Bevan and Estrin, 2004; Neto et al. 2010). In the EU, some of the specific location endowments that have been empirically tested to be the reason behind the region's attractiveness for inflows of FDI include high value of Gross domestic products (GDP), technological advancement, human resource development, attractive business environment, large population size and so on (see Janicki and Wunnava, 2004; Caetano and Galego, 2009; Özkan-Günay, 2011; Hansson and Olofsdotter, 2014; Dumciuviene and Paleviciene, 2017; Dorakh, 2020a).

Secondly, the EU has the advantage of benefiting from the positive spill overs that accompany FDI inflows(Makhavikova, 2018). It is almost a unanimous agreement among researchers that host country's FDI inflows are vital sources of additional capital inflows, new job creations, technological transfer, complementing domestic private investments, and promoting economic growth (for comprehensive discussion see e.g.: Mello, 1997 and 1999; Blomstrom and Kokk, 1998; Asiedu, 2003; Alfaro et al. 2004; Carkovic and Levine, 2005; Hansen and Rand, 2006; Ashraf et al. 2016; Tsaurai, 2018). Considering the dominance of the EU in receiving FDI inflows for the past three (3) decades, it is suggestive that FDI has been instrumental in the economic development of the region. Hence sustaining FDI flows into EU could be a crucial objective for the union to continue to harvest the potential positive spill overs for maximum growth and eliminating poverty in the region.

The third implication is that the EU may as well become susceptible to being a harbour for larger volumes of negative externalities accompanying FDI inflows. Among the contemporary negative issues surrounding FDI is its potential deteriorating effects to the environmental conditions of host countries (Demena and Afesorgbor, 2020). These negative spill overs have been empirically justified by several studies investigating FDI’s contribution to greenhouse gas emissions growth and environmental degradation (see Cole et al. 2011; Zhu et al. 2016; Zang et al. 2019). These greenhouses (GHS) gas pollutants include CO_2, SO_2, NO_2 and other emissions have intensified environmental degradation (Gyamfi et al. 2021). They are conclusively linked to global concerns like climate change, global warming, desertification, land degradation, socio-economic inequalities, ecological distortions, and other related human environmental deterioration (Alola et al. 2019; Bekun et al. 2021). CO_2 also known as Carbon dioxide emissions is empirically revealed in a more conclusive arguments by academic researchers as being the most threatening pollutant and constitute about 81% of the total GHS gas emissions (Alola et al. 2019; Salehnia, Alavijeh and Salehnia, 2020). Due to these negative spill overs that accompany FDI inflows, both the EU and governments of other countries continue to express great need to establish strict environmental related policies to manage the situation in their countries or regions (Sarkodie, 2021).

As explained in subsections 3.1.3 and 3.1.4 of Chapter 3 of this thesis, foreign companies, when entering or establishing a foothold in a foreign market, do so in two ways, referred to as FDI entry modes. The entry modes are classified into two primary categories: greenfield investments (GFDI) and mergers and acquisitions (M&As) (Hennart and Park, 1993; Harzing, 2002; Dikova and Van Witteloostuijn, 2007; Slangen and Hennart, 2008; Marinescu, 2016; Jaworek et al., 2018; Alon et al., 2020; Nguyen, 2023; European Commission, 2023). GFDI refers to a foreign corporation's strategic decision to establish new activities or wholly owned subsidiaries in a nation that is distinct from its place of origin (Hennart and Park, 1993; Alon et al., 2020; Nguyen, 2023). Mergers and acquisitions (M&A) refer to the process through which a foreign firm obtains ownership interests with a minimum share of 10% in an established domestic entity in a foreign country (Alon et al., 2020; Nguyen, 2023). Such acquisitions can be accomplished through various methods, including establishing a joint venture with a domestic firm, acquiring equity stakes in an existing local corporation, or wholly purchasing a company operating in the host nation (Hennart and Park, 1993; Harzing, 2002). In this study the GFDI data series represent the value of announced greenfield FDI projects by destination. Additionally, the value of net cross-border M&A sales, categorised by the seller's region or economy, represents the M&A data series. Both are expressed as a percentage of GDP in current US dollars and collected from UNCTAD database (2021). Evidence from existing literature has shown that these two modes of entry impact the host country differently, with GFDI exhibiting higher polluting potentials compared to M&As, which can be environmentally friendly (Harms and Méon, 2018; Zhou et al., 2021). This scenario also implies that the strict environmental policy of the host country is more likely to have strong deterring effects on GFDI compared to M&As (Doytch and Ashraf, 2022; Ashraf et al., 2022).

4.1.1. Gaps and Contribution

To contribute to existing literature, this study adopts environmental taxes, energy taxes, overall environmental stringency index, emissions limit value nitrogen oxide (NOx), emissions limit value sulphur oxide (SOx), and emissions limit value particulate matter as proxies for environmental policy. This approach differs from the popular practice of adopting specific environmental abatement taxes, which may introduce selection bias and influence empirical outcomes. This chapter of the thesis also disaggregates FDI into entry modes as discussed in subsection 3.1.3 of chapter 3.

In addition, the distributional heterogeneity that exists among EU member countries with respect to the amount of FDI, GFDI, and M&A received by each country is rigorously examined and analysed which is also unique compared to existing literature. This distributional heterogeneity of the inflows among member countries may contribute to environmental policy measures demonstrating different effects on different FDI variables. Hence, this study adds to complement existing literature by looking at the effects of environmental policy while taking into account the distributional heterogeneity in the panel data for the 28 EU countries using the bootstrap quantile regression framework. The Bootstrap quantile regression model has the advantage of providing more useful information on the countries based on percentiles or conditional distribution of the FDI variables. Therefore, the model allows for more variability, greater degrees of freedom, and a higher level of efficiency (Borgen, 2016; Akram et al., 2021; Bui et al., 2021; Zang et al., 2023). This approach helps to obtain a better view of how environmental taxes and energy taxes affect the FDI, GFDI and M&As based on the amounts received by each EU member country. Another important factor is that the results will show whether the effect is similar across all countries or differs based on the amount of FDI, GFDI, and M&As that each country receives. Furthermore, Zhu et al. (2016) argues that the ordinary least squares (OLS) models are usually not suitable for making environmental protection policies. But the quantile regression estimation results are robust to outlying observations of the explanatory variables and more effective especially when the error term is non-normal. Therefore the bootstrap method supports the accurate formulation of environmental regulations by policy makers (Lean and Smyth, 2010; Zhu et al., 2016). Examples of researchers that adopted panel quantile regression with fixed effects include Lean and Smyth (2010), Damette and Delacote (2012), Flores et al. (2014), Yaduma et al. (2015) and Zhu et al. (2016).

4.1.2. Summary of findings

The results from this chapter shows that aggregate FDI does not point to pollution havens or halo effects in EU countries. However, splitting FDI into modes of entry reveals that rigorous environmental policies inhibit GFDI, thereby supporting the pollution haven hypothesis in EU countries. M&As also benefitted from tight EU energy taxes, validating the pollution halo concept. This evidence was consistent when data from all 28 EU countries and 19 EU countries were used. Market and command variables of environmental policy were employed for robustness, and the results were consistent. Different conditional means of aggregate FDI, GFDI, and M&As yielded the similar conclusions. The pollution haven effect and pollution halo hypothesis were unsupported in countries with higher and lower FDI percentages of GDP. While, both nations with higher and lower GFDI percentages of GDP supported the pollution haven effect. Some EU countries with lower M&A percentages of GDP also supported the pollution halo theory.

4.2. FOREIGN DIRECT INVESTMENT AND THE ENVIRONMENT THEORY

Earliest discussion about firms' activities and their related negative consequences or externalities to the environment can be traced to Pigou (1920), Bator (1957), Buchanan and Stubblebine (1962) and Turvey (1963). For instance, just around the beginning of the century Pigou expanded the idea of externalities in *The Economics of Welfare* initially introduced by Sidwick (1883, 444). However, it did not receive much attention until Bator (1957) made an analysis of welfare maximisation. Buchanan and Stubblebine (1962) on the other hand offered additional contributions to the explanations of externalities by classifying marginal and inframarginal externalities, potentially relevant and irrelevant externalities, and pareto-relevant and pareto-irrelevant externalities. From Pigou's point of view a market can be classified as inefficient when the marginal social cost of the market activity diverges from the marginal private cost (Pigou and Aslanbeigui, 2017). Meaning that the market will over-supply a product alongside economic externalities since there is lack of incentives to internalise marginal social cost from production activities. This view is claimed to be the foundation upon which pollution charges were developed and introduced (Wang et al. 2016; Pigou and Aslanbeigui, 2017; Hawkins, 2020). Thereby earning the popular name, Pigouvian tax.

The essence of this tax was to manage pollution from production activities by internalising the cost of economic externalities in form of market prices. For example, Baranzini et al., (2000) expounded the importance of this tax as offering a direct effect and indirect effect. Where direct effect meant the effect from these taxes is evident through price increment, encouraging methods of conservation, increase investments in environmentally friendly products, fuel substitution, and transformation of the economic structures of production and consumption. The indirect effect of these taxes is also noticeable through recycling of the tax revenues received by government to resolve previous environmental effects. In addition, the effects of these taxes rely significantly on what is being taxed (tax base), the rate of the tax levied on the tax base, and institutionally or legally enforcing the tax (Baranzini et al., 2000).

Despite the potential usefulness of the pollution taxes to manage externalities. Turvey (1963) and Coase (2013) have criticised the pollution taxes by suggesting that, it can be problematic and could inhibit optimum resource allocation from being realised. The key scenario is that, if agent ***X*** is participating in the act which is generating externalities for the dependent ***Y*** who directly suffers. Agent ***Y*** may still not be the direct recipient of the benefit from the environmental tax being paid by ***X***. However, they suggested that a possible solution to this could be a direct negotiation between ***X*** and ***Y*** in such situations. These environmental discussions have evolved into two contemporary theories that have captured the attention of researchers which are Pollution haven hypothesis and Pollution halo hypothesis (Zhu et al. 2016; Bekun et al. 2021; Nawaz et al. 2021).

4.2.1. The Pollution haven hypothesis

The Pollution haven hypothesis explains the relationship between MNCs location decisions relative to the environmental policy ambitions of the prospective host economy. In that, the Pollution haven hypothesis is explained as the transfer of pollution-embodied productions from home country to host countries through FDI or international trade (Bekun et al. 2021). Foreign firms seek opportunity to avoid stringent environmental regulations at home to enjoy lax environmental policies at the host country (Abdo et al. 2020). Therefore, FDI location decisions are determined by how strict or lax the home environmental policy is relative to prospective host country. In which case, developing countries with lax environmental policies are more likely to attract dirtier FDI inflows than the developed with stringent regulatory standards (Balsalobre-Lorente et al. 2019).

Despite FDI's significance to growth, host countries are also left to employ stringent environmental policies to deal with the accompanied negative spill over or externalities that threatens environmental quality (Ge et al. 2020; Bekun et al. 2021). Proponents of the Pollution haven hypothesis paradigm like Walter and Ugelow (1979) postulate that lax regulations encourage inflows of MNCs activities from developed countries to developing countries, as weak measures minimise production cost. Therefore, strict environmental regulations deter inflows of FDI and encourages outflows of FDI due to increasing production cost involved with attaining to high environmental standards. Again, host economies with high priority for economic globalisation weaken their environmental policy standards to gain competitive advantage as preferred location for MNCs activities.

4.2.2. The Pollution halo hypothesis

Researchers that are examining Pollution haven hypothesis and its counter theory referred to as Pollution halo provide diverse ample perspectives about FDI and environmental policies. Contrarily, the Pollution halo theory introduce an intriguing argument that the Pollution haven hypothesis might not hold in all circumstances of stringent environmental measures (Mohr, 2002; Petroni et al. 2019). For example, Pollution halo argues that adhering to environmental regulations is not a condition for MNCs to make a location decision (Porter and Van der Linde, 1995). This is because newer and greener technology is more cost-efficient in the longer term and can provide economic incentives that will offset the additional cost incurred by complying with stringent environmental regulations (Iršová and Havránek, 2013). Often, the research that did not find support for Pollution haven hypothesis ended up finding support for Pollution halo.

4.3. FOREIGN DIRECT INVESTMENT AND ENVIRONMENT POLICY LITERATURE REVIEW.

4.3.1. Deterring Effect of Home Environmental Policy on FDI inflows

The first perspective of the studies suggest that environmental policy create deterring effects on FDI inflows. These studies provide support for the Pollution haven hypothesis and rejects the Pollution halo hypothesis. For example, earlier studies focusing on United States (US) like Becker and Henderson (2000), Greenstone (2002), List et al. (2003) and Fredriksson et al. (2003) found evidence of deterring effect of environmental policy on FDI. The various environmental policy proxies adopted for the studies included the Clean Air Act Amendment used by Becker and

Henderson (2000), Greenstone (2002), List et al. (2003), and the Levinson's (2001) index of state pollution abatement costs used by Fredriksson et al. (2003). The FDI variables utilised in these studies were FDI inflows, FDI stocks, and FDI of US manufacturing industries. The findings from these studies supported the Pollution haven hypothesis.

Similarly, several studies about China provide support for Pollution haven hypothesis and assert to the view that environmental policies have negative deterring effects on foreign capital inflows. Zhang and Fu (2008) examined the relationship between environmental policies and FDI inflows using data covering 1998 to 2003 for 30 Chinese provinces. Their findings showed that of the three environmental policy indicators utilised in their study, the share of investment in industrial pollution treatment projects in total innovation investment and the total administrative punishment cases filed by environmental authorities had significant negative effects on MNCs location decisions. Yet, pollution emission charges were found to exert no significant effects on FDI inflows. Moreover, Yang et al. (2018) also used data spanning from 2006 to 2010 with conditional logit model and found significant negative effects of emission reduction mandate, compliance rate of water discharge, and private abatement cost of wastewater on inflows of manufacturing firms. Other recent studies such as Ge et al. (2020) using Difference-in-difference-in-difference model, found significant negative effects of variously adopted environmental policy indicators on Chinese industries with less technology but positive effects on high technology industries.

However, opposing views to this perspective find contradictory results and reject Pollution haven hypothesis but supported pollution halo. Among them is Kim and Rhee (2019) which found significant positive effects of Yale environmental law and policy index on FDI inflows. The researchers used data available for 120 developing countries from 2000 to 2014, and their adopted two-way fixed effect model offered support for Pollution halo. Additionally, Fahad et al. (2022) found that environmental regulation level in China have significant positive effects on inflows of 35 Chinese industries. Meaning that, environmental regulations promoted FDI inflows, and the findings supported Pollution halo. Also, their extended game theory model and the three-stage least squares (3SLS) of simultaneous equations provided further support for Pollution halo while rejecting Pollution haven hypothesis.

4.3.2. Effects of Home Environmental Policy on FDI outflows

Another view of existing literature also argue that environmental policy stringency has significant positive effects on FDI outflows. In other words, home countries with strict environmental regulations will exert pressure on MNCs to relocate the production plants to prospective host countries with relatively weaker environmental policies. This is a bid to avoid huge environmental related taxes or fines that become additional production cost which can potentially reduce capital returns or profit. Hanna (2010) is among the studies that assert to this view. The paper used fixed effects and Modified difference-in-difference approach with data covering 1966 to 1999. The regression models reported that US Clean Air Act Amendment has a significant positive effect on the outward FDI of US manufacturing sector. That is, providing support for Pollution haven hypothesis rather than Pollution halo. Related to that, Mulatu (2017) also examined the impact of four (4) UK environmental policy indicators on outward FDI flows using data from 1966 to 1999. Their fixed effects model, instrumental variable (IV) and 2SLS estimations all reported that the UK's environmental policy indicators have significant positive effects on outward FDI. In a nutshell Mulatu (2017) supported Pollution haven hypothesis and rejected Pollution hallo. This second perspective on the relationship between environmental policy and FDI is not without opposing results. For instance, Xing and Kolstad (2002) used Sulphur dioxide emissions as proxy for environmental policy strictness and found that their regression model provided a significant negative effect on US outward FDI. Sulphur dioxide emissions encourage US MNCs to remain and maintain production plants rather than driving them outside. Hence, providing support for Pollution halo.

4.3.3. Effects of Host Environmental Policy on FDI outflows from Home Country

Differentiating from previous views, Yoon and Heshmati (2021) also considered host Asian countries' degree of environmental policy stringency and strict enforcement of these regulations as a determinant of Korean outward FDI data. The actual findings from their fixed effects and negative binomial model showed that the strictness of the policy in host Asian countries had negative impact on the attraction of Korea's outward FDI into these countries. This implied that a trade-off relationship is evident between host country's strict environmental policy and outward FDI attraction from home country. Therefore, indicating support for Pollution haven hypothesis in this case and not Pollution halo.

4.3.4. Summary of Literature Review, Gaps, and Contributions

4.3.4.1. Summary of literature review.

The empirical literature on the relationship between environmental policy and FDI discussed above reveal divergent views with inconclusive results. One of the reasons is the selection of environmental policy measure which are very inconsistent, lacking comparability, stereotypical and fail to clearly capture the actual degree of environmental policy (Ge et al. 2020). For instance, Xing and Kolstad (2002) and Fredriksson et al. (2003) argue that some of the environmental regulations that were adopted seem to have been setup to reduce specific pollutants in specific manufacturing industries. Therefore, may fail to offer significant results if the FDI industry under scrutiny is not a major production source for the pollutants.

4.3.4.2. The adopted environmental policy variables for this study.

This paper adopts more generalised environmental policy **variables** to examine their effects on inflows of aggregate FDI, GFDI and M&As. These environmental policy **variables** include total environmental tax revenues, and total energy tax revenues for the 28 EU member countries. To the best of the author's knowledge, the research investigating the relationship between environmental policy **variables** and FDI have not yet considered these variables as environmental indicators. However, these forms of market-based taxes can eliminate any form of selection bias since it captures all environmental related taxes other than taxes for specific pollutants. Both the total environmental taxes and total energy taxes are collected from the Statistical office of the European Union database (Eurostat, 2020). The data series show the total of all environmental related tax revenues collected for the individual member states and expressed as a share of the state's GDP. Specifically, total environmental taxes data series capture all the various environmental related tax elements which are grouped into four categories: energy taxes, transport taxes, pollution taxes and resource taxes (Eurostat, 2020).

The total energy taxes capture three related categories (Eurostat, 2020). The first category is capturing all energy products for transport purposes including unleaded petrol, leaded petrol, diesel, LPG, natural gas, kerosine or fuel oil. The second include energy products for stationary purposes such as light and heavy fuel oil, coal, coke, biofuels, electricity and district heat consumption and production. The third category are taxes related to carbon embodied fuels and emissions of greenhouse gases which include proceeds generated from emission permits and are documented in the national accounts statement. Eurostat (2020) strictly classify environmental taxes based on payments indicated as taxes in the national accounts. This is because it offers better international comparison of the statistics and incorporate the data with both national accounts, environmental and economic accounting. Besides, the data is adequately balanced and there is reasonable period of data available with no missing variables compared to other policy **variables** like environmental stringency index at the OECD database. Additionally, the total environmental taxes as a share of GDP data series were adopted by Morley (2012) as environmental policy instrument to measure its effectiveness in mitigating pollution in the EU region. The findings provided from the empirical model suggested significant negative effect of the market-based instrument on pollution. Likewise, Shahzad (2020), Chien et al. (2021), and Li et al. (2021) all find environmental taxes as relevant environmental policy indicator and adopt it for their study on pollution mitigations and promotion of green energies.

Therefore, this study also finds environmental taxes and energy taxes as relevant environmental policy variables. The only limitation is that since it is a market-based instrument, it is unable to cover relative effect of command-and-control **variables**. For this reason, four environmental stringency indexes are employed for further examination and scrutiny to avoid biases in selecting environmental policy proxies. These stringency indexes include the overall environmental stringency index and three other command-and-control policy indexes. These three indexes include the emissions limit value NOx, emissions limit value SOx, and emissions limit value particulate matter (PM). Hence, this study is with the belief that the data series will offer effective analysis of the complex linkages between environmental policy and FDI location decisions in the EU countries.

4.3.4.3. *Why adopting FDI mode of entry variables for this study.*

Considering the above existing literature on the pollution haven hypothesis. One popularly used proxy for FDI is the aggregate FDI inflows, whereas others have also used industry level and inward stock of FDI (see e.g., Xing and Kolstad, 2002; Fredriksson et al. 2003; Kirkpatrick and Shimamoto, 2008; Jugurnath et al. 2017). However, the aggregate FDI variable has faced criticism from several studies including Harms and Méon (2018) and Ashraf et al. (2020). They claim that most of the literature that are testing for pollution haven hypothesis have generated inconclusive results because the aggregate FDI variable lack the ability to deal with heterogeneity issues inherent in the total capital flows. These researchers suggest that a more suitable option to deal with the heterogeneity issue is the adoption of the sectoral FDI or the two modes of FDI entry which are GFDI and M&As. Also, Abu Bakar (2019) argues that adopting aggregate FDI flows can hinder clarity of understanding of environmental policy effects on foreign capital flow, therefore leading to misleading pollution haven hypothesis results. Yet to the best of my knowledge, existing literature which is testing for pollution haven hypothesis is yet to consider the relationship that exist between market-based environmental policy and the two FDI mode of entries. Existing literature that has attempted to test for pollution haven hypothesis while utilising GFDI and M&As like Abu Bakar (2019) and Ashraf et al. (2020) examined their relationship with ecological footprints, energy consumption, carbon emissions and other environmental degradation variables.

4.4. THE EMPIRICAL DATA

This study employs annual data for the 28 EU member countries that existed before the United Kingdom recently exited as member country in 2020. The countries include, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom. The sample size of the data collected for this empirical study spans from 2003 to 2019. In addition to the two-market based environmental policy proxies which are environmental taxes and energy taxes as the main predictors for this study. This study decides to include four other nonmarket based environmental policy proxies which include the overall environmental stringency index, Emission limit value Particulate Matter (PM), Emission limit value SOx, and Emission limit value NOx. A typical drawback of the nonmarket based environmental policy data is that they are available for only 19 EU countries with OECD membership status. These countries include Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, and The United Kingdom. These countries comprise all the 15 EU countries that joined the union latest by 1995, and 4 out of the thirteen that joined the union after 1995. These four countries include Czech Republic, Poland, Slovak Republic, and Slovenia which joined the union in the 5th enlargement of the year 2004. The nine countries that are not part of the OECD are Estonia, Hungary, Latvia, Lithuania, Malta, Cyprus, Romania, Bulgaria and Croatia. To this end estimations are made for the 28 EU countries and additional estimations are made for the 19 EU countries with OECD membership status for comparison and robustness check.

4.4.1. Definitions of Dependent Variables

There are three main FDI variables that are used as dependent variables for the econometric analysis. They include variables for FDI inflows, GFDI and M&As and they are all scaled by aggregate GDP. The data for FDI inflow share of GDP are collected from UNCTAD (2021) and WDI (2021). The data are expressed as the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. This is also the sum of equity capital, reinvestment of earnings, other than long-term capital, and short-term capital as shown in the balance of payments. Lastly the data series show net inflows as new investment inflows less disinvestment in the reporting economy from foreign investors, and they are a percentage of GDP in current US Dollas WDI (2021). The Data has been adopted in several FDI related studies like Cole, Elliott and Fredriksson (2006), Kubicová (2014), Sun et al. (2017), Gyamfi et al. (2021), and so on. The GFDI data series are defined as the value of announced greenfield FDI projects by destination and they are expressed as a percentage of GDP in current US Dollas. Moreover, M&A data series are defined as the value of net cross border M&A sales by region or economy of seller. An example of literature that adopted these disaggregated FDI variables for empirical analysis is that of Ashraf et al. (2020).

4.4.2. The Variables of Interest

The environmental policy **variables** are also estimated as regressor variables of interest in the regression analysis. The main **environmental policy variables** adopted for this study are the market-based policies which are environmental taxes and energy taxes collected from the statistical office of the European Union database (Eurostat, 2021). The environmental tax series show the total of all environmental related tax revenues and is expressed as percentage of GDP. Additionally, energy tax series display the total of all energy related taxes expressed as a percentage of GDP. These variables were selected for this study as proxies for two reasons. First, the environmental taxes capture all the various environmental related tax elements which are grouped into four categories: energy taxes including carbon dioxide emission taxes, transport taxes, pollution taxes and resource taxes (Eurostat, 2021). The Eurostat database strictly classify environmental taxes based on payments indicated as taxes in the national accounts. This is because it offers better international comparison of the statistics and incorporate the data with both national accounts, and environmental and economic accounting. Secondly, the data is quite balanced and there is also a reasonable period of data availability with no missing variables compared to other environmental policy variables data at the OECD database.

Figure 4.1 below illustrates the trend of environmental and energy taxes as a proportion of GDP for the 28 EU member states. In each country, environmental taxes and energy taxes exhibit a similar trajectory due to the substantial contribution of energy taxes to the overall environmental taxes (Eurostat, 2021). Additionally, Belgium and France Estonia, Greece, Italy, Latvia, and Slovenia are the nations that have exhibited a more consistent increase in environmental and energy taxes over the specified period. Austria, Denmark, Cyprus, Germany, Czech Republic, Hungary, Luxembourg, and Sweden exhibit a declining tendency in both environmental and energy taxes. However, other nations, including Bulgaria, Croatia, Finland, Ireland, Lithuania, the Netherlands, Portugal, Poland, Romania, the Slovak Republic, Spain, and the United Kingdom, have also had periodic fluctuations in their environmental and energy taxes throughout this period. The differences in the trajectories of environmental and energy taxes indicate that, although environmental policy is established by the EU Parliament, member states vary in their local enforcement of it. Notwithstanding, there is, however, a commitment within the organization to promote sustainable environmental and economic development among its member countries.

Fig 4.1

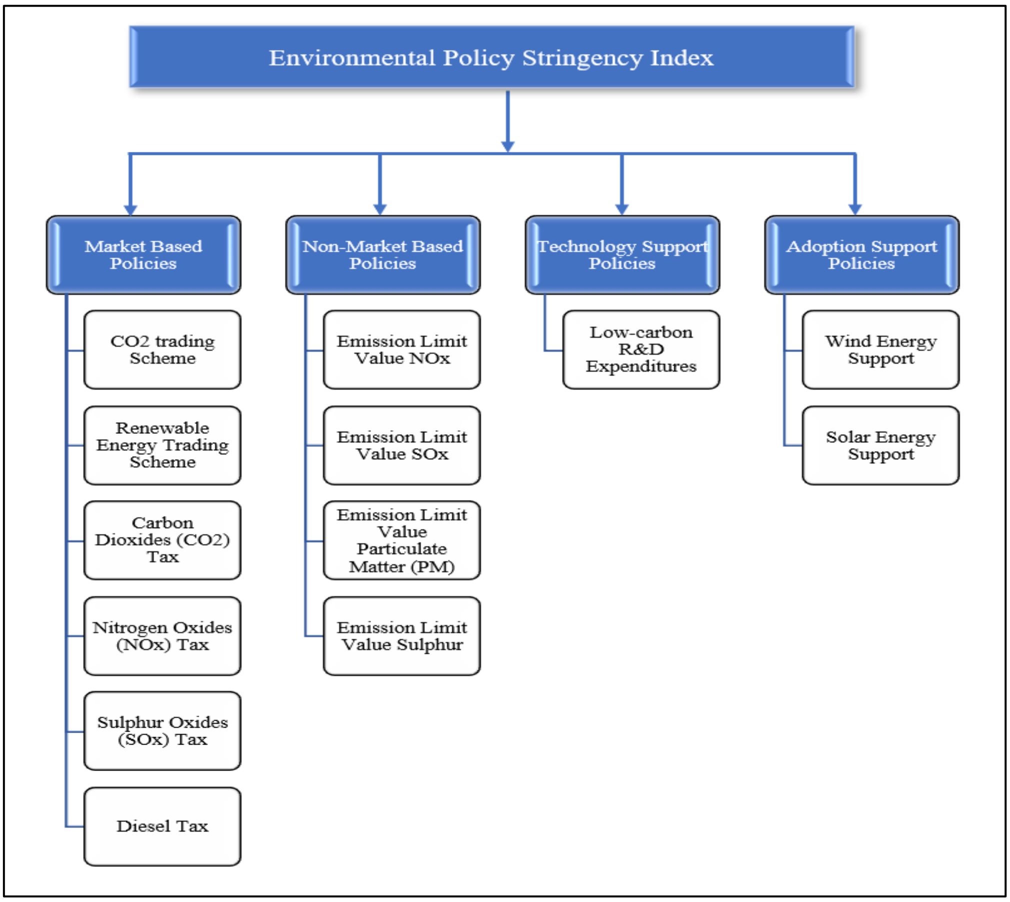
Environmental taxes (EnvTax%GDP) and Energy taxes (EnerTax%GDP) for the 28 EU countries spanning from 2003 to 2019.

Source: Eurostat database (2022)

4.4.3. Measurement Method of Environmental Policy Stringency Indexes and Caveats.

In addition to the environmental taxes and energy taxes, this study performs robustness check by utilising four nonmarket based environmental policy indexes as proxies to examine their effects on the FDI variables. These include the overall environmental stringency index, emissions limit value NOx, emissions limit value Sox, and emissions limit value PM. The OECD (2024) provides reports on the environmental policy stringency indexes for its members of which nineteen (19) are EU Member States. Apart from these 19 EU Member States, there are no data available for the remaining 9 EU countries who are not OECD members. The OECD environmental policy stringency index (EPS) is a metric that assesses the level of strictness of environmental policies on a country-specific basis and allowing for worldwide comparisons. The term "stringency" refers to the extent to which environmental rules incorporate a clear or implied cost for engaging in activities that contribute to pollution or environmental harm. The rating of the index is the result of an evaluation of the strictness of 13 environmental policy **variables**, most of which deal with air pollution and climate changes.

Fig 4.2.
Breakdown of the Overall Environmental Stringency index.



Source: OECD database (2023); Botta and Koźluk, (2014) ; Kruse et al. (2022).

The diagram above, labelled as Fig 4.2, illustrates the 13 environmental policy **variables** employed to assess the overall stringency of environmental policies in different member countries of the OECD. These **variables** are classified into 4 distinct clusters. The categories encompass market-oriented policies, policies not based on market mechanisms, policies aimed at supporting technology development, and policies aimed at facilitating the adoption of new technologies (Kruse et al., 2022). The indexes are assessed on a scale of 0 to 6, with 0 indicating the lowest value and 6 representing the highest value. This scale represents different levels of environmental policy strictness. The report indicates a consistent and ongoing rise in the stringency of environmental policies across all 19 European Union nations from 2003 to 2019 (Botta and Koźluk, 2014; Kruse et al. 2022). Nevertheless, all market-based policy indexes, such as the carbon dioxide (CO2) trading system, renewable energy trading scheme, CO2 tax, Nitrogen Oxide (NOx) tax, Sulphur Oxides (SOx) tax, and Diesel tax, have a significant number of zero values. The Low-Carbon Research and Development (R&D) expenditures, which indicate the level of technological support policy, as well as the Wind Energy support and Solar Energy support indices, which represent the level of adoption support policies, also have significant number of zeros for the nations and time periods for which data is available. However, the indexes that are associated with non-market-based policies provide more reliable data for research. They include Emissions Limit Value NOx, Emissions Limit Value SOx, Emissions Limit Value Particulate Matter (PM), and Emission Limit Value Sulphur. Figures 4.2 and 4.3 below illustrate the pattern of the overall environmental stringency index, as well as the emissions limit values for SOx, NOx and PM. The emissions limit value for Sulphur is purposefully omitted to prevent redundancy, as it closely aligns with the emissions limit value for Sox.

Particularly, Fig 4.3 shows that among the 19 countries of the EU the overall environmental stringency index exhibits an upward trend with periodic fluctuations. The changes in these countries' environmental stringency index can mostly be attributable to the presence of numerous zeros for several periods among the 13 environmental policy **variables** utilised for the measurement. Notwithstanding these fluctuations, the general trend indicates that EU countries are implementing increasing stringent environmental policies to safeguard and maintain their environmental quality. Additionally, within the category of non-market-based policies, the levels of PM emissions in Figure 4.3, as well as the emissions limit values of SOx and NOx emissions in Fig 4.4, are either at their peak between 5 to 6 or showing an upward trend over the periods for all the 19 EU nations.

Fig 4.3.

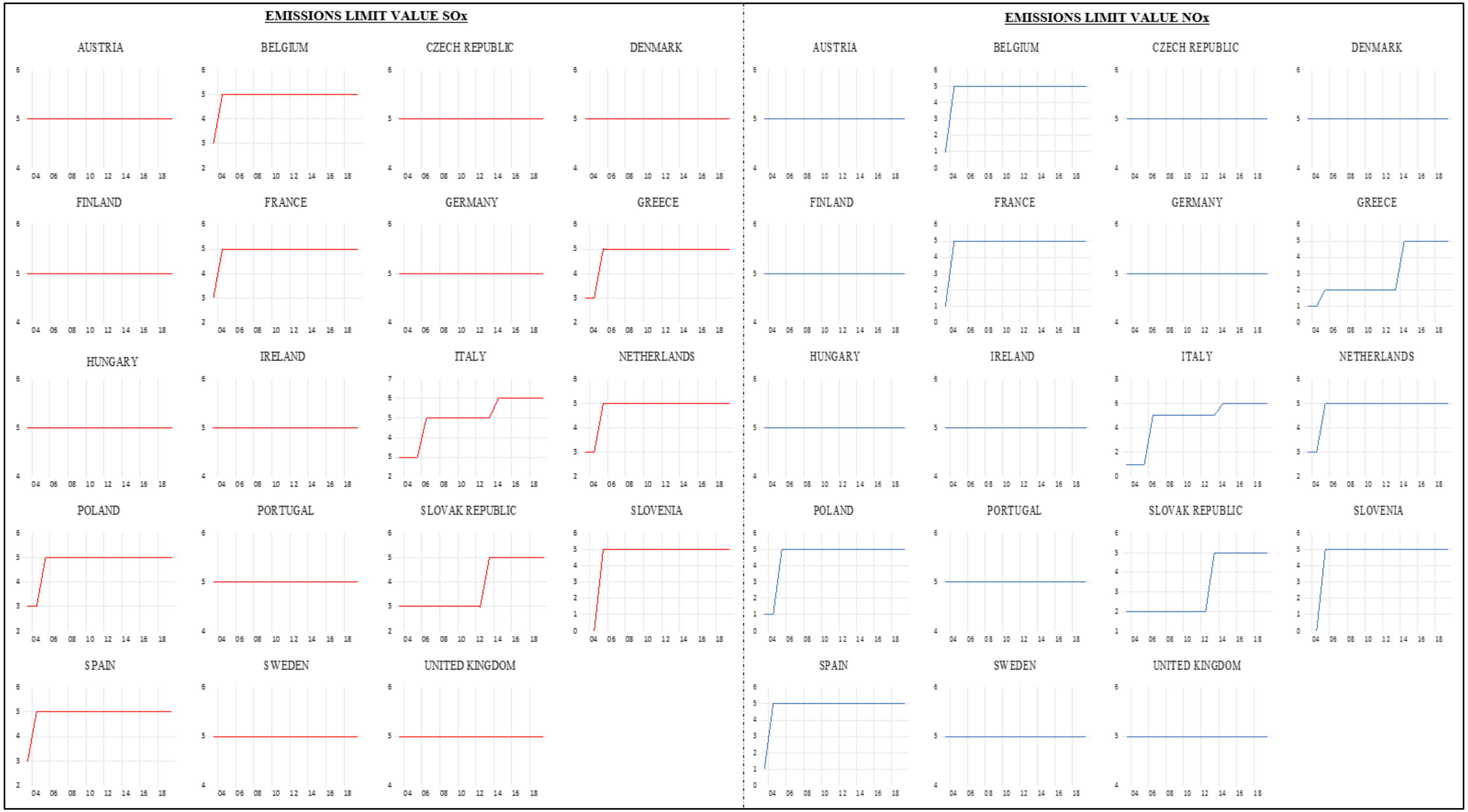
The Pattern of the 19 EU countries with OECD membership's Overall Environmental Stringency Index and Emissions Limit Value of Particulate Matter (PM) From 2003 To 2019.

Note: The values on the vertical axis are the environmental strictness indexes ranging from lowest value being 0 to highest value being 6. The horizontal axis represents the year periods expressed in double digits from 2003 to 2019.

Source: OECD Database (2023).

Fig 4.4.

The Pattern of the 19 EU countries with OECD Membership's Emissions Limit Value of SOx and Emissions Limit Value of NOx from 2003 To 2019.



Note: The values on the vertical axis are the environmental strictness indexes ranging from lowest value being 0 to highest value being 6. The horizontal axis represents the year periods expressed in double digits from 2003 to 2019.

Source: OECD Database (2023).

4.4.4. Control Variables: Determinants of FDI inflows, GFDI, and M&As

Based on existing literature on FDI, GFDI, and M&As this paper adopts some potential determinants and are classified into three (3) broader categories including Market size, Trade openness, and two Economic freedom index variables.

4.4.4.1. *Market Size*

It is expected that larger market size will attract FDI flows (Vijayakumar et al. 2010). This is because MNCs are interested in obtaining new market opportunities for their products and services. Having access to a large market size is an opportunity for MNCs to reach maximum profit and attain economies of scale. The EU single market economy coupled with member countries having larger GDP per capita render the EU as an attractive location for FDI. Examples of empirical evidence that suggest positive effects of the market size on FDI location decisions include Tsai, 1994, List et al. (2003), Rossi and Volpin (2004), Asiedu (2006), Vijayakumar et al. (2010), Özkan-Günay (2011), Erel et al. (2012), Wang et al. (2019). Contrary, studies like Holland and Pain (1998) and Asiedu (2002) found market-related factors to be insignificant determinants of FDI. The rationale is that the implication of market size on FDI inflows differ in terms of its motive (Makhavikova, 2018). For example, market size can be a significant factor when FDI is influenced by horizontal motives, whilst insignificant when FDI is influenced by vertical motive (see Dunning, 1973). This study follows existing studies that have used GDP per capita constant (GDPpc) as variable for market size like Tsai (1994) and Asiedu (2002) and adopt it as a control variable. The World bank define GDPpc as gross domestic product (GDP) divided by midyear population (WDI, 2021). GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products (WDI, 2021). It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The data is available for the entire period under study. Also, the data is converted to its natural logarithm before including in all empirical estimations. This is practiced by studies such as Pritchett (1997), Blanco et al. (2013), Van and Bao (2018), Hayat (2018), and Ghazi (2021).

4.4.4.2. *Trade openness*

Trade Openness is the sum of exports and imports of goods and services measured as a share of gross domestic product. The data is sourced from WDI (2021). Usually, the variable is considered in literature as a significant positive determinant of FDI (Kersan-Skabic and Orlic, 2007). This is evident in literatures like Asiedu (2002), Vijayakumar et al. (2010), Özkan-Günay (2011), Erel et al. (2012) and Wang et al. (2019). For instance, Saini and Singhania (2018) finds mixed effects of trade openness on FDI in their static panel models for developed countries. Their baseline results suggested positive effects of trade openness on FDI but becomes insignificant when efficiency scores and interest rate differential is included. Moreover, controlling for financial crises yielded positive and significant effects of trade openness on FDI. This could mean that trade openness could only encourage FDI during crises period but rather become volatile towards FDI in periods of economic stability. That notwithstanding, the robust estimation with dynamic panel GMM one step model produced insignificant effects of trade openness on FDI inflows to developed countries even in crises periods.

However, Bevan and Estrin (2000) find no significant impact of trade openness on FDI into European transition economies. Basically, when trade openness increases in developed or developing countries. It is most likely that FDI may not be very important because there is easy accessibility to trade in new markets without MNCs relocating their plants. Also, Schmitz and Bieri (1972) used data from 1952 to 1996 to analyse the FDI flow from the United States to Canada, the European Economic Community (EEC), and the European Free Trade Association (EFTA). Their findings demonstrated that the tariff discrimination hypothesis is particularly obvious in U.S. FDI flows to the EEC. The authors suggest that a government's imposition of trade tariffs, which hinder exports, prompts the pursuit of FDI to overcome these tariff barriers. Consequently, the authors contended that increasing trade openness will likely decrease FDI. Their findings indicate that in countries like the EEC and Canada, trade openness decreases FDI inflows.

Following studies like Asiedu (2002), Vijayakumar et al. (2010), Özkan-Günay (2011), Erel et al. (2012) and Wang et al. (2019) this study adopts trade as a percentage of GDP as a proxy for trade openness and include it among the control variables in the empirical estimation. Also, this study anticipates negative effects of trade openness on direct investments in the EU countries. Since an increase in trade openness could minimize the importance of setting up subsidiary in the form of FDI. The natural logarithm of trade as percentage of GDP is used in all estimations as practiced extensively in empirical literature like Dollar and Kraay (2003), Mahmood (2019), Mahmood et al. (2019), Mahmood et al. (2020), Belloumi and Alshehry (2020), and Khan et al. (2021). It is argued by Khan et al. (2021) that the results produced by log-linear measurement are significantly superior to those of the linear operational method.

4.4.4.3. *Unemployment rate*

Unemployment rate is used to capture the role of business cycle conditions and macroeconomic stability that can affect investment decisions. The host country's potential for investment opportunity can be evidenced by its low unemployment rate. High unemployment rate could imply a period of economic downturns, and lower purchasing power of the host economy that can influence firms to withdraw their investments and profits to home country (Kersan-Skabic and Orlic, 2007). However, Kersan-Skabic and Orlic, (2007) finds unemployment rate to have positive effects on FDI inflows to Central and Eastern Europe (CEE). But this could be attributed to evidence of lower wage growth in the region and strong macroeconomic performance. Contrarily, Özkan-Günay (2011) concludes from their results that macroeconomic stability variables like unemployment are not significant factors to attract foreign investors to developed EU member countries. Similarly, Rodríguez-Pose and Zademach (2003) found in most cases insignificant effects of unemployment rates on M&As to Germany cities. Hence, this study follows Kersan-Skabic and Orlic (2007), Rodríguez-Pose and Zademach (2003), and Özkan-Günay (2011) and include unemployment among the control variables adopted for the empirical analysis. The low unemployment rate in the EU may indicate higher wages in the labour market because individuals are less likely to be in a desperate position to secure employment. Consequently, a reduction in FDI could result from higher wages, as the high labour cost may deter multinational companies.

4.4.4.4. *Financial freedom index and Government integrity index*

The business environment in the host country can be a potential determinant for FDI location decision (Economou, 2019). Therefore, financial freedom index and government integrity index are included as controlled variables. The data are collected from the Heritage foundation index of economic freedom 2023 database. The Government integrity index is used as proxy for the rule of law, and the financial freedom index also captures the open market category. A country's score is graded on a scale of 0 to 100 (Heritage Foundation index, 2023). The significance of both financial freedom index and government integrity index in attracting FDI inflows have been mixed results in literature. For example, the empirical evidence from Economou (2019) and Cieślik and Ghodsi (2021) find positive effects of both financial freedom index and government integrity index on FDI. On the contrary Imtiaz and Bashir (2017) and Sooreea-Bheemul (2020) find no statistically significant effects of both financial freedom index and government integrity index on FDI.

Therefore, following the studies of Imtiaz and Bashir (2017), Economou (2019), Cieślik and Ghodsi (2021) and Sooreea-Bheemul (2020), this study adopts financial freedom index and government integrity index as controlled variables. Moreover, this study anticipates positive effects of financial freedom index and government integrity index on direct investments because of the high level of institutional qualities that exist within EU countries.

4.4.5. Descriptive Statistics for the Panel Data for EU Countries

Table 4.1, and Table 4.2 below are panel data for 28 and 19 EU countries respectively. Both tables contain aggregate FDI, GFDI and M&As as the main dependent variables and environmental taxes as well as energy taxes as variables of interest. All the remaining variables in the Table 4.1 are controlled variables. But in Table 4.2, the overall environmental stringency index, emissions limit value NOx, emissions limit value Sox, and emissions limit value PM are also variables of interest for robustness checks. Comparatively, the standard deviation of the variables found in Table 4.1 are higher than that of Table 4.2. This is because the nine EU members that are not members of the OECD are responsible for outliers in Table 4.1. For example, in Table 4.1 the maximum value for FDI %GD is 449.083% and this is for the Island country of Malta in the year 2007. But Malta is not part of the OECD and the maximum value for FDI%GDP in Table 4.2 becomes 85.589% which represent the Netherlands. These outliers in Table 4.1 also account for why the means of the variables for the 28 EU countries are higher compared to the means of the variables for the 19 EU countries in Table 4.2.

Table 4.1.

Descriptive Statistics for data of 28 EU Countries spanning from 2003 to 2019.

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI%GDP	476	12.704	41.247	-58.323	449.083
GFDI%GDP	476	2.313	3.512	0.071	44.848
MAs%GDP	476	1.422	4.505	-6.284	81.041
Environmental taxes % of GDP	476	2.641	0.599	1.410	4.990
Energy taxes % of GDP	476	1.973	0.458	0.850	3.300
Log GDP per capita Constant (GDPpc)	**476**	**10.198**	**0.656**	**8.485**	**11.626**
Trade % of GDP	476	119.03	63.08	45.419	380.104
Unemployment rate	476	8.584	4.261	2.010	27.470
Financial freedom index	476	69.454	12.570	40	90
Government integrity index	476	62.456	18.698	26	99

Table 4.2.

Descriptive Statistics for data of 19 EU Countries with OECD Membership Status spanning from 2003 to 2019.

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI%GDP	323	5.601	12.150	-40.33	86.589
GFDI%GDP	323	1.514	1.751	0.078	14.384
MAs%GDP	323	1.160	2.020	-2.544	19.178
Environmental taxes % of GDP	323	2.642	0.629	1.410	4.990
Energy taxes % of GDP	323	1.933	0.449	0.850	3.300
Log GDP per capita constant (GDPpc)	**323**	**10.394**	**0.482**	**9.122**	**11.284**
Trade % GDP	323	103.118	43.386	45.419	252.335
Unemployment rate	323	8.617	4.487	2.010	27.470
Financial freedom index	323	68.893	6.174	53.200	82.600
Government integrity index	323	67.153	18.191	33.200	99
Environmental Stringency index	323	2.896	0.625	0.528	4.722
Emission limit value PM	323	4.638	1.585	0	6
Emission limit value SOx	323	4.851	0.652	0	6
Emission limit value NOx	323	4.675	1.059	0	6

4.5. EMPIRICAL METHODOLOGY AND STRATEGY

Unlike other panel ordinary least squares (OLS), the fixed effects (FE) model treats the constant as different groups or section specific (Woodridge, 2010: Makhavikova, 2018). The model can deal with the heterogeneity bias that exist in the Pooled OLS (Asteriou and Hall, 2016). Hence there is liberty in the model for different constants to be created for each section. This model specification is also referred to as least squares dummy variables (Wooldridge, 2010). This is because the group constants are included in the panel model as dummy variable for each of the specific sections. Furthermore, the model demonstrates an important characteristic of capturing all specific effects related to an individual observation which are also time invariant (Asteriou and Hall, 2016). For instance, in a panel consisting of many countries, the FE method will consider fully the individual geographical characteristics, and any possible varying characteristics that exist within the countries.

Equation 4.1 is the fundamental panel model specification in a dynamic form by utilising the first lag of all independent variables to eliminate issues of endogeneity that can render the results erroneous (Bellemare, Masaki and Pepinsky, 2017).

$$Y_{it} = a_{it} + \beta_1 EP_{it-1} + \beta_2 logGDPpc_{it-1} + \beta_3 logTradeGDP_{it-1} + \beta_4 UE_{it-1} + \beta_5 FFI_{it-1} + \beta_6 GI_{it-1} + \varepsilon_{it-1} \quad (4.1)$$

Based on equation 3.1 the Two-way FE model with both time and cross-sectional dummies is expressed as follows:

$$Y_{it} = a_{it} + \beta_1 EP_{it-1} + \beta_2 logGDPpc_{it-1} + \beta_3 logTradeGDP_{it-1} + \beta_4 UE_{it-1} + \beta_5 FFI_{it-1} + \beta_6 GI_{it-1} + v_t + u_i + \varepsilon_{it} \qquad (4.2)$$

Where Y_{it} represents the dependent variables which include FDI, GFDI and M&As country i at time t. One of these dependent variables is used when estimating the model. a_{it} represent the intercept term showing the expected value of Y for country i at time t when all control variables are zero. EP_{it-1} represents the environmental policy variable in the estimation for country i at time t using 1 lag. Which is also the variable of interest. The environmental policy variables used interchangeably in the model estimation include environmental taxes, energy taxes, environmental stringency index, emission limit value PM, emissions limit value SOx, and emissions limit value NOx. $logGDPpc_{it-1}$ represent the natural log of GDP per capita constant for country i at time t using 1 lag. Which is also a control variable in the estimation. $\log TradeGDP$ represent the natural log of Trade % GDP for country i at time t using 1 lag. Which is a control variable in the estimation. UE_{it-1} represent unemployment rate for country i at time t using 1 lag. Which is a control variable in the estimation. FFI_{it-1} represent financial freedom index for country i at time t using 1 lag. Which is a control variable in the estimation. GI_{it-1} represent government integrity index for country i at time t using 1 lag. Which is a control variable in the estimation. ε_{it} represents the error term of the model for country i at time t and capturing all unobserved factors that can affect Y_{it}.

Moreover, the v_t is the time specific dummy effect and, u_i is country specific dummy effects in equation 4.2. The two-way fixed effects model is adopted because the EU countries share common policies and interest as a bloc, and they are similarly affected by periodic shocks that occurs over the years. In equation 4.2, β_1 is the co-efficient of any of the environmental policy variables that will be estimated as variable of interest. To this end, significant negative β_1 will imply evidence of pollution haven effect in the inflows of the estimated aggregate FDI, GFDI and M&As to the EU countries. Contrarily, significant positive β_1 will imply pollution halo effect in the inflows of the estimated aggregate FDI, GFDI and M&As to the EU countries. Also, $\beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the co-efficient of the first lags of the log of GDP per capita constant, log of Trade % GDP, unemployment rate, financial freedom index, and government integrity index respectively.

4.5.1. Classical Linear Regression Assumption

Cameron (2005) and, Asteriou and Hall (2016) explain classical linear regression as a linear equation which is estimated by OLS and has a list of assumptions concerning the stochastic error term (ε) in the model which must be upheld to be best linear unbiased estimator (Blue). In other words, the classical linear regression assumption is supposed to help understand the causal relationships between the predictors or independent variables at the right-hand side of the equation and the dependent variable at the left-hand side of the equation. The results are justified or unjustified only when the model passes the Blueness test. This study performs three important tests to examine classical linear regression (CLR) assumptions, and they include multicollinearity, homoskedasticity, and cross-sectional independence.

4.5.2. Examining Multicollinearity Problem

The CLR assumption states that the number of data observations (n) must be greater than two (n > 2). It must also be greater than the number of predictors in the regression. In addition to that there should be no direct linear relationship among predictors in the regression equation (Asteriou and Hall, 2016). In other words, two or more independent variables should not be highly correlated in the regression model (Daoud, 2017). If no linear relationship exists between the predictors or independent variables, then they are classified as orthogonal. In the light of Asteriou and Hall (2016) the mathematical expression for a no multicollinearity in the dependent variables can be stated as follows.

$$\sum_{it=1}^{n}(\beta_1 logGDPpc_{it} + \beta_2 logTradeGDP_{it} + \beta_3 FFI_{it} + \beta_4 GI_{it} + \beta_5 UE_{it}) \neq 0$$

Multicollinearity can obviously be identified to exist in two conditions (Asteriou and Hall, 2016). When the signs of the coefficients of the predictor variables have huge standard errors with small t-values. Also, when the coefficients do not agree with the expected signs. This is because, the affected coefficients can fail to achieve statistical significance and can cause erroneous relegation of influential variable(s) from the empirical equation. Moreover, these problematic situations can also cause the OLS coefficients to be imprecise since large standard errors potentially enlarge the confidence intervals of the regression. The methods adopted for testing multicollinearity in this study include Variance inflation factor (VIF) and correlation coefficient matrix of the independent variables. The expression of the variance inflation factor (VIF_j) for all controlled variables is mathematically estimated as follows (Asteriou and Hall, 2016).

$$VIF_j = \frac{1}{1 - R_j^2}$$

Where the R_j^2 is the squared of all the correlation coefficients that exist among the controlled variables. The high levels of intercorrelation among two or more controlled variables will lead to the rise of the value of R_j^2 and will eventually inflate the estimated coefficients of the controlled variables. Also, increasing R_j^2 will mean increasing VIF_j until it approaches infinity. The table below shows the corresponding values for R_j^2 and VIF_j.

R_j^2	VIF_j
0	1
0.5	2
0.8	5
0.9	10
0.95	20
0.975	200
0.999	1000

Values of VIF_j that exceed 10 are typically considered indicative of the existence of problematic multicollinearity. Hence, the table indicates that multicollinearity occurs when the coefficient of determination $R_j^2 > 0.9$.

Alternatively, correlation coefficients serve as a straightforward and valuable approach for detecting issues related to multicollinearity (Cameron, 2005). In this process, a correlation matrix is constructed to assess the potential amount of correlation between several independent variables. One common issue associated with this approach is the determination of a sufficiently high value for the correlation coefficient to be deemed significant. Like the variance inflation factor (VIF), many scholars adopt a threshold of 0.9 as the point at which multicollinearity is very probable (Asteriou and Hall, 2016).

4.5.3. Performing Heteroskedasticity Test

Another CLR assumption that is often violated is the issue of heteroskedasticity (Halunga, 2017). Importantly, the CLR assumption requires that all disturbance terms have the same variance across time. Implying evidence of homoskedasticity and not heteroskedasticity. Each of these two Greek words have two parts (McCulloch, 1985). The first parts of homoskedasticity are ‘’homo’’ a Greek word which means ‘same’ or ‘equal’. While the first part of heteroskedasticity is ‘’hetero’’ which also means ‘unequal or different’’. The second part of the two words are the same which is ‘skedasmos’ in Greek meaning to ‘scatter or spread’. Hence, homoskedasticity can be defined as same or equal spread, while heteroskedasticity is different or unequal spread. In terms of econometrics homoskedasticity can be referred to as same or equal variance (constant), while heteroskedasticity is different or unequal variance (no constant). The mathematical equation for testing homoskedasticity can be expressed as follows.

$$Var(\varepsilon_{it}) = \sigma^2 = constant\ for\ all\ t$$

The heteroskedasticity test is conducted to basically perform diagnostic test by examining whether the model is best linear unbiased estimator (BLUE). For instance, Gauss-Markov theorem suggest that a linear regression model should meet the assumptions of the classical linear regression model to be BLUE.

Specifically, the test shows whether the serial correlation affects the standard errors of the regression (Breusch and Pagan, 1979; Cook and Weisberg, 1983; Halunga, 2017). The null hypothesis of the test is that there is constant variance in the model indicating no evidence of heteroskedasticity when significance level is beyond 5%. The alternative hypothesis states that there is no constant variance in the model and so implying the presence of heteroskedasticity at 5% significance level. The presence of heteroskedasticity can also be simply interpreted as the independent variables being responsible for the variations in the error term (Halunga, 2017). Moreover, the evidence of heteroskedasticity means that the FE models will require robust standard errors to achieve Blueness.

4.5.4. Cross-Sectional Dependence Test

The Pesaran's (2004) Cross-sectional dependence (CD) test is used to examine the presence of spatial dependence for the two-way FE models. The null hypothesis of the CD test is that there exist cross-sectional uncorrelated residuals. In other words, there is spatial independence within the subjects. The alternative hypothesis disputes the previous claim by the null hypothesis and suggest existence of spatial dependence. In the case of spatial independence, a different robust standard error estimation like Driscoll Kraay standard errors that can deal with heteroskedasticity problems in panel data settings can be adopted (Hoechle, 2007). Therefore, at 5% significant level the null hypothesis is rejected, and the alternative hypothesis is accepted. Suggesting that, Driscoll Kraay standard errors is more efficient to offer robust results for the panel (Driscoll and Kraay, 1998; Hoechle, 2007).

4.5.5. Driscoll-Kraay Robust Standard Errors Model

Driscoll and Kraay (1998) have suggested a nonparametric covariance matrix estimator that are robust to general forms of spatial and temporal dependence. Their proposed estimator can generate results for both Pooled OLS and FE models. However, Hoechle (2007) also suggest that Driscoll and Kraay standard errors are inefficient or unsuitable if the panel data does not exhibit spatial correlation. In other words, the results are very robust with Driscoll-Kraay standard errors in case there is evidence of cross-sectional dependence or spatial correlation. So, statistical results become seriously biased when cross-sectional dependence is overlooked in the panel models (Driscoll and Kraay,1998; Cameron and Trivedi, 2005; Hoechle, 2007). Cameron and Trivedi (2005) enforce this argument by stating specifically that ''*NT* correlated observations have less information than *NT* independent observations''. These arguments have led many researchers to adjust the standard errors of estimated coefficients in panel data analysis to examine possibility of cross-sectional dependence in the residuals to justify the quality of their results (Hoechle, 2007).

4.5.6. Estimation of Bootstrap Quantile Panel Fixed Effects.

To consider possible heterogenous distribution of the FDI inflows among the 28 countries in the EU, the quantile regression approach is adopted to generate estimated coefficients (Cameron and Trivedi, 2010). This semi-parametric approach generates a bootstrapped estimate of the variance-covariance matrix with between-quantile blocks, which takes interdependencies between the estimations for different quantiles into account and allows the direct comparison of the coefficients for different quantiles. Unlike the OLS regression method that summarises the average relationship between the dependent variable and a set of regressors based on conditional mean function. The quantile regression provides the causal relationship between the regressors and the dependent variable at different conditional means (Sahu and Dash, 2021). In this study, the quantile regression allows for the effects of the environmental policy variables to be examined at different conditional percentiles or means of the aggregate FDI, GFDI and M&As to the EU countries. Hence, 100 bootstrap replications are carried out for the 5^{th}, 10^{th}, 25^{th}, 30^{th}, 45^{th}, 50^{th}, 60^{th}, 75^{th}, 90^{th}, 95^{th}, and 99^{th} conditional percentiles of the aggregate FDI, GFDI and M&As to these countries. This means that, for example a 25^{th} percentile fits the regression line through the data such that 25% of the observations are below the regression line and the remaining 75% are above. Moreover, 25^{th} percentile represents the 1^{st} quartile, 50^{th} percentile or median is the 2^{nd} quartile and 75^{th} percentile represent the 3^{rd} quartile for the observations of the dependent variable. Moreover, the lower percentiles below the median represents EU countries with their aggregate FDI, GFDI and M&As accounting for small proportion of their GDP comparatively. Whilst the upper percentiles above the median represent countries in the EU having their aggregate FDI, GFDI and M&As accounting for larger proportion of their GDP comparatively. The quantile regression, therefore, offer the opportunity to relegate the assumption that the regressors have homogeneous effect across the lower and the upper tails of the distribution of aggregate FDI, GFDI and M&As as share of GDP variables. This offers more revealing information about the effects of the environmental policy variables on aggregate FDI and the two FDI modes of entry. The quantile regression is also able to deal with biases due to outliers and provides more robust results compared to OLS estimates (Sahu and Dash, 2021).

Following the quantile regression with fixed effects in Koenker (2004) and Zhu et al. (2016) the model is specified as follows.

$$Q_{y_{it}}(\tau/\alpha_i, v_t, \varepsilon_t, x_{it}) = a_i + \beta_1 EP_{it-1} + \beta_2 logGDPpc_{it-1} + \beta_3 logTradeGDP_{it-1} + \beta_4 UE_{it-1} + \beta_5 FFI_{it-1} + \beta_6 GI_{it-1} \quad (4.3)$$

Where the countries are indexed by i and time t. The y_{it} represents aggregate FDI or GFDI or M&As all as a percentage of GDP which are the dependent variables. Moreover, α_i and v_t are also the cross-sectional and time fixed effects variables respectively. The estimated coefficients $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, and\ \beta_6$ represent the level of effect on the dependent because of a one-unit change in the regressor variables at a specified quantile or conditional mean.

4.6. EMPIRICAL ANALYSIS OF THE RESULTS

Subsection 4.6.1. begins the preliminary analysis of the results for the diagnostic tests that examine the classical linear regression assumptions in the panel model and provide basis for selecting a suitable model. This is followed by the analysis of results for the effects of the market-based and nonmarket based environmental policy proxies on the aggregate FDI and the two FDI modes of entry (GFDI and M&As) into the EU countries. These market-based policies as discussed previously include the environmental taxes and energy taxes. While the nonmarket based also include the four indexes that measures the strictness of environmental regulations which are the overall environmental stringency index, and the emissions limit value SOx, emissions limit value NOx and emissions limit value PM. To this end subsection 4.6.2, provides the analysis of the results for the effects of the environmental policy variables on aggregate FDI. While subsection 4.6.3 also offer the analysis of the results for the effects of the environmental policy variables on GFDI. Moreover, subsection 4.6.4 provides the analysis of the results for the effects of the environmental policy variables on M&As.

These analysis are conducted based on the full panel of 28 EU countries and also the subsample of 19 EU countries. The findings are generated using lags of all regressors to deal with issues of suspected endogeneity in the three adopted panel models which are the two-way fixed effects estimation model, variance covariance robust standard errors estimation model, and the Driskoll Kraay robust standard errors estimation model. Among these three models the results from the Driskoll Kray robust standard errors are chosen as the most acceptable results since the model estimation demonstrates the unique ability to correct issues of heteroskedasticity and spatial cross-sectional dependence found in the model. Furthermore, analysis of the results for the effects of environmental policies on aggregate FDI, GFDI and M&As as a percentage of GDP based on the differences in the distribution of these variables for the EU countries are provided in subsection 4.6.5. That is by categorising the countries into quantiles based on the countries who's aggregate FDI, GFDI and M&As constitute larger share of their GDP and the countries the variables constitute smaller share of GDP comparatively. The empirical model used to execute this task is the Bootstrap quantile regression with two-way fixed effects due to its suitability to achieving such objective (Koenker, 2004; Zhu et al. 2016).

4.6.1. Results for Multicollinearity, Heteroskedasticity and Cross-Sectional Dependence

The VIF results is presented in Table 4.3 below and the pairwise correlation matrix tables are reported in Tables 4.4 and 4.5 below. The correlation coefficients and the VIF results presented in the tables suggest the absence of multicollinearity among the controlled variables in the panel dataset. The modified Wald test for groupwise heteroskedasticity test for the fixed effects model regression is executed and the results is presented in Table 4.6. below. The p-value of the Modified Wald test for groupwise heteroskedasticity in the two-way fixed effects regressions are found to be significant at 1% level for all estimations conducted with the two panels of EU countries. Hence, the null hypothesis is rejected whereas the alternative hypothesis is accepted. Suggesting evidence of heteroskedasticity in all the panels. This means that the two-way fixed effects models will require robust standard errors to achieve Blueness. Similarly, in Table 4.6 the cross-sectional dependence test results are presented for the panel of 28 EU countries and the sub sample of 19 EU countries. In the panel of 28 EU countries, generally the null hypothesis is rejected at 1% significant level, supporting evidence of heteroskedasticity and spatial cross-sectional dependence in the models. However, in the panel of 19 EU countries evidence of heteroskedasticity is generally supported but spatial cross-sectional dependence is only rejected when M&As is the dependent variable. This implies that, it is appropriate to specify the robust Driscoll-Kraay standard errors, since there is general support for heteroskedasticity and spatial cross-sectional dependence. Also, it offers robust and more consistent results (Driscoll and Kraay, 1998; Hoechle, 2007). Though, the Driscoll Kraay robust standard errors estimation is more efficient and remains the acceptable results, the robust covariance matrix standard errors which is also effective in dealing with heteroskedasticity issues is additionally estimated with two-way fixed effects to generate results for the purpose of comparison.

Table 4.3.

Variance inflation factor for all dependent variables for panel of 28 EU Countries for period from 2003 to 2019

Independent Variables:	28 EU Countries	19 EU/OECD Countries
	VIF	VIF
Government Integrity	3.870	4.170
Log GDPpc	3.160	3.080
Financial freedom	1.470	2.750
Log Trade % GDP	1.230	1.360
Unemployment rate	1.150	1.340
Mean VIF	2.180	2.540

Table 4.4.
Pairwise correlations matrix with for 28 EU Countries for period of 2003 to 2019

Variables	(1)	(2)	(3)	(4)	(5)
(1) Log GDPpc	1.000				
(2) Log Trade % GDP	0.365	1.000			
(3) Unemployment rate	-0.364	-0.293	1.000		
(4) Financial freedom	0.566	0.331	-0.422	1.000	
(5) Government Integrity	0.749	0.045	-0.371	0.662	1.000

Table 4.5.
Pairwise correlations matrix with for 19 EU/OECD Countries for period of 2003 to 2019

Variables	(1)	(2)	(3)	(4)	(5)
(1) Log GDPpc	1.000				
(2) Log Trade % GDP	-0.098	1.000			
(3) Unemployment rate	-0.335	-0.238	1.000		
(4) Financial freedom	0.613	0.291	-0.449	1.000	
(5) Government Integrity	0.815	-0.035	-0.419	0.724	1.000

Table 4.6.

Classical linear regression assumption test for estimations with panel of 28 EU countries using data from 2003 to 2019.

Dependent variables	**Modified Wald test for groupwise heteroskedasticity in FE regression**		**Pesaran's test of cross-sectional independence**	
28 EU Countries	Details	Coef.	Details	Coef.
FDI%GDP	Chi2 (28)	10472.090	Absolute value	0.419
	Probability > Chi2	0.000***	Probability	0.000***
GFDI%GDP	Chi2 (28)	10472.090	Absolute value	0.419
	Probability > Chi2	0.000***	Probability	0.000***
M&As%GDP	Chi2 (28)	21300.430	Absolute value	0.390
	Probability > Chi2	0.000***	Probability	0.000***
19 EU Countries				
FDI%GDP	Chi2 (19)	3925.150	Absolute value	0.386
	Probability > Chi2	0.000***	Probability	0.012**
GFDI%GDP	Chi2 (19)	10472.090	Absolute value	0.419
	Probability > Chi2	0.000***	Probability	0.000***
M&As%GDP	Chi2 (19)	3542.720	Absolute value	0.205
	Probability > Chi2	0.000***	Probability	0.264

Note: *p*-values in parentheses, ** $p < 0.05$, *** $p < 0.01$. All controlled variables are included in these estimations, and they are log GDPpc, log Trade % of GDP, Financial freedom index, Government integrity index and unemployment rate.

4.6.2. Analysis of the Effects of Environmental Policy on FDI.

This section starts by analysing the effect or impact of environmental taxes and energy taxes on FDI for the panel of 28 EU countries (see Table 4.7 below) and that of the 19 EU countries (see Table 4.8 below). Then followed by analysis of the results for the effects of each of the four environmental stringency indexes on FDI received by the subsample of 19 EU countries (see Tables 4.9 and 4.10 below). In Tables 4.7 and 4.8

all the results do not provide significant support for either pollution haven effect or pollution halo effect in the impact of both environmental taxes and energy taxes on aggregate FDI for the overall 28 EU countries and the subsample of 19 EU countries respectively. However, in Table 4.7, among the controlled variables trade exert significant negative effects on aggregate FDI of the 28 EU countries as anticipated. Also, financial freedom index and government integrity significantly impact aggregate FDI positively as expected.

Concerning Tables 4.9 and 4.10, the results of the four environmental strictness indexes similarly demonstrated insignificant effects on the aggregate FDI of the 19 EU countries. But due to all the independent variables being insignificant in Tables 4.8, 4.9 and 4.10 for the subsample of 19 EU countries. In appendix A, the three estimated models are re-estimated without fixed effects and the results are reported in Tables A1, A2 and A3. In these results, the effect of energy taxes and the overall environmental stringency index have significant negative effects on aggregate FDI inflows of the 19 EU countries and imply evidence of pollution haven hypothesis. Moreover, the effect of energy taxes, emissions limit value for NOx, SOx and PM remains insignificant even after dropping the fixed effects. While, among the controlled variables trade have significant positive effects on aggregate FDI contrary to what was expected but financial freedom index has positive effects on aggregate FDI as expected.

Table 4.7.

The effects of environmental tax and energy tax on FDI for 28 EU countries using data from 2003 to 2019.

	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	FDI	FDI	FDI	FDI	FDI	FDI
EnvTax % GDP (-1)	1.828		1.828		1.828	
	(5.968)		(7.004)		(4.846)	
EnerTax % GDP (-1)		-3.830		-3.830		-3.830
		(6.980)		(8.699)		(6.946)
lnGDPpc (-1)	-47.92	-53.88	-47.92	-53.88	-47.92	-53.88
	(33.81)	(33.52)	(50.95)	(60.65)	(44.01)	(48.27)
lnTrade % GDP (-1)	-99.92***	-95.45***	-99.92	-95.45	-99.92**	-95.45**
	(28.78)	(28.80)	(62.22)	(60.39)	(40.17)	(41.64)
Unemployment rate (-1)	0.800	0.908	0.800	0.908	0.800	0.908
	(0.876)	(0.889)	(0.790)	(0.849)	(0.866)	(0.898)
Financial Freedom (-1)	0.541*	0.515*	0.541	0.515	0.541*	0.515
	(0.295)	(0.296)	(0.546)	(0.501)	(0.299)	(0.302)
Government Integrity (-1)	0.888**	0.967**	0.888	0.967	0.888	0.967
	(0.386)	(0.387)	(0.577)	(0.704)	(0.881)	(0.929)
Constant	832.9**	881.5***	832.9	881.5	881.0*	930.0*
	(336.5)	(333.3)	(651.0)	(711.1)	(428.9)	(450.0)
Observations	448	448	448	448	448	448
R^2	0.110	0.111	0.110	0.111	0.110	0.111

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.8.

The effects of environmental tax and energy tax on FDI for 19 EU countries using data from 2003 to 2019.

	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
EnvTax % GDP (-1)	0.063 (2.691)		0.063 (2.325)		0.063 (2.355)	
EnerTax % GDP (-1)		-0.711 (3.143)		-0.711 (2.866)		-0.711 (2.627)
lnGDPpc (-1)	7.284 (17.39)	5.903 (17.21)	7.284 (22.85)	5.903 (22.80)	7.284 (12.06)	5.903 (12.55)
lnTrade % GDP (-1)	-0.899 (13.13)	-0.133 (13.27)	-0.899 (14.86)	-0.133 (15.48)	-0.899 (7.124)	-0.133 (7.413)
Unemployment rate (-1)	0.333 (0.372)	0.339 (0.373)	0.333 (0.346)	0.339 (0.329)	0.333 (0.274)	0.339 (0.257)
Financial Freedom (-1)	-0.565 (0.405)	-0.592 (0.410)	-0.565 (0.729)	-0.592 (0.733)	-0.565 (0.573)	-0.592 (0.577)
Government Integrity (-1)	0.065 (0.198)	0.077 (0.200)	0.065 (0.256)	0.077 (0.258)	0.065 (0.272)	0.077 (0.273)
Constant	-36.61 (170.6)	-23.23 (167.5)	-36.61 (225.1)	-23.23 (222.6)	-35.52 (136.2)	-21.99 (137.0)
Observations	304	304	304	304	304	304
R^2	0.129	0.129	0.129	0.129	0.129	0.129

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.9.

The effects of the overall stringency index and emission limit of NOx on FDI for 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
Overall Stringent index (-1)	-1.174 (2.220)		-1.174 (1.823)		-1.174 (1.858)	
NOx Limit (-1)		-0.252 (0.819)		-0.252 (0.734)		-0.252 (0.676)
lnGDPpc (-1)	6.025 (16.45)	6.588 (16.42)	6.025 (18.37)	6.588 (20.36)	6.025 (9.924)	6.588 (10.26)
lnTrade % GDP (-1)	-1.390 (12.93)	-0.377 (12.98)	-1.390 (13.86)	-0.377 (13.92)	-1.390 (6.929)	-0.377 (7.122)
Unemployment rate (-1)	0.313 (0.374)	0.323 (0.373)	0.313 (0.335)	0.323 (0.363)	0.313 (0.276)	0.323 (0.274)
Financial freedom (-1)	-0.582 (0.396)	-0.589 (0.401)	-0.582 (0.721)	-0.589 (0.765)	-0.582 (0.506)	-0.589 (0.553)
Government Integrity (-1)	0.071 (0.194)	0.071 (0.194)	0.071 (0.247)	0.071 (0.258)	0.071 (0.240)	0.071 (0.255)
Constant	-18.04 (162.2)	-29.42 (160.1)	-18.04 (190.0)	-29.42 (207.9)	-15.10 (115.5)	-27.82 (112.1)
Observations	304	304	304	304	304	304
R^2	0.130	0.129	0.130	0.129	0.130	0.129

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.10.

The effects of emissions limit of SOx and PM on GFDI for 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	FDI	FDI	FDI	FDI	FDI	FDI
SOx Limit (-1)	-0.162		-0.162		-0.162	
	(1.195)		(0.658)		(0.647)	
PM Limit (-1)		0.744		0.744		0.744
		(0.698)		(0.863)		(0.698)
lnGDPpc (-1)	7.153	5.603	7.153	5.603	7.153	5.603
	(16.32)	(16.35)	(18.90)	(17.82)	(9.942)	(10.79)
lnTrade % GDP (-1)	-0.741	-0.694	-0.741	-0.694	-0.741	-0.694
	(12.92)	(12.87)	(13.59)	(13.22)	(6.729)	(6.654)
Unemployment rate (-1)	0.331	0.336	0.331	0.336	0.331	0.336
	(0.372)	(0.371)	(0.347)	(0.352)	(0.272)	(0.269)
Financial freedom (-1)	-0.572	-0.550	-0.572	-0.550	-0.572	-0.550
	(0.397)	(0.394)	(0.733)	(0.719)	(0.517)	(0.520)
Government Integrity (-1)	0.066	0.087	0.066	0.087	0.0663	0.087
	(0.194)	(0.194)	(0.250)	(0.244)	(0.247)	(0.245)
Constant	-34.73	-24.35	-34.73	-24.35	-33.47	-25.56
	(159.0)	(159.0)	(193.6)	(181.0)	(109.1)	(115.0)
Observations	304	304	304	304	304	304
R^2	0.129	0.132	0.129	0.132	0.129	0.132

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

4.6.3. Analysis of the Effects of Environmental Policy on GFDI.

This section initially provides analysis for the results of the effects of environmental taxes and energy taxes on GFDI for the panel of 28 EU countries and that of the 19 EU countries (see Table 4.11 and 4.12 below). This is followed by analysis for the results for the effects of each of the four environmental stringency indexes on GFDI received by the subsample of 19 EU countries (see Tables 4.13 and 4.14 below). The results are broadly similar among the three models and for Tables 4.11 and 4.12. In both Tables 4.11 and 4.12, the overall results indicate that the impact of both environmental taxes and energy taxes on GFDI is significantly negative and they imply evidence of pollution haven hypothesis while rejecting pollution halo hypothesis. In other words, increase in environmental taxes and energy taxes lead to decrease in the amount of GFDI received generally by the 28 EU countries and the sub sample of 19 EU countries.

Also, in Tables 4.13 and 4.14 the results indicate that the impact of emissions limit of NOx and SOx are significantly negative on GFDI for the subsample of 19 EU countries. Thus, supporting pollution haven hypothesis and rejecting pollution halo hypothesis. But the impact of the overall stringency index and the emissions limit of PM on GFDI is insignificant and does not support either pollution haven or pollution halo hypothesis. This could be because NOx and SOx are largely used in the production processes of GFDI and therefore limits on their consumption causes challenges to multinationals.

Table 4.11.

The effects of environmental tax and energy tax on GFDI for 28 EU countries using data from 2003 to 2019.

28 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	GFDI	GFDI	GFDI	GFDI	GFDI	GFDI
EnvTax % GDP (-1)	-1.382***		-1.382**		-1.382***	
	(0.399)		(0.563)		(0.418)	
EnerTax % GDP (-1)		-1.028**		-1.028**		-1.028**
		(0.471)		(0.460)		(0.358)
lnGDPpc (-1)	-1.550***	-1.690***	-1.550**	-1.690*	-1.550***	-1.690***
	(2.261)	(2.262)	(7.491)	(7.470)	(4.379)	(4.424)
lnTrade % GDP (-1)	-0.487	-0.903	-0.487	-0.903	-0.487	-0.903
	(1.925)	(1.944)	(2.041)	(2.042)	(0.792)	(0.814)
Unemployment rate (-1)	-0.112*	-0.101*	-0.112	-0.101	-0.112*	-0.101
	(0.059)	(0.060)	(0.108)	(0.112)	(0.0615)	(0.0629)
Financial Freedom (-1)	0.036*	0.036*	0.036*	0.036*	0.036*	0.036*
	(0.020)	(0.020)	(0.018)	(0.018)	(0.019)	(0.020)
Government Integrity (-1)	0.014	0.007	0.014	0.007	0.014	0.007
	(0.026)	(0.026)	(0.046)	(0.044)	(0.017)	(0.015)
Constant	162.9***	154.6***	162.9**	154.6**	165.7***	157.5***
	(22.500)	(22.500)	(71.090)	(71.630)	(45.120)	(45.770)
Observations	448	448	448	448	448	448
R^2	0.332	0.320	0.332	0.320	0.332	0.320

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.12.

The effects of environmental tax and energy tax on GFDI for the 19 EU countries using data from 2003 to 2019.

19 EU countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	GFDI	GFDI	GFDI	GFDI	GFDI	GFDI
EnvTax % GDP (-1)	-0.675**		-0.675		-0.675***	
	(0.262)		(0.642)		(0.155)	
EnerTax % GDP (-1)		-0.602*		-0.602		-0.602***
		(0.308)		(0.666)		(0.161)
lnGDPpc (-1)	-8.736***	-8.280***	-8.736	-8.280	-8.736**	-8.280**
	(1.694)	(1.686)	(5.750)	(5.818)	(3.588)	(3.773)
lnTrade % GDP (-1)	-0.828	-0.848	-0.828	-0.848	-0.828	-0.848
	(1.279)	(1.300)	(1.837)	(1.916)	(0.934)	(0.904)
Unemployment rate (-1)	-0.056	-0.048	-0.056	-0.048	-0.056	-0.048
	(0.036)	(0.037)	(0.051)	(0.053)	(0.049)	(0.051)
Financial Freedom (-1)	-0.034	-0.032	-0.034	-0.032	-0.034	-0.032
	(0.040)	(0.040)	(0.067)	(0.070)	(0.035)	(0.036)
Government Integrity (-1)	-0.009	-0.010	-0.009	-0.010	-0.009	-0.010
	(0.019)	(0.020)	(0.012)	(0.013)	(0.015)	(0.016)
Constant	101.1***	95.68***	101.1*	95.68	102.1**	96.65**
	(16.62)	(16.41)	(55.26)	(55.53)	(39.07)	(40.76)
Observations	304	304	304	304	304	304
R^2	0.351	0.345	0.351	0.345	0.351	0.345

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.13.
The effects of the overall stringency index and emission limit of NOx on GFDI for the 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	GFDI	GFDI	GFDI	GFDI	GFDI	GFDI
Overall Stringent index (-1)	-0.182		-0.182		-0.182	
	(0.219)		(0.289)		(0.150)	
NOx Limit (-1)		-0.214***		-0.214*		-0.214**
		(0.080)		(0.112)		(0.091)
lnGDPpc (-1)	-7.404***	-7.702***	-7.404	-7.702	-7.404*	-7.702*
	(1.621)	(1.598)	(5.543)	(5.187)	(3.838)	(3.619)
lnTrade % GDP (-1)	-1.532	-1.054	-1.532	-1.054	-1.532	-1.054
	(1.275)	(1.264)	(1.611)	(1.678)	(0.887)	(1.003)
Unemployment rate (-1)	-0.057	-0.063*	-0.057	-0.063	-0.057	-0.063
	(0.037)	(0.036)	(0.058)	(0.055)	(0.054)	(0.051)
Financial freedom (-1)	-0.014	-0.030	-0.014	-0.031	-0.014	-0.030
	(0.039)	(0.039)	(0.077)	(0.066)	(0.041)	(0.038)
Government Integrity (-1)	-0.019	-0.015	-0.019	-0.015	-0.019	-0.015
	(0.019)	(0.019)	(0.013)	(0.012)	(0.018)	(0.017)
Constant	88.24***	90.45***	88.24	90.45*	89.38*	91.72**
	(15.98)	(15.58)	(53.92)	(50.32)	(42.00)	(39.44)
Observations	304	304	304	304	304	304
R^2	0.337	0.353	0.337	0.353	0.337	0.353

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.14.

The effects of emissions limit of SOx and PM on GFDI for the 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	GFDI	GFDI	GFDI	GFDI	GFDI	GFDI
SOx Limit (-1)	-0.246**		-0.246*		-0.246*	
	(0.117)		(0.123)		(0.123)	
PM Limit (-1)		-0.093		-0.093		-0.093
		(0.069)		(0.081)		(0.075)
lnGDPpc (-1)	-7.216***	-7.038***	-7.216	-7.038	-7.216*	-7.038*
	(1.596)	(1.610)	(5.196)	(5.246)	(3.806)	(3.862)
lnTrade % GDP (-1)	-1.294	-1.466	-1.294	-1.466	-1.294	-1.466
	(1.264)	(1.268)	(1.689)	(1.632)	(0.883)	(0.853)
Unemployment rate (-1)	-0.057	-0.055	-0.057	-0.055	-0.057	-0.055
	(0.036)	(0.037)	(0.055)	(0.056)	(0.050)	(0.052)
Financial freedom (-1)	-0.019	-0.013	-0.019	-0.013	-0.019	-0.013
	(0.039)	(0.039)	(0.070)	(0.075)	(0.039)	(0.038)
Government Integrity (-1)	-0.019	-0.022	-0.019	-0.022	-0.019	-0.022
	(0.019)	(0.019)	(0.014)	(0.014)	(0.018)	(0.018)
Constant	86.23***	84.22***	86.23	84.22	87.34**	85.37*
	(15.56)	(15.66)	(50.42)	(50.99)	(40.74)	(41.72)
Observations	304	304	304	304	304	304
R^2	0.346	0.340	0.346	0.340	0.346	0.340

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

4.6.4. Analysis of the Effects of Environmental Policy on M&As.

Tables 4.15 and 4.16 below, present results for the effects of the market-based policy which are environmental taxes and energy taxes on M&As for both the panel of 28 EU countries and the subsample of 19 EU countries respectively. In Table 4.15, the effects of environmental taxes on M&As is generally insignificant for all three model estimations and so do not support either pollution haven or pollution halo hypothesis. Also, the effects of energy taxes on M&As is significantly positive for the two-way fixed effects model estimation but insignificant in the two robust standard errors estimations. Since the significance is not supported by the Driscoll-Kraay robust standard errors, the effect of energy taxes on the M&As is considered insignificant and do not support both pollution haven effect and pollution halo effect for the panel of 28 EU countries. Similarly in Table 4.16, all the three model estimations for the effects of both environmental taxes and energy taxes are insignificant implying no support for either pollution haven or pollution halo hypothesis among the panel of 19 EU countries. This means that in both Tables 4.15 and 4.16 the effects of the market based environmental policy **variables** on M&As for the 28 EU countries and the subsample of 19 EU countries does not support either pollution halo or pollution haven effects.

Moreover, Tables 4.17 and 4.18 also display the results for the effects of the strictness indexes of the environmental command **variables** on M&As for the subsample of 19 EU countries. Like the findings in Tables 4.15 and 4.16, the findings for Tables 4.17 and 4.18 also reject evidence of both pollution haven effect and pollution halo effect in the linkage between the four environmental stringency indexes and M&As of the 19 EU countries. This is because the overall stringency index, emissions limit of NOx, emissions limit of SOx and emissions limit of PM all have insignificant effect on M&As.

Table 4.15.

The effects of environmental tax and energy tax on M&As for 28 EU countries.

28 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	M&As	M&As	M&As	M&As	M&As	M&As
EnvTax % GDP (-1)	1.182		1.182		1.182	
	(0.756)		(1.538)		(1.270)	
EnerTax % GDP (-1)		2.582***		2.582		2.582
		(0.878)		(2.237)		(2.046)
lnGDPpc (-1)	1.888	2.733	1.888	2.733	1.888	2.733
	(4.283)	(4.214)	(3.291)	(3.120)	(3.599)	(3.787)
lnTrade % GDP (-1)	-1.506	-2.435	-1.506	-2.435	-1.506	-2.435
	(3.646)	(3.621)	(1.752)	(2.005)	(1.677)	(1.830)
Unemployment rate (-1)	0.060	0.011	0.060	0.011	0.060	0.011
	(0.111)	(0.112)	(0.078)	(0.098)	(0.074)	(0.067)
Financial Freedom (-1)	0.019	0.027	0.019	0.027	0.019	0.027
	(0.037)	(0.037)	(0.047)	(0.051)	(0.044)	(0.047)
Government Integrity (-1)	0.021	0.004	0.021	0.004	0.021	0.004
	(0.049)	(0.049)	(0.030)	(0.029)	(0.022)	(0.024)
Constant	-17.88	-23.13	-17.88	-23.13	-17.36	-22.89
	(42.63)	(41.91)	(40.66)	(38.25)	(39.62)	(40.48)
Observations	448	448	448	448	448	448
R^2	0.075	0.089	0.075	0.089	0.015	0.089

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.16.

The effects of environmental tax and energy tax on M&As for 19 EU countries.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	M&As	M&As	M&As	M&As	M&As	M&As
EnvTax % GDP (-1)	-0.055		-0.055		-0.055	
	(0.478)		(0.602)		(0.254)	
EnerTax % GDP (-1)		0.125		0.125		0.125
		(0.559)		(0.615)		(0.246)
lnGDPpc (-1)	6.849**	7.189**	6.849*	7.189*	6.849	7.189
	(3.091)	(3.060)	(3.789)	(3.861)	(4.391)	(4.687)
lnTrade % GDP (-1)	-3.330	-3.504	-3.330	-3.504	-3.330**	-3.504**
	(2.334)	(2.359)	(2.067)	(2.121)	(1.396)	(1.453)
Unemployment rate (-1)	0.143**	0.142**	0.143	0.142	0.143	0.142
	(0.066)	(0.066)	(0.102)	(0.106)	(0.093)	(0.093)
Financial Freedom (-1)	-0.172**	-0.166**	-0.172	-0.166	-0.172***	-0.166***
	(0.072)	(0.073)	(0.133)	(0.135)	(0.049)	(0.050)
Government Integrity (-1)	0.061*	0.058	0.061	0.058	0.061***	0.058***
	(0.035)	(0.036)	(0.056)	(0.056)	(0.013)	(0.013)
Constant	-48.69	-52.04*	-48.69	-52.04	-47.65	-51.04
	(30.33)	(29.78)	(33.97)	(34.74)	(44.35)	(47.26)
Observations	304	304	304	304	304	304
R^2	0.115	0.115	0.115	0.115	0.115	0.115

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.17.

The effects of the overall stringency index and emission limit NOx on M&As for 19 EU countries using data from 2003 to 2019.

	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	M&As	M&As	M&As	M&As	M&As	M&As
Overall Stringent index (-1)	0.036		0.036		0.036	
	(0.395)		(0.212)		(0.185)	
Emissions Limit NOx (-1)		-0.034		-0.034		-0.034
		(0.146)		(0.124)		(0.092)
lnGDPpc (-1)	7.005**	6.895**	7.005*	6.895*	7.005	6.895
	(2.925)	(2.918)	(4.028)	(3.974)	(4.598)	(4.712)
lnTrade % GDP (-1)	-3.363	-3.316	-3.363*	-3.316*	-3.363**	-3.316**
	(2.300)	(2.308)	(1.834)	(1.875)	(1.418)	(1.500)
Unemployment rate (-1)	0.144**	0.142**	0.144	0.142	0.144	0.142
	(0.067)	(0.066)	(0.102)	(0.101)	(0.092)	(0.095)
Financial freedom (-1)	-0.169**	-0.173**	-0.169	-0.173	-0.169***	-0.173***
	(0.070)	(0.071)	(0.121)	(0.127)	(0.045)	(0.050)
Government Integrity (-1)	0.060*	0.061*	0.060	0.061	0.060***	0.061***
	(0.034)	(0.035)	(0.050)	(0.052)	(0.014)	(0.014)
Constant	-50.46*	-49.16*	-50.46	-49.16	-49.49	-48.06
	(28.84)	(28.45)	(36.35)	(36.27)	(45.52)	(47.56)
Observations	304	304	304	304	304	304
R^2	0.115	0.115	0.115	0.115	0.115	0.115

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.18.

The effects of the emissions limit of SOx and PM on M&As for 19 EU countries using data from 2003 to 2019.

19EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1)	(2)	(3)	(4)	(5)	(6)
	M&As	M&As	M&As	M&As	M&As	M&As
Emissions Limit Sox (-1)	-0.0001		-0.0001		-0.0001	
	(0.212)		(0.150)		(0.107)	
Emissions Limit PM (-1)		0.084		0.084		0.084
		(0.124)		(0.102)		(0.068)
lnGDPpc (-1)	6.971**	6.796**	6.971	6.796	6.971	6.796
	(2.901)	(2.910)	(4.122)	(4.165)	(4.637)	(4.694)
lnTrade % GDP (-1)	-3.380	-3.363	-3.380*	-3.363*	-3.380**	-3.363**
	(2.297)	(2.291)	(1.838)	(1.808)	(1.460)	(1.487)
Unemployment rate (-1)	0.143**	0.144**	0.143	0.144	0.143	0.144
	(0.066)	(0.066)	(0.103)	(0.105)	(0.094)	(0.094)
Financial freedom (-1)	-0.170**	-0.168**	-0.170	-0.168	-0.170***	-0.168***
	(0.071)	(0.070)	(0.123)	(0.122)	(0.048)	(0.047)
Government Integrity (-1)	0.060*	0.062*	0.060	0.062	0.060***	0.062***
	(0.034)	(0.035)	(0.050)	(0.049)	(0.014)	(0.015)
Constant	-49.94*	-48.71*	-49.94	-48.71	-48.91	-47.95
	(28.27)	(28.30)	(37.60)	(38.33)	(46.62)	(46.96)
Observations	304	304	304	304	304	304
R^2	0.115	0.116	0.115	0.116	0.115	0.116

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

4.6.5. Analysis of Bootstrap Quantile Regression with 2-way Fixed Effects Results.

The Bootstrap quantile regression also analyses the effects of environmental taxes and energy taxes on aggregate FDI, GFDI and M&As entering the 28 EU countries. The results are reported for the 5th, 10th, 25th, 30th, 45th, 50th, 60th, 75th, 90th, 95th, and 99th percentiles of the conditional heterogeneous distribution of aggregate FDI, GFDI and M&As flowing into both the entire 28 EU countries and, the subsample of 19 countries. These conditional percentiles put the countries within the EU into clusters based on the differences in aggregate FDI, GFDI and M&As as a share of the countries' GDP. Hence, the lower percentiles from 5th to the 45th represent countries who's aggregate FDI, GFDI and M&As constitute smaller share of their GDP comparative to other EU member countries. The 50th percentile also represents median of the variable distribution of aggregate FDI, GFDI and M&As all as a percentage share of the EU countries GDP. The percentiles above the median represent the EU countries who's aggregate FDI, GFDI and M&As constitute larger share of their GDP comparative to other EU member countries.

In Tables 4.19 and 4.20 below, the quantile results for the effect of environmental tax on aggregate FDI and the effects of energy tax on aggregate FDI respectively reveal no significant support for both pollution haven and pollution halo effects at all conditional means. These findings support the earlier results from the two-way fixed effects, robust covariance matrix standard errors and the Driscoll-Kray standard errors which reject evidence of both pollution haven effects and pollution halo effect in the link between the strict EU environmental policy and FDI. This means that the effects of the strict environmental policies remain insignificant irrespective of how large or smaller the share of FDI is to the GDP of EU countries.

Tables 4.21 and 4.22 below, also constitute the results for the effects of environmental taxes on GFDI, and the effects of energy taxes on GFDI respectively. The evidence from these results reveals homogenous negative effect of environmental tax and energy tax on GFDI across all conditional percentiles. However, in Table 4.21 the significance level is stronger in the countries where GFDI constitute a smaller share of their GDP from the median through the lower percentiles, while the significance decline is stronger for 90^{th,} 95th and 99th percentiles but insignificant for the 60th and 75th percentiles among the countries where GFDI constitute a larger share of their GDP. In other words, the findings show significant evidence of pollution haven effects in the link between environmental taxes and GFDI across the lower quartiles, the median, and the upper quartiles beyond the 3rd quartiles. Implying that among the EU countries, the pollution haven effect is generally stronger among the countries with GFDI constituting smaller percentage of their GDP and the countries where GFDI constitute larger percentage of their GDP.

Likewise, in Table 4.22 there is evidence of significant decreasing effects of energy taxes on GFDI in all estimated percentiles from the median to the lowest percentile. But above the median percentile the significant decreasing effect is only realised at the 95th and 99th percentiles. These results also provide significant support for pollution haven effects across the EU countries where GFDI constitute a smaller share of their GDP and larger share of GDP. But the significance of pollution haven is felt only at a very high percentile among the countries who's GFDI constitute larger percentage or share of their GDP. In other words, evidence of pollution halo effect is homogenously rejected across all estimated conditional means for Tables 4.21 and 4.22. These findings are consistent with the results from the two-way fixed effects, robust covariance matrix standard errors and the Driscoll-Kray standard errors which support evidence of pollution haven effects and reject pollution halo effects within the EU countries.

Yet in Tables 4.23 and 4.24 below, the quantile results for the effect of environmental taxes on M&As respectively reveal no significant support for both pollution haven and pollution halo effects at all conditional means. This means that the effects of the environmental taxes remain insignificant, irrespective of how large or smaller the share of M&As is to the GDP of EU countries. Similarly, these findings support the results from the two-way fixed effects, robust covariance matrix standard errors and the Driscoll-Kray standard errors which reject evidence of both pollution haven effects and pollution halo effect within the EU countries. However, the effects of energy taxes on M&As demonstrates significant positive effect at 10% significance level for the median percentile and the 45th percentile which is part of the lower percentile. These results differ from the results from the robust covariance matrix standard errors and the Driscoll-Kray standard errors which reject evidence of both pollution haven effects and pollution halo effect within the EU countries and aligns with the two-way fixed effects. Therefore, the findings suggest that some of the countries in the EU which have their M&As constituting lower share of their GDP experience pollution halo hypothesis. Appendix B, C and D provides results for the 19 EU countries that are OECD members.

Table 4.19.
The effects of environmental tax on FDI for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05	q.10	q.25	q.30	q.45	q.50	q.60	q.75	q.90	q.95	q.99
	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI
EnvTaxGDP (-1)	0.635	1.118	0.375	0.0727	-0.525	-0.498	-0.350	-0.847	-0.395	-0.639	-0.639
	(0.641)	(0.390)	(0.682)	(0.935)	(0.526)	(0.523)	(0.684)	(0.311)	(0.746)	(0.571)	(0.623)
lnGDPpc (-1)	-7.952	-4.445	-4.055	-3.635	-8.522	-8.456	-10.120**	-9.127*	-12.030**	-8.997	-8.997
	(0.179)	(0.352)	(0.410)	(0.449)	(0.092)	(0.068)	(0.034)	(0.052)	(0.038)	(0.145)	(0.226)
lnTrade % GDP (-1)	-1.678	-1.838	-1.262	0.692	3.026	2.681	-0.041	-1.696	-5.988	-7.949	-7.949
	(0.748)	(0.679)	(0.729)	(0.869)	(0.458)	(0.516)	(0.992)	(0.666)	(0.235)	(0.159)	(0.203)
Unemployment rate (-1)	-0.102	-0.056	0.041	0.019	-0.032	-0.024	-0.039	0.0432	-0.136	-0.040	-0.040
	(0.351)	(0.582)	(0.649)	(0.850)	(0.727)	(0.782)	(0.697)	(0.658)	(0.381)	(0.784)	(0.794)
Financial Freedom (-1)	0.091*	0.101**	0.048	0.051	0.024	0.024	0.030	0.015	0.071	0.023	0.023
	(0.063)	(0.036)	(0.183)	(0.098)	(0.525)	(0.413)	(0.333)	(0.678)	(0.188)	(0.692)	(0.720)
Government Integrity (-1)	0.003	-0.002	0.014	-0.007	-0.002	-0.003	0.045	0.051	0.011	-0.013	-0.013
	(0.973)	(0.984)	(0.835)	(0.922)	(0.979)	(0.954)	(0.479)	(0.418)	(0.900)	(0.869)	(0.889)
Constant	78.44	41.08	42.19	31.97	78.60	79.37*	105.2**	105.9**	156.2***	152.0**	152.0*
	(0.203)	(0.404)	(0.404)	(0.485)	(0.134)	(0.078)	(0.032)	(0.021)	(0.005)	(0.011)	(0.030)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.334	0.187	0.113	0.121	0.189	0.213	0.290	0.430	0.674	0.791	0.910

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.20.
The effects of energy tax on FDI for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05	q.10	q.25	q.30	q.45	q.50	q.60	q.75	q.90	q.95	q.99
	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI
EnerTaxGDP (-1)	0.436	1.032	0.555	0.381	-0.385	-0.584	-0.385	-0.484	-0.470	-0.612	-0.612
	(0.804)	(0.389)	(0.589)	(0.733)	(0.593)	(0.534)	(0.583)	(0.600)	(0.700)	(0.626)	(0.648)
lnGDPpc (-1)	-8.790	-5.509	-4.103	-3.457	-8.471**	-8.796*	-9.822**	-8.062	-11.53*	-8.674	-8.674
	(0.124)	(0.233)	(0.380)	(0.484)	(0.043)	(0.079)	(0.036)	(0.114)	(0.074)	(0.153)	(0.255)
lnTrade % GDP (-1)	-1.860	-1.328	-1.632	-0.495	2.640	2.410	0.0537	-1.964	-6.164	-8.008	-8.008
	(0.755)	(0.755)	(0.693)	(0.918)	(0.483)	(0.553)	(0.989)	(0.621)	(0.240)	(0.161)	(0.226)
Unemployment rate (-1)	-0.124	-0.080	0.027	0.017	-0.036	-0.041	-0.028	0.036	-0.128	-0.024	-0.024
	(0.343)	(0.423)	(0.747)	(0.860)	(0.673)	(0.671)	(0.769)	(0.761)	(0.336)	(0.852)	(0.871)
Financial Freedom (-1)	0.091*	0.111***	0.053	0.051	0.024	0.022	0.028	0.012	0.067	0.023	0.023
	(0.096)	(0.007)	(0.104)	(0.140)	(0.364)	(0.447)	(0.371)	(0.734)	(0.227)	(0.644)	(0.693)
Government Integrity (-1)	-0.004	0.001	0.008	-0.018	-0.001	-0.0004	0.041	0.046	0.006	-0.010	-0.010
	(0.968)	(0.990)	(0.915)	(0.776)	(0.994)	(0.995)	(0.520)	(0.521)	(0.945)	(0.906)	(0.917)
Constant	89.42	50.29	44.90	35.82	78.93*	83.88	101.8**	94.98*	152.1**	147.6***	147.6*
	(0.148)	(0.307)	(0.323)	(0.475)	(0.067)	(0.120)	(0.038)	(0.074)	(0.012)	(0.009)	(0.051)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.333	0.186	0.113	0.121	0.189	0.213	0.290	0.430	0.674	0.791	0.910

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.21.
The effects of environmental tax on GFDI for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
EnvTaxGDP (-1)	-0.287**	-0.271**	-0.320**	-0.329**	-0.297	-0.398*	-0.378*	-0.513	-1.392***	-1.590***	-1.590***
	(0.033)	(0.023)	(0.036)	(0.017)	(0.110)	(0.086)	(0.098)	(0.116)	(0.005)	(0.010)	(0.003)
lnGDPpc (-1)	-4.750***	-4.575***	-5.725***	-5.883***	-6.625***	-7.036***	-6.950***	-8.931***	-8.049**	-7.493*	-7.493
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.005)	(0.004)	(0.034)	(0.071)	(0.102)
lnTrade % GDP (-1)	-0.743	-0.555	-0.745	-1.039	-2.375***	-1.821*	-1.802	-2.718*	-0.876	-1.410	-1.410
	(0.248)	(0.402)	(0.359)	(0.233)	(0.003)	(0.077)	(0.145)	(0.062)	(0.666)	(0.541)	(0.573)
Unemployment rate (-1)	-0.053***	-0.050***	-0.066***	-0.069***	-0.070***	-0.074*	-0.076*	-0.116**	-0.054	-0.015	-0.015
	(0.004)	(0.004)	(0.000)	(0.000)	(0.003)	(0.059)	(0.064)	(0.027)	(0.435)	(0.826)	(0.839)
Financial Freedom (-1)	0.005	0.008	0.015**	0.014**	0.019**	0.024***	0.024**	0.028**	0.047**	0.054**	0.054**
	(0.554)	(0.228)	(0.043)	(0.032)	(0.011)	(0.003)	(0.014)	(0.042)	(0.016)	(0.023)	(0.020)
Government Integrity (-1)	-0.009	-0.013	-0.018*	-0.017	-0.021	-0.026*	-0.040***	-0.018	-0.040	-0.043	-0.043
	(0.376)	(0.253)	(0.098)	(0.183)	(0.111)	(0.051)	(0.007)	(0.366)	(0.106)	(0.122)	(0.190)
Constant	55.77***	53.15***	66.60***	69.59***	83.48***	86.02***	86.13***	110.1***	95.22**	93.15**	93.15*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)	(0.002)	(0.019)	(0.037)	(0.058)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.345	0.345	0.382	0.395	0.432	0.439	0.467	0.513	0.619	0.706	0.847

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.22.
The effects of energy tax on GFDI for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	(q.05) GFDI	(q.10) GFDI	(q.25) GFDI	(q.30) GFDI	(q.45) GFDI	(q.50) GFDI	(q.60) GFDI	(q.75) GFDI	(q.90) GFDI	(q.95) GFDI	(q.99) GFDI
EnerTaxGDP (-1)	-0.348**	-0.286**	-0.329**	-0.352**	-0.380**	-0.366	-0.379	-0.528	-1.356**	-1.399**	-1.399**
	(0.029)	(0.045)	(0.026)	(0.012)	(0.026)	(0.124)	(0.150)	(0.107)	(0.035)	(0.036)	(0.029)
lnGDPpc (-1)	-4.549***	-4.473***	-5.573***	-5.731***	-6.985***	-6.820***	-6.951***	-8.961***	-9.064**	-6.320	-6.320
	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.004)	(0.006)	(0.032)	(0.234)	(0.183)
lnTrade % GDP (-1)	-0.0692	-0.283	-0.672	-0.761	-1.980**	-1.978**	-1.800*	-2.730**	-1.665	-3.048	-3.048
	(0.920)	(0.702)	(0.390)	(0.340)	(0.027)	(0.017)	(0.077)	(0.043)	(0.399)	(0.154)	(0.188)
Unemployment rate (-1)	-0.048***	-0.045**	-0.058***	-0.058***	-0.070***	-0.070**	-0.075**	-0.119**	-0.069	-0.011	-0.011
	(0.008)	(0.012)	(0.001)	(0.003)	(0.009)	(0.028)	(0.024)	(0.024)	(0.290)	(0.901)	(0.887)
Financial Freedom (-1)	0.006	0.010	0.013*	0.014*	0.016**	0.016*	0.024***	0.028**	0.035*	0.037	0.037*
	(0.564)	(0.197)	(0.078)	(0.078)	(0.036)	(0.057)	(0.007)	(0.016)	(0.094)	(0.146)	(0.075)
Government Integrity (-1)	-0.012	-0.013	-0.016	-0.019*	-0.024**	-0.030**	-0.041***	-0.021	-0.044	-0.049	-0.049*
	(0.324)	(0.256)	(0.159)	(0.051)	(0.032)	(0.030)	(0.008)	(0.298)	(0.111)	(0.116)	(0.099)
Constant	50.58***	50.48***	64.29***	66.61***	86.02***	84.66***	85.78***	110.3***	109.3**	87.57	87.57*
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.003)	(0.015)	(0.112)	(0.081)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.344	0.343	0.382	0.395	0.431	0.438	0.464	0.509	0.614	0.700	0.844

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.23.
The effects of environmental tax on M&As for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	(q.05) M&As	(q.10) M&As	(q.25) M&As	(q.30) M&As	(q.45) M&As	(q.50) M&As	(q.60) M&As	(q.75) M&As	(q.90) M&As	(q.95) M&As	(q.99) M&As
EnvTaxGDP (-1)	-0.061	-0.040	-0.019	0.028	0.209	0.245	0.222	0.230	0.042	0.257	0.257
	(0.641)	(0.767)	(0.864)	(0.856)	(0.195)	(0.176)	(0.269)	(0.396)	(0.914)	(0.635)	(0.648)
lnGDPpc (-1)	0.654	0.214	-0.041	0.226	0.423	0.359	-0.002	-0.614	-1.738	-2.943	-2.943
	(0.338)	(0.768)	(0.945)	(0.731)	(0.507)	(0.658)	(0.998)	(0.633)	(0.456)	(0.395)	(0.450)
lnTrade % GDP (-1)	0.114	0.499	-0.107	-0.360	-0.467	-0.636	-1.001	-1.728	-1.600	-0.542	-0.542
	(0.856)	(0.275)	(0.835)	(0.509)	(0.399)	(0.423)	(0.229)	(0.207)	(0.429)	(0.825)	(0.824)
Unemployment rate (-1)	0.009	0.012	0.010	0.023	0.029*	0.023	0.026	0.016	0.036	-0.009	-0.009
	(0.552)	(0.497)	(0.443)	(0.182)	(0.080)	(0.217)	(0.227)	(0.673)	(0.572)	(0.896)	(0.910)
Financial Freedom (-1)	-0.005	-0.001	-0.004	-0.004	0.0002	-0.001	0.001	-0.001	-0.025	-0.030	-0.030
	(0.517)	(0.861)	(0.435)	(0.478)	(0.980)	(0.877)	(0.955)	(0.955)	(0.359)	(0.265)	(0.363)
Government Integrity (-1)	-0.018*	-0.010	-0.005	-0.004	-0.001	0.001	0.009	0.016	0.007	0.021	0.021
	(0.063)	(0.219)	(0.429)	(0.564)	(0.939)	(0.963)	(0.471)	(0.353)	(0.829)	(0.606)	(0.599)
Constant	-5.449	-3.387	1.844	-0.112	-2.726	-1.275	3.450	12.81	27.66	34.17	34.17
	(0.449)	(0.672)	(0.776)	(0.988)	(0.700)	(0.893)	(0.743)	(0.366)	(0.268)	(0.351)	(0.421)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.187	0.096	0.101	0.117	0.150	0.164	0.194	0.270	0.413	0.553	0.827

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

Table 4.24.
The effects of energy tax on M&As for 28 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
EnerTaxGDP (-1)	-0.016	0.058	0.204	0.171	0.347*	0.394*	0.325	0.355	0.278	0.331	0.331
	(0.923)	(0.735)	(0.146)	(0.344)	(0.078)	(0.060)	(0.158)	(0.320)	(0.602)	(0.629)	(0.639)
lnGDPpc (-1)	0.722	0.318	0.280	0.325	0.509	0.533	0.0672	-0.513	-1.329	-2.946	-2.946
	(0.351)	(0.644)	(0.621)	(0.574)	(0.464)	(0.513)	(0.938)	(0.701)	(0.669)	(0.430)	(0.396)
lnTrade % GDP (-1)	0.183	0.623	-0.335	-0.524	-0.651	-0.720	-0.995	-2.200	-1.759	-0.252	-0.252
	(0.754)	(0.274)	(0.561)	(0.378)	(0.371)	(0.386)	(0.308)	(0.207)	(0.348)	(0.915)	(0.921)
Unemployment rate (-1)	0.008	0.012	0.016	0.021	0.024	0.021	0.018	0.012	0.039	-0.019	-0.019
	(0.638)	(0.416)	(0.335)	(0.161)	(0.218)	(0.387)	(0.451)	(0.738)	(0.550)	(0.812)	(0.832)
Financial Freedom (-1)	-0.004	-0.001	-0.002	-0.002	0.0003	0.0009	0.001	0.0003	-0.014	-0.025	-0.025
	(0.563)	(0.918)	(0.723)	(0.739)	(0.971)	(0.919)	(0.929)	(0.985)	(0.578)	(0.357)	(0.373)
Government Integrity (-1)	-0.020**	-0.011	-0.005	-0.004	-0.002	-0.003	0.008	0.012	-0.007	0.031	0.031
	(0.028)	(0.159)	(0.402)	(0.525)	(0.858)	(0.724)	(0.501)	(0.515)	(0.821)	(0.403)	(0.447)
Constant	-6.481	-5.305	-1.092	-0.800	-2.699	-2.611	2.871	14.13	23.98	32.09	32.09
	(0.404)	(0.433)	(0.856)	(0.895)	(0.738)	(0.792)	(0.788)	(0.367)	(0.477)	(0.392)	(0.384)
N	448	448	448	448	448	448	448	448	448	448	448
R^2	0.186	0.096	0.103	0.111	0.151	0.166	0.196	0.272	0.414	0.553	0.827

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag.

4.7. DISCUSSION OF EMPIRICAL RESULTS

The results generated and analysed from the empirical models offer interesting insights into the effects of environmental policy on the aggregate FDI, GFDI and M&As flowing into the EU countries. It is noticed that the impact of various strict environmental policy proxies employed in this study have proven to have no significant effects on aggregate FDI for the overall 28 EU countries and even with subsample of 19 EU countries. Also, whether an EU country's FDI constitute a larger share of its GDP or not, the impact of strict environmental policy remains insignificant. This seemed to suggest that the lack of significance could be because generally the overall environmental tax rate of EU countries is not high enough to pose any economic threats to MNC's location decisions in the region as similarly suggested by Hemmelskamp (1997), Requate (2005), and Bergek et al. (2014). Therefore, environmental policy does not qualify as a possible determinant of foreign investments location decision into the EU countries. This also means that, irrespective of the persuasive campaigns executed to promote environmental quality in the EU region and across the globe (WECOOP, 2022), total environmental taxes in the region are not strict enough to have significant deterring effects on MNC's activities nor lead to increasing MNC's activities. Moreover, the results do not support the findings of Abdo et al. (2020), Ge et al. (2020), and Bekun et al. (2021), which suggest the existence of a pollution haven, as well as the studies conducted by Abid and Sekrafi (2021) and Gao et al. (2022), which argue that a pollution halo is present in developed economies like the EU countries.

Nevertheless, after considering the insightful criticisms offered by Harms and Méon (2018) and Ashraf et al. (2020), who contended that the aggregate FDI variable's inability to handle the inherent heterogeneity of the variable is the cause of the literature's inconclusive findings when testing the pollution haven hypothesis. This study generated and analysed results for the two modes of entry which the aforementioned researchers supported as providing more reliable results that accounts for the inherent heterogeneous differences in the aggregate FDI. To this end, this study realises that the impact of strict environmental policy in the EU for both the entire 28 member countries and subsample of 19 countries is significantly and decreasingly felt when FDI mode of entry is in the form of GFDI. Also, the significant decreasing effects of the strict EU environmental policy manifest in the EU member countries whether the GFDI constitute smaller or larger share of the GDP. The countries in the EU where GFDI constitute smaller percentage of GDP are those that are highly advanced economies in the EU with very huge GDP, whereas the countries whose GFDI constitute larger percentage have share GDP are comparatively less developed Central and Eastern European countries that joined from the year 2004 to 2013. These findings align with the results of previous studies conducted by Abdo et al. (2020), Ge et al. (2020), and Bekun et al. (2021), which refute the evidence supporting pollution halo ideas and support pollution haven hypothesis. The potential rationale can be derived from scholarly works such as Ashraf et al. (2020) and Doytch and Ashraf (2022), which posit that the GFDI is prone to causing environmental degradation and so exhibits greater sensitivity to more stringent environmental regulations. To elaborate further, because GFDI entail the establishment of new subsidiaries in foreign countries, the processes involved in their implementation are susceptible to causing pollution and environmental degradation. Also, studies like Holzinger (1999), McDermott and Sotirov (2018), and Bradford (2020) assert that within the EU, the richer countries are more willing to enforce much stricter EU environmental policy compared to those with weaker economy. Hence, this could possibly be the reason for the differences in the deterring effect experienced across member countries.

Also, the analysed results for the effects of the strict environmental policy in the form of energy taxes on FDI's entering the EU in the form of M&As offered significant evidence of pollution halo hypothesis in the panel of 28 countries but insignificant evidence in the subsample of 19 countries. The evidence of pollution halo effects of energy taxes on M&As is further supported in the panel of 28 EU countries at the lower and median percentile. These findings align with studies like Ashraf et al. (2020) and Doytch and Ashraf (2022) that claim that M&As are not neegatively affected by strict environmental policy because they are very unlikely to pose any threat to environmental quality. Therefore, the analysis of the results for the relationship between environmental policy and FDI in the form of M&As refutes the studies by Abdo et al. (2020), Ge et al. (2020), and Bekun et al. (2021) that provide evidence for the pollution haven effect, but support the studies by Abid and Sekrafi (2021) that argue for the existence of pollution halo effect in developed economies such as the EU.

4.8. CONCLUSION AND RECOMMENDATIONS.

This chapter provided empirical analysis and discussions for the effects of strict environmental policy on aggregate FDI and FDI modes of entry. The motivation for including the FDI mode of entry rather depending only on the aggregate FDI is to avoid the variable's inability to deal with its inherent heterogeneous differences from suggesting misleading results as asserted by some leading researchers. Additionally, research studies on economic growth and environmental pollution demonstrate that GFDI and M&As which constitute the two entry modes of FDI are very different in nature. This has been confirmed in this study in how the two entry modes of FDI are affected by strict environmental policy in host economy.

The result from this chapter demonstrates that, though the aggregate FDI suggest no evidence of pollution haven or pollution hallo effects in the EU countries. When FDI is disaggregated into the two modes of entry, GFDI experiences strong deterring effects due to strict environmental policies and thus implying support for pollution haven hypothesis in the EU countries. On the contrary, M&As showed significant positive effects from strict environmental policies in the form of energy taxes of the EU countries and so supporting pollution halo hypothesis.

This evidence remained consistently true when data for the entire sample of 28 EU countries are employed and subsample of 19 EU countries are also utilised. Both market based and command **variables** of environmental policy were used for robustness and the results stayed consistent. In addition, the results remained unchanged using different conditional means of the aggregate FDI, GFDI and M&As. For countries where FDI constitute larger percentage of their GDP and those FDI constitute smaller percentage of their GDP, the evidence for pollution haven effect and pollution hallo hypothesis remained unsupported. Moreover, pollution haven effect remained supported in both countries where GFDI constitute larger percentage of GDP and those where GFDI constitute lower percentage of GDP. While the evidence also remained consistent for M&As because pollution hallo hypothesis was supported for some of the lower cluster of EU countries where M&As constitutes smaller percentage of their GDP.

Based on the evidence from the results in this chapter, it is revealed that the aggregate FDI variable could not provide adequate clarity for policy makers on how the strict environmental policy in the EU countries are deterring polluting industries from flowing into the EU countries. However, the two modes of entry offer more clarity, and it is observed that the strict environmental policy has been effective in deterring polluting investments in the form of GFDI while promoting M&As which literature classifies as environmentally friendly. Hence, by prioritising and increasing the strictness environmental policy as a deterrence to pollution activities the EU policymakers can effectively reduce or eliminate the pollution caused by foreign investments in the form of GFDI. However, to ensure these deterred GFDI does not relocate to pollute other countries with weak environmental policy a scheme to offer green technological incentives to support polluting industries in the form of GFDI could avoid the race to the bottom situation. This study suggests that the macroeconomic results presented here can be used as a basis for future research on the impact of environmental policy on GFDI and M&As, particularly at the industry level, given that larger volumes of data become available for the EU countries.

CHAPTER 5

Examining the Direction of Causality and the Impulse Responses between Environmental Policy and FDI.

5.1. INTRODUCTION

The pollution haven hypothesis posits that corporations migrate to nations with less stringent environmental rules to reduce production expenses. The endogenous pollution haven concept expands upon this notion by examining the evolution of environmental regulations, economic policies, corporate practices, and technological advancements inside nations. Previous research, such as that by Copeland and Taylor (1993; 2017) and Grossman and Krueger (1993), posits that globalisation and trade liberalisation encourage polluting enterprises to migrate to developing nations. This perspective presupposes that environmental regulations are exogenous and immutable. Subsequent models, such as those by Antweiler et al. (2001), incorporate scale, composition, and technique impacts, acknowledging that the environmental impact of trade and foreign investment is contingent upon endogenous factors. Another criticism of the pollution haven hypothesis is that it overlooks the dynamics of policymaking. Governments may strategically modify their environmental policies in response to economic advantages, FDI inflows, and political pressures (Fredriksson and Svensson, 2003). Consequently, pollution havens are not static; they evolve as nations progress economically and politically. Research by Eskeland and Harrison (2003) posits that host nations with initially lenient environmental regulations may thereafter gain from the transfer of cleaner technologies from foreign investors upon implementing stronger environmental policies. As economies expand, they undergo a shift from pollution-intensive industries to more sustainable production techniques (Dasgupta et al. 2002). This growth concept posits that pollution havens are transient rather than enduring. Levinson (2009) observes that emerging nations that initially welcomed polluting firms subsequently enact more stringent environmental regulations as public awareness and institutional ability grow. This dynamic adaptation contrasts with the static concept of pollution havens. Cole and Elliot (2005) assert that industries with significant relocation costs are more likely to adhere to stringent restrictions instead of relocating overseas. Sanna-Randaccio and Sestini (2012) examined the impact of unilateral climate policy on the international location plans of enterprises in emission-intensive sectors, including variations in country size. The study examined both partial and complete relocation of foreign direct investment (FDI) independently. Their straightforward international duopoly model indicated that, in the medium term, no alteration in location is probable in highly capital-intensive sectors, and when a strategic shift occurs, it manifests as partial rather than complete migration. In the long term, complete relocation becomes a viable option. However, when stricter mitigation measures are implemented by the larger country and transportation costs are elevated, along with significant market asymmetry, the likelihood of enterprises remaining domestically is substantial, even in the long term. Similarly, Dijkstra et al. (2011) proposed that the host market structure is defined by a duopoly and demonstrated that an escalation in the per-unit environmental tax may incentivise a foreign firm to transition its supply strategy from exporting to foreign direct investment, provided that the relocation costs are relatively minimal and the rise in the environmental tax elevates the domestic firm's costs by at least double those of the foreign firm. However, Elliot and Zhou (201) contend that, by presuming a duopoly market structure, Dijkstra et al. (2011) neglect the potential for strategic behaviour from the foreign firm.

Other existing research in the political economics perspective indicates that FDI inflows may impact the environmental policy of host countries. Consequently, environmental policies may be less stringent when foreign direct investment is minimal but become more rigorous as foreign direct investment rises. This indicates a reciprocal relationship between foreign direct investment and environmental policy, wherein alterations in one may induce modifications in the other. Cole et al. (2006) designate this connection as an endogenous pollution haven. Cole et al. (2006) employs a political economy model that integrates imperfect competition in the product market to elucidate the phenomenon of domestic and international corporations collaborating in lobbying efforts to influence corrupt local governments to implement lenient environmental policies. Consequently, it may be asserted that an increase in foreign direct investment leads to more severe environmental policies in the host country, assuming the local government is not corrupt. Ferrara et al. (2015) also supported the concept of an endogenous pollution haven in their investigation. They contended that an increase in FDI inflows diminishes the host economy's profit-shifting strategy, which offers incentives for multinational investments, due to escalating expenses related to environmental mitigation. Fredriksson et al. (2004) also ascertain that nations with robust democratic institutions tend to implement more stringent environmental policies over time, hence diminishing their appeal as pollution havens. Furthermore, Ullah et al. (2022) have examined the asymmetric relationship between environmental restrictions and foreign direct investment (FDI) in China. The researchers employed data from 2005 to 2015 regarding China's FDI inflows and applied a Nonlinear Autoregressive Distributed Lag (NARDL) methodology. Their findings demonstrated that, in the near term, the positive and negative shocks of environmental policy resulted in increased (decreased) FDI inflows. Furthermore, over the long term, both positive and negative shocks in environmental policy resulted in an increase in FDI inflows. The findings indicated that the response of FDI inflows varies between the long run and short run in relation to both positive and negative alterations in environmental legislation. Empirical studies by Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) have similarly regarded the relationship between environmental policy and FDI as endogenous. Nevertheless, there is insufficient empirical data from studies that forecast or examine the causal relationship between environmental policy and FDI variables. Literature concerning the causal relationship between foreign direct investment (FDI) and pollutant emissions or energy consumption has undergone considerable examination at both the national and regional levels (Pao and Tsai, 2011; Khan and Ozturk, 2020); nonetheless, the interplay between environmental policy and FDI remains underexplored.

5.1.1. Contribution to Existing literature

This chapter of the thesis aims to address research questions 2 and 3 outlined in chapter 1. This chapter draws inspiration from the research conducted by Cole et al. (2006), Ferrara et al. (2015), Millimet and Roy (2016), Kathuria (2018), Singhania and Saini (2021), and others who suggest that changes in a host country's environmental policy will result in changes in foreign capital flows and vice versa. However, our study differs from existing literature in that it does not rely solely on the aggregate FDI inflows for the analysis. This study uses the disaggregated FDI variables, which are GFDI and M&As, to address the heterogeneous characteristics of the FDI inflows that enter host countries by different means and respond to domestic policies differently. Existing literature that relies on aggregate FDI flows assumes FDI to have homogenous characteristics, which can hinder policymakers' useful insight when considering the impact of strict environmental policy on the foreign capital flows they receive. The results of this chapter attempt to solve this crucial issue by investigating not only how changes in environmental policy variables influence the changes in aggregate FDI and vice versa. Additionally, this chapter scrutinises how changes in environmental policy impact both GFDI and M&A and vice versa. The analysis is conducted using panel vector autoregression with generalised methods of moment style to generate Granger causality results to test the direction of causality between the environmental policy variables and FDI variables. The analysis is followed by impulse response function results that explain the periodic changes in the FDI variables of EU countries when there is a standard deviation shock to environmental policy variables and vice versa. However, this study will additionally use the literature review from chapter 4.3 to explore evidence of pollution haven or pollution halo theory that might appear in the predicted relationship between environmental policy and direct investment flows. The investigation formulates the following hypothesis based on the growing literature.

Hypothesis 1: A bidirectional causality exists between stringent environmental policy and foreign investments in advanced countries like the EU. Moreover, the endogenous pollution haven exist in developed countries like the EU and the rise in foreign investment leads to a strengthening of environmental policy, owing to their strong institutional characteristics.

In summary the results of this chapter offer interesting insights. The preliminary results indicated a unidirectional Granger causality from environmental policy to FDI. A bidirectional Granger causation is also evident in the relationship between the EU's environmental policy and the two modes of FDI entry. Consequently, this evidence supports the existence of endogenous pollution havens. The findings indicate that the stringent environmental policies of the EU deter multinational corporations from selecting member nations for investment locations. Nonetheless, this reduction is particularly pronounced in investments characterised as GFDI during the initial and subsequent periods following a change in environmental policy. Moreover, direct investment through M&As rises in the initial years and thereafter declines in the later years of the 10 projected year period. Thus, throughout the full projected period, the data validated both endogenous pollution haven hypothesis when foreign investments come in the form of GFDI. The results supported the pollution halo hypothesis in the initial phase and the pollution haven hypothesis in the subsequent phase of the ten projected years, when direct investments occurred through M&As. These align closely with the findings presented in Chapter 4. The data clearly indicate that foreign investments in the EU affect the pace of change in environmental policy. The endogenous pollution haven effect is reported to be significant in the initial phase but diminishes over the projected ten years. However, the results further indicate that the rate at which a shock to environmental policy influences or contributes to changes in foreign investment is projected to increase over the ten years after the shock. Ultimately, the findings indicate that EU environmental policy intensifies in response to a rise in total FDI inflows. The rise in both GFDI and M&As initially undermines EU environmental policies, but they become more stringent later in the projected decade supporting the endogenous pollution haven theory.

5.2. EMPIRICAL DATA

This chapter also employs the variables of interest utilised in the Chapter 3 which include three FDI variables namely aggregate FDI inflows, GFDI, and M&As and two environmental policy variables which are Environmental taxes and Energy taxes. The data is collected for the period from 2003 to 2019 (see Table 5.1). Also, all the controlled variables used and discussed in Chapter 3 are included in the estimations.

Table 5.1.

Variables for the Panel Data utilised for this Empirical Analysis.

Variables of Interest (2003 to 2019)	All Control variables used in Chapter 2 are Adopted
Aggregate FDI inflows % of GDP (FDI%GDP)	GDP per capita constant (GDPpccs)
Greenfields FDI % of GDP (GFDI%GDP)	Trade % of GDP (Trade% GDP)
Mergers and Acquisition Sales % GDP (M&As%GDP)	Financial Freedom Index (FF)
Environmental tax % of GDP (Env.Tax)	Government Integrity index (GovI)
Energy tax % of GDP (Ener.Tax)	Unemployment rate (Unemp)

5.3. EMPIRICAL METHODOLOGY

The empirical model adopted for this chapter follows the suggested Panel Vector Autoregressive model estimated in GMM-style which is proposed by Holtz-Eakin et al. (1988) and Abrigo and Love (2016) as a modified time-series vector autoregressive model with solid robust control for endogeneity in panel data estimation setting.

5.3.1. The Vector Autoregressive Model

The original time-series vector autoregressive (VAR) model which is mostly used in macroeconomic and is traceable to proponents like Sims (1980), and Litterman (1979, 1986). The proponents argued that the model can generate better empirical forecast compared to structural equation models (Greene, 2008). The VAR model expresses each of the variables as a linear function of its own past values, as well considering the past values of all other variables in the estimated equation and a serially uncorrelated error term. The resulting autoregressive model is estimated as follows.

$$y_t = \mu + \Gamma_1 y_{t-1} + \Gamma_1 X_{t-1} + \cdots + \Gamma_p X_{t-p} + \varepsilon_t, \tag{5.1}$$

where ε_t is the vector of non-autocorrelated disturbances or innovations having means equal to zero and with contemporaneous covariance matrix $E[\varepsilon_t \varepsilon'_t] = \Omega$.

Based on Hamilton (1994) and (Greene, 2008), there is room for anyone to argue that since μ involves the present observations on the important exogeneous variables, then consequently the VAR could be classified as overfitted reduced form of a typical simultaneous equation model. Moreover, adding more lags than it would have been acceptable in the original simultaneous equation model generates the over fitting results (Greene, 2008). However, among others what make VAR much useful is that it eliminates the difficulty in determining which contemporaneous variables maybe exogeneous. This is due to the inclusion of only predetermined or lagged variables on the right-hand side of the equation, and therefore have all variables in the model being endogenous.

Most researchers have found VARs as more efficient when forecasting (Holtz-Eakin et al. 1988; Abrigo and Love, 2016). The general practice of the VAR model is to generate results for the Granger causality test, impulse responses and forecast error variance decomposition (Stock and Watson, 2001). This model is particularly useful for data description, forecasting and policy analysis, and can track the effects of changes in policies and other external stimulating factors on the economy.

5.3.2. Panel VAR GMM-Style Model in Macroeconomics

Though initial literature focused on time series data, contemporary studies have provided a new paradigm for Panel VAR estimation (PVAR) to be possible. For instance, Chamberlain (1980) suggested the fundamental approach of analysing panel data by estimating each period of observation as a separate equation. Also, Holtz-Eakin et al. (1988) and Abrigo and Love (2016) have modified the model to generate robust results for panel data settings which is currently referred to as Panel VAR Generalised Method of Moment-Style (PVAR GMM-Style). This is a combination of two empirical techniques which are the PVAR and the GMM estimations style.

5.3.2.1. *The rationale for the GMM estimation style*

A major objective of introducing GMM estimation style is to deal with endogeneity issues that exist in a PVAR estimation (Abrigo and Love, 2016). Endogeneity in regression models of structural equation modelling refers to the situation where an explanatory variable correlates with the error term or where two error terms correlate (Ullah et al. 2018). As sample sizes grow, endogeneity bias may lead to inconsistent estimates, which could lead to erroneous inferences or conclusions, and spurious theoretical interpretations (Bond, 2002). Even studies like those by Hamilton and Nickerson (2003), Antonakis (2010), and Ketokivi and McIntosh (2017) recognised that endogeneity bias could lead to researchers producing incorrect coefficient signs and resulting in incorrect interpretations. Yet, since the error term in endogeneity bias is unobservable, it is extremely challenging to explicitly detect or statistically test that an endogenous variable is correlated with the error term (Ullah et al. 2018). Nevertheless, the source of endogeneity is typically discussed by academics to include measurement errors, bias from omitted variables and simultaneity, and common-method variance (Ketokivi and McIntosh, 2017). Researchers have outlined several methods for dealing with endogeneity (Ketokivi and McIntosh, 2017; Ullah et al. 2018). The GMM model estimation constitute one of the helpful methods for addressing endogeneity problems in panel data settings.

5.3.2.2. *Types of GMM estimations*

Arellano and Bond (1991), and Blundell and Bond (1998) developed the GMM model, which can be applied to dynamic panel data. Typically, it explains the cause-and-effect relationship phenomena underpinning dynamic panel data as dynamic over time. For instance, it may not be the values from the current year of the regressor's variables that are significantly influencing changes in the dependent variable, but rather the values from the previous year. Estimation methods for dynamic panel data use the lags of the dependent variables as independent variables to account for this. In addition, the lagged values of the dependent variables serve as instruments to regulate existing endogenous relationships. These instruments are frequently referred to as internal instruments. This is because they are derived from the already existing model (Roodman, 2009). Typically applied to panel data, the GMM model consistently produces results despite various endogeneity issues such as unobserved heterogeneity, simultaneity, and dynamic endogeneity (Wintoki et al. 2012). Studies have usually used two lags of the dependent variables as tools, saying that these are enough to account for the persistent nature of the dependent variable and get rid of the chance of endogeneity in the model (Wintoki et al. 2012; Ullah et al. 2018).

The GMM model eliminates the possibility of endogeneity by subjecting the data to a series of internal transformations. This method of statistical analysis entails deducting the value that a variable had at an earlier point in time from the value that it has had at the most recent point in time, as stated by Roodman (2009). This method of internal transformation sometimes leads to a reduction in the overall number of observations, while improving the efficiency of the GMM model (Wooldridge, 2012). Both come about as a direct consequence of the technique's application. Moreover, we can use both first-difference transformations, also known as one-step GMM, and second-order transformations, also known as two-step GMM, as valid alternatives for estimating the GMM model. Despite this, it is important to consider the drawbacks of the first difference transformation. For instance, if the most recent value of a variable is unavailable, the first-difference transformation, which subtracts its prior value from its current value, may lead to the loss of an excessive number of observations (Roodman, 2009). In such situations, Arellano and Bover (1995) recommended using a second-order transformation to prevent data loss due to the problematic internal transformation of the one-step GMM. This is to be carried out to reduce the potential for data loss that could be produced by the one-step GMM.

Instead of deducting the previous observations of a variable from its current value, the second-order transformation applies forward orthogonal deviations (Roodman, 2009). This is where the model deducts the average of all past available observations of a particular variable. In contrast, the first-order transformation subtracts a variable's past observations from its current value. Researchers can avoid unnecessarily losing data by employing a GMM model with two steps. According to Arellano and Bover (1995), a two-step GMM model yields more efficient and accurate estimates for the related parameters when applied to an unbalanced panel dataset. However, this study's panel data sets exhibit strong balance and minimal missing data, thereby reducing the risk of significant data loss when utilizing first differencing or 1-sept GMM. For this reason, the first differencing method is deemed suitable and employed for this analysis.

5.3.2.3. *Empirical model estimation of the PVAR GMM style*

In the light of the GMM technique the PVAR model is estimated. The Holtz-Eakin, Newey and Rosen (1988) specify the initial PVAR model as

$$y_{it} = \alpha_{0t} + \sum_{l=1}^{m} \alpha_{lt} y_{i,t-l} + \sum_{l=1}^{m} \delta_{lt} x_{i,t-l} + \Psi_t f_i + v_{it}\,, \tag{5.2}$$

Equation 5.2 is estimated with smaller number of periods and larger cross-section or individual observations. Also, despite the estimation of the dynamic equation for a specific period, the actual sample size in each for equation 5.2 is not T but n.

However, it is argued by Nickell (1981) and Bond (2002) that the fixed effects within the groups does not neutralise the endogenous bias that exist in dynamic panels. Hence in equation 5.2, the existing problem in the estimation is that the $y_{i,t-1}$ term correlates negatively with the transformed v_{it} which is $v_{i,t-1}$ and concurrently y_{it} and v_{it} also correlates with each other. This means that the PVAR estimation with fixed effects has its regressor and error remains correlated though the lagged values are present in the model. At this point, Holtz-Eakin, Newey and Rosen (1988) and Abrigo and Love (2016) suggest the use of GMM-style instrumental variables and by first differencing to deal with this problem to eliminate issues with endogeneity. Yet, adopting $y_{i,t-1}$ as instrument for $y_{i,t-1}$ worsens the problem because that too is correlated with the transformed error. Therefore, they suggested that the natural candidate to be used as instrumental variable or lag for $y_{i,t-1}$ should be $y_{i,t-2}$ (Wintoki et al. 2012; Ullah et al. 2018). By differencing to eliminate the fixed effects in the model, the instrumental lag becomes $\Delta y_{i,t-2}$ and is mathematically connected to $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ but not related to the error term $\Delta v_{it} = v_{it} - v_{i,t-1}$. The weakness of the differencing estimation is that in a very unbalanced panel there will be huge data loss and that will mean that forward orthogonal deviation (Helmert transformation) will have to be employed to remove the fixed effects to save data. Yet, in the case of this study the data set is strongly balanced, hence the first differencing is suitable. After including instrumental lags and differencing the variables in the PVAR model, the proponents argued that to be more efficient to generate reliable and unbiased results (Holtz-Eakin et al. 1988; Abrigo and Love, 2016).

Therefore, for this study the PVAR-GMM style model based on Holtz-Eakin et al. (1988), Love and Zicchino (2006), Head et al. (2014), Abrigo and Love (2016) can be estimated as follows.

$$Y_{it} = \propto_{1j} + \sum_{k=1}^{q} \theta_{11k}\, Y_{it-k} + \sum_{k=1}^{q} \theta_{12k}\, Env_{it-k} + \sum_{k=1}^{q} \theta_{13k}\, C_{it-k} + \mu_{1i} + \varepsilon_{1it}, \qquad (5.3a)$$

$$Env_{it} = \propto_{2j} + \sum_{k=1}^{q} \theta_{21k}\, Env_{it-k} + \sum_{k=1}^{q} \theta_{22k}\, Y_{it-k} + \sum_{k=1}^{q} \theta_{23k}\, C_{it-k} + \mu_{2i} + \varepsilon_{2it}, \qquad (5.3b)$$

Where μ_i designates the vector of country-specific fixed effects, ε_{1it} is the vector of idiosyncratic errors, and Y_{it} is the vector of any of the three FDI variables (FDI % GDP, GFDI % GDP, and M&As % GDP) depending on the purpose of the estimation. Also Env_{it} is Environmental tax % GDP. The C_{it} represents all the controlled variables adopted for this study, which include GDP per capita constant (GDPppcs), Trade % GDP, financial freedom index (FF), government integrity index (GovI), and unemployment rate (Unemp).

Furthermore, $\theta_{11k}, \theta_{12k}, \theta_{13k}, \theta_{21k}, \theta_{22k}, \theta_{23k}, \theta_{31k}, \theta_{32k}, and\ \theta_{33k}$ are short run dynamic coefficients of the model's adjustment to long run equilibrium. When the coefficients of the regressing vectors in the model are positive or negative and significant at 5% or 1%, they imply increasing or decreasing effects on the dependent variable in the respective PVAR equation. In addition, the first difference is introduced in the model to create the instrumental variables for the dependent variable to eliminate all fixed effects as suggested by proponents of the model like Abrigo and Love (2016) and Antonietti and Franco (2021) based on the one-step GMM estimation method. Moreover, all the endogenous variables take the same number of lags (q) based on the optimum lag selection criteria and this is discussed in detail in subsection 5.4.2.

The PVAR model has been adopted across several fields, particularly economics literature like Hoffmann et al. (2005), Pradhan (2011), Pradhan et al. (2014), Bayraktar-Sağlam and Sayek Böke (2017), Abdel-Latif (2019), AI (2020), Antonietti and Franco (2021), and Aslan et al. (2022). Hence the selection of the model for this study is based on its suitability to provide robust results for analysing the possible direction of causality that exist between FDI variables and environmental policy variables. In other words, the model is useful in establishing Granger causality relationships, stimulating shocks to the system to trace out the effects of these shocks on the endogenous variables which is popularly referred to as Impulse-response functions. It also allows for conducting forecasting through decomposition of shocks to the PVAR system known as Forecast error variance decompositions (FEVDs), which offers robust insights to answer the research question 3 of this study.

5.4. EMPIRICAL STRATEGY

5.4.1. Unit Root Stationarity Test

To execute the Granger causality analysis through PVAR in a GMM-stye, the preliminary requirement is to ensure that all variables are having a stationary process. The GMM estimation is disadvantaged by problem of weak instruments if the estimated variables are near unit root (Blundell and Bond, 1998; Abrigo and Love, 2016). The classification of the dataset as stationary series depends on the following properties (Wooldridge, 2015): 1. The data is a mean reverting series. In other words, it fluctuates around a constant mean. 2. The data series has a finite variance that does not vary over time. 3. Lastly, the auto-correlation function diminishes quickly with increasing lag length.

Therefore, the unit root test ascertains whether the time series data that forms the panel has probability distribution that is stable over time (Wooldridge, 2015). Simply put if the series is not stationary then it contains a unit root. Unit root test for stationarity in autoregressive model has attain position of importance since the work by Fuller (1976), and Dickey and Fuller (1979). While the study by Dickey and Fuller (1979) conducted their test with focus on the OLS estimator and some related statistics. The initial procedure has received several expansions to conduct panel unit root test. These include the Levin-Lin-Chu (2002), Harris and Tzvarlis (1999), Breitung (2001), Hadri (2000), Breitung and Das (2005), Fisher-type (Choi, 2001), and the Im-Pesaran-Shin (2003) cross-sectional dependence test (CIPS). The null hypothesis for all these different unit root test estimations is that each panel contain a unit root. Yet, these estimations of unit root test also differ in their asymptotic assumptions with respect to the number of panels in the dataset and the time periods in each panel. For instance, most of the assorted panel unit root test assume the panel data set to be perfectly balanced. Only the Fisher-type test and the CIPS test allow for unbalanced panels which makes them suitable for the panel data set adopted for this study which suffers from very few data loss. Hence, all unit root tests are conducted using the Fisher-type test and CIPS test based on the augmented Dickey-Fuller tests.

Initially, the Fisher-type test and the CIPS test are conducted to investigate evidence of unit root at level for all respective panel variables and then followed by second test at first difference if the variables are not stationary at level. A variable is referred I (0) series when it is stationary at level and I (1) series when it is stationary at first difference. Furthermore, the null hypothesis that all panels are not stationary is accepted when p-value for the test results is above 5% significant level. While the alternative hypothesis is accepted only when the p-value is less than the 5% significant level, indicating stationary process in the panels.

5.4.2. Optimal Lag Selection Criteria and Stability Condition Test

The next step for executing the empirical analysis is to determine the optimal lag for the PVAR-GMM style estimation. In PVAR and moment condition analysis, it is very important to estimate and identify the appropriate model through the optimal lag selection criteria (Abrigo and Love, 2016; Antonietti and Franco, 2021; and Aslan et al. 2022). For instance, Andrews and Lu (2001) suggest the moment model selection criteria (MMSC) for GMM models predicated on Hansen's (1982) J statistic of over-identifying restrictions. These MMSC are compared to diverse similarly adopted maximum likelihood model selection criteria like the moment Akaike information criteria (MAIC) (Akaike, 1969), moment Bayesian information criteria (MBIC) (Schwarz, 1978; Rissanen, 1978; Akaike, 1977), and lastly moment Hanna-Quinn information criteria (MQIC) (Hannan and Quinn, 1979). The selection of the optimal lag length is chosen based on the lowest value from among MBIC, MAIC, and MQIC (Abrigo and Love, 2016; Antonietti and Franco, 2021; and Aslan et al. 2022). However, in case these criteria give different optimal lags, this study will choose MAIC because of its ability to suggest more lags and eliminate any suspicion of bias in smaller lags. In addition, it is very crucial to ensure that the PVAR estimation based on the chosen lag criteria meets the VAR stability condition (Abrigo and Love, 2016). The stability condition implies that, all Eigenvalues or modulus are strictly less than 1 and they lie inside the unit circle of the companion matrix (Lütkepohl, 2005: Hamilton, 2010). In other words, the PVAR is invertible as well as depicting an infinite-order vector moving-average (VMA) that offer known interpretation for specifying the IRFs and FEVDs. Therefore, the assumption about the error covariance matrix can be imposed and the IRFs can be estimated by reformulating the model as infinite VMA (Abrigo and Love, 2016).

5.4.3. Estimation of PVAR Granger Causality Wald Test

The PVAR model proposed by Holtz-Eakin et al. (1988) and Abrigo and Love (2016) is effective for estimating robust results for Granger causality Wald test. However, it is important to note that causality in the results does not imply causal effect as in positive or negative but only reveal direction of causality or the ability to predict and supposedly cause it (Granger, 1969; Sims, 1972; Greene, 2008). For instance, in a Granger causality test that has y_{it} and x_{it}, one of four results can be generated from the model. The first is unidirectional causality, whereby the lagged regressors of x_{it} at the right side of the equation can predict y_{it}

but the lagged regressors of y_{it} cannot predict x_{it} . Secondly, the unidirectional causality can also imply the lagged regressors of y_{it} at the right-hand side of the equation can predict the dependent variable x_{it}, but the lagged regressors of x_{it} cannot predict y_{it}. Third scenario is that the results could also be bidirectional, when both the lagged regressors of x_{it} can predict y_{it} and the lagged regressors of y_{it} can also predict x_{it}. Then lastly, there can be no causality results when the lagged regressors of x_{it} cannot predict y_{it}, and the lagged regressors of y_{it} cannot predict x_{it}. The null hypothesis of the model is estimated as follows.

Ho: Excluded variable (x) does not Granger-cause Equation variable (y)

Ha: Excluded variable (x) Granger-causes Equation variable (y)

The Ho is rejected, and Ha is accepted if the results is significance at 5% or 1% level.

The PVAR Granger causality Wald test equation can be expressed as.

$$y_{it} = \alpha_{0t} + \sum_{l=1}^{m} \alpha_{lt} y_{i,t-l} + \sum_{l=1}^{m} \delta_{lt} x_{i,t-l} + \mu_{it}, \quad (5.4)$$

5.4.4. Impulse Response Functions

The PVAR impulse response function is an essential instrument for graphically illustrating the short and long-term dynamics or periodic effects between statistical variables with short panels (Cao and Sun, 2011; Zhang and Zhang, 2022). In other words, IRFs measure the time profile of the effect of a shock on a variable and how that influences the behaviour patterns of another variable series. Koop et al. (1996) and Su and Li (2023) also explain IRFs as a method for calculating the dynamic response of one variable to another while controlling the other variable. According to Abrigo and Love (2016), a one standard deviation shock in one variable frequently causes a changes in another variable under a certain level of confidence interval condition. Therefore, in this study, the IRF results are presented graphically to illustrate the trajectory values of the response variable due to a one standard deviation shock to an impulse variable (Dong et al., 2020).

On the y-axis of the IRFs, the positive and negative values are labelled to indicate positive response and negative response regions at different percentage points. Point zero on the y-axis of the IRFs graph represent the position where the response variable attains equilibrium or stable state following a one standard deviation shock to the impulse variable. The equilibrium or stable state separates the positive response region from the negative response region. The horizontal line or x-axis is labelled from period 0, 1, 2 up to 10 representing the yearly trajectory or time profile of interest for this study (Koop et al. 1996). The breaking line in the graph depicts the calculated changes in the response variable caused by a one standard deviation shock to the impulse variable. The grey area surrounding the breaking line represents the estimated confidence interval level and it shows that the response is significant when the entire grey area is either above or below the stable state at a specific time within the 10 years period (Abrigo and Love, 2016). On the other hand, the response is insignificant when the stable state at point zero lies within the grey area. Implying that the grey area covers both the positive response and negative response region of the IRFs graph. Moreover, a significant positive response means that the breaking lines of the response variable lies in the positive region of the graph and the entire grey area representing the confidence interval is completely above the stable state at a specific time. While a significant negative means that the breaking lines of the response variable lies within the negative region of the graph and the entire grey area representing the confidence interval is completely below the stable state at a specific time.

In this study two different confidence interval (CI) levels which are 95% and 68% are estimated to generate IRFs results. The rationale for using 68% and 95% CI is based on Sims and Zha's (1999), Jentsch and Lunsford (2016 and 2019) and Dong et al., (2020) argument that 68% CI bands typically produce more useful and meaningful results than 95% and 99% CI bands when estimating IRFs. The 68% represents a half-length CI with one standard deviation. Also, the IRFs are constructed orthogonally in this study to produce the short and long run effects (Holtz-Eakin et al. 1988).

5.4.5. Forecast Error Variance Decompositions (FEVDs)

Impulse responses can provide detailed information about how changes in one variable affect another, but they cannot specifically indicate the magnitude and degree of these effects (Abrigo and Love, 2016; Su and Li, 2023). We use the variance decomposition method of the PVAR GMM model to predict the degree of mutual contribution to changes in the periodic response variable until it reaches a stable state in the future. Therefore, we use the FEVDs in this chapter to illustrate the percentage change in the response variable. This change is explained by a shock of one standard deviation to the impulse variable, which has accumulated over time (Brahmasrene et al., 2014). The forecast horizons or forecasted periods reported for this study are from 1 to 10 years ahead, indicating periodic variations of the response variable in percentages (Abrigo and Love, 2016).

5.5. RESULTS AND DISCUSSIONS

5.5.1. The Distinctive Estimations of the PVAR.

The PVAR estimates used for this empirical analysis are estimated in four ways. Estimation 1 is including two variables of interest which are FDI% of GDP and environmental tax % of GDP. The next estimation is also executed to contains two variables of interest which include FDI% of GDP and energy tax % of GDP as estimation 2. Estimation 3 is also executed to include three variables of interest, and these include GFDI%GDP, M&As%GDP, and environmental tax % of GDP. Finally, in estimation 4 the three variables of interest are GFDI%GDP, M&As%GDP, and energy tax % of GDP.

The rational is to avoid any likelihood of multicollinearity between the two variables of environmental policy should they be estimated together in the same model. The findings of the PVAR-Granger causality Wald test, IRFs, and FEVDs are generated in addition to the PVAR based on the GMM style results for all 4 different estimations. These findings are covered and discussed in detail in subsequent subsections. Moreover, the PVAR model is executed in a GMM-stye only after conducting three diagnostic tests which are unit root stationarity test, the Optimal lag selection criteria, and stability condition test (Holtz-Eakin et al. 1988; Abrigo and Love, 2016).

5.5.2. Unit Root Test Results

Table 5.2 below, represents the CIPS test and the Fisher-type test results for all the variables to be used for the PVAR-GMM style and Granger causality test. The results shows that all the FDI variables when estimated at level are all I(0) series at 1% significant level in both the CIPS test and Fisher-type test. Also, the economic freedom index variables which include financial freedom index and government integrity index are all I(0). The financial freedom index series is significant at 5% level for CIPS test and 1% level for Fisher-type test when estimated at level. On the other hand, government integrity index series is significant at 1% level for both CIPS test and Fisher-type test when estimated at level indicating I(0) series. Therefore, the null hypothesis that the panels of the three FDI variables, financial freedom index, and government integrity index contain unit root is rejected and the alternative hypothesis that the panels are stationary is accepted when estimated at level. Moreover, environmental policy variables, unemployment rate, GDP per capita constant, and Trade % GDP are all I(1) series in both the CIPS test and Fisher-type test. Implying that the p-values for these variables are not significant at 5% level, hence the null hypothesis that all the panels contain unit root is accepted, and the alternative hypothesis is rejected when the variables are estimated at level. However, both results for the CIPS test and Fisher-type test reveal that environmental policy variables, unemployment rate, GDP per capita constant, and Trade % GDP are all significant at 1% level when estimated in their first difference.

Table 5.2.

Pasaran (2007) panel unit root test for all variables.

Variables	CIPS Test		Fisher-Type test	
	@ Level	@ 1st Difference	@ Level	@ 1st Difference
FDI Variables				
FDI%GDP	-8.470 (0.000) ***		18.604 (0.000) ***	
GFDI%GDP	-5.669 (0.000) ***		12.408 (0.000) ***	
M&As%GDP	-9.066 (0.000) ***		27.175 (0.000) ***	
Environmental Policy variables				
Environmental tax % GDP	0.274 (0.608)	-11.715 (0.000) ***	-0.390 (0.652)	35.569 (0.000) ***
Energy tax % GDP	0.087 (0.535)	-11.534 (0.000) ***	0.502 (0.308)	34.362 (0.000) ***
Controlled variables				
Unemployment rate	0.472 (0.682)	-7.514 (0.000) ***	-0.668 (0.748)	15.750 (0.000) ***
GDPpccs	0. 196 (0.578)	-6.573 (0.000) ***	0.746 (0.228)	11.323 (0.000) ***
Trade % GDP	-0.595 (0.276)	-12.732 (0.000) ***	-0.448 (0.673)	41.102 (0.000) ***
Financial freedom	-1.963 (0.025) **		2.782 (0.003) ***	
Government integrity	-5.000 (0.000) ***		8.612 (0.000) ***	

Note: The figures outside the brackets are z-t-tilde bar statistics for CIPS and chi^2 statistics for the Fisher-type test. The p-values are those in the brackets, and the symbols represent ***, **, and * represent 1%, 5%, and 10% significance level. Also, the automatic lag length selection criteria based on Augmented Dickey-Fuller tests is utilised.

5.5.3. Optimal Lag Selection Criteria and Stability Condition Test – Results

The results for the selection of the optimal lag are presented in Tables 5.3, 5.4, 5.5 and 5.6 representing results for estimation 1, 2, 3 and 4 respectively. All the lag selection criteria presented in all the four tables chooses 1 lag as suitable for all the four different estimations. In other words, all three selection criteria which are MBIC, MAIC, and MQIC produce their minimum values at 1 lag. Moreover, Fig 5.1 presents the root of companion matrix for each of the four estimations, and they all have eigen values lying inside the circle which indicate that PVAR GMM-style stability condition is satisfied. Therefore, it is possible to generate reliable results for IRFs graphs and FEVDs values.

Table 5.3.

Lag selection criteria for the Panel A (2003 – 2019) – Estimation 1.

Lag	Cd	J	J pvalue	MBIC	MAIC	MQIC
1	1	203.403	0.001	-663.479	-90.597	-318.291
2	1	138.844	0.004	-439.077	-57.156	-208.952
3	1	63.771	0.076	-225.189	-34.229	-110.127

Note: This estimation includes FDI % of GDP and Environmental tax % of GDP as the variables of interest.

Table 5.4.

Lag selection criteria for the Panel A (2003 – 2019) – Estimation 2.

Lag	Cd	J	J pvalue	MBIC	MAIC	MQIC
1	1	186.423	0.015	-680.459	-107.577	-335.271
2	1	129.738	0.018	-448.183	-66.262	-218.058
3	1	61.927	0.102	-227.033	-36.073	-111.971

Note: This estimation includes FDI % of GDP and Energy tax % of GDP as the variables of interest.

Table 5.5.

Lag selection criteria for the Panel B (2003 – 2020) – Estimation 3.

Lag	Cd	J	J pvalue	MBIC	MAIC	MQIC
1	1	230.658	0.030	-901.596	-153.342	-450.739
2	1	151.768	0.075	-603.068	-104.232	-302.496
3	1	97.863	0.004	-279.556	-30.137	-129.269

Note: This estimation includes GFDI % of GDP, M&As % of GDP, and Environmental tax % of GDP as the variables of interest.

Table 5.6.

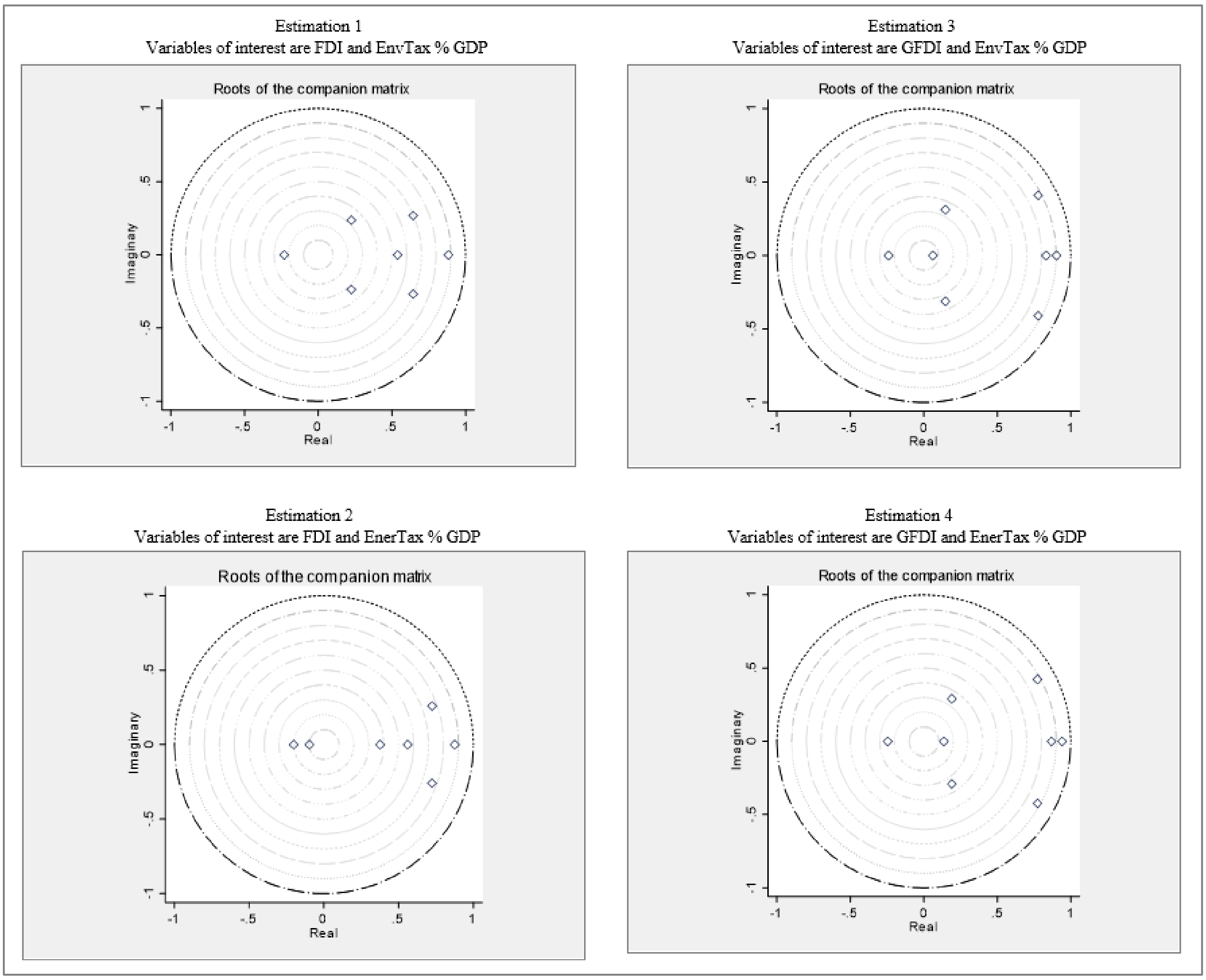
Lag selection criteria for the Panel B (2003 – 2020) – Estimation 4.

Lag	Cd	J	J pvalue	MBIC	MAIC	MQIC
1	1	231.612	0.027	-900.642	-152.389	-449.785
2	1	159.521	0.031	-595.315	-96.479	-294.743
3	1	99.181	0.003	-272.339	-26.819	-124.402

Note: This estimation includes GFDI % of GDP, M&As % of GDP, and Energy tax % of GDP as the variables of interest.

Fig 5.1.

Roots of Companion Matrix for All Four Panel Estimations



Note: PVAR satisfies stability condition because all the eigenvalues lie inside the unit circle.

5.5.4. Discussion of the PVAR Granger Causality Wald Test Estimation Results.

The results for estimation 1 which include aggregate FDI inflows and environmental taxes of EU countries as variables of interest is reported in Table 5.7 below. However, the reported findings suggest no direction of causality between environmental taxes and aggregate FDI inflows at 5% significance level. In this the null hypothesis of no causality is accepted, and the alternative hypothesis of significant causality is rejected. Implying that, the relationship between aggregate FDI inflows and environmental taxes of EU countries does not support endogenous pollution haven theory. Hence, contradicting studies like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that FDI inflows can also influence the host countries environmental policy strictness.

Furthermore, the results of estimation 2 with aggregate FDI inflows and energy taxes of EU countries as variables of interest are also presented in Table 5.8 below. The reported results suggest that energy taxes of

EU countries Granger cause aggregate FDI inflows significantly at 1% level. Therefore, the alternative hypothesis of significant Granger causality is accepted whereas the null hypothesis of no significant Granger causality is rejected. However, aggregate FDI inflows does not significantly Granger cause energy taxes of EU countries, which also implies acceptance of the null hypothesis of no Granger causality and rejection of alternative hypothesis of significant Granger causality. To this end, the relationship between aggregate FDI and energy taxes of EU countries is classified as unidirectional but not endogenous. Collectively, the findings from Tables 5.7 and 5.8 no endogenous pollution haven between EU strict environmental policy and aggregate FDI inflows into EU countries at 5% significance level. Additionally, the results contradict supporters of endogenous pollution haven theory like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that FDI inflows can also influence the host countries environmental policy strictness.

Moreover, the results for estimation 3 is presented in Table 5.9 and the variables of interest include GFDI, M&As, and environmental taxes. The results demonstrate that the environmental taxes of EU countries do not significantly Granger causes GFDI at 5% significance levels. So, the null hypothesis of the PVAR Granger causality Wald test which claim no significant causality is accepted, whereas the alternative hypothesis which support causality is rejected. Notwithstanding, the results further indicate that GFDI significantly Ganger cause environmental taxes at 1% significance level and rejects the null hypothesis but accept the alternative hypothesis of significant causality. These results demonstrate a unidirectional causality relationship from GFDI to environmental taxes of EU countries. In addition, the evidence supports that GFDI can influence environmental taxes of EU countries offering support for endogenous pollution haven and so consistent with studies like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021). These studies claim that foreign investments can also influence the host countries environmental policy strictness.

The results in Table 5.9 also demonstrates that the environmental taxes of EU countries significantly Granger causes M&As at 1% significance levels. Therefore, implying that the alternative hypothesis of the PVAR Granger causality Wald test is accepted, and the null hypothesis of no causality is rejected. On the other hand, M&As also significantly Granger causes the environmental taxes of EU countries at 1% significant level, implying acceptance of the alternative hypothesis of significant Granger causality but rejecting the null hypothesis of no Granger causality. In this case, the findings suggest that the relationship between M&As and environmental taxes is bidirectional Granger causality. Also implying that, the results is consistent with studies supporting endogenous pollution haven theory like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that foreign investments can also influence the host countries environmental policy strictness.

Furthermore, in Table 5.10 and the variables of interest include GFDI, M&As and energy taxes of EU countries. The reported findings indicate that energy taxes significantly Granger causes GFDI and M&As at 1% significance level. These results accept the alternative hypothesis of significant Granger causality of the PVAR Granger causality Wald test but rejects the null hypothesis of no Granger causality. Also, GFDI and M&As both significantly Granger causes energy taxes at 1% significance level. Similarly, these results also accept the alternative hypothesis of the estimation and rejects the null hypothesis of no significant Granger causality. Therefore, the relationship between GFDI and energy taxes of EU countries is classified as bidirectional Granger causality and support endogenous pollution haven. Likewise, the relationship between M&As and energy taxes of EU countries is also bidirectional Granger causality and support endogenous pollution haven. These findings indicate that the results for both the direction of causality between GFDI and energy taxes, and between M&As and energy taxes is consistent with studies supporting endogenous pollution haven theory like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that foreign investments can also influence the host countries environmental policy strictness.

In summary, the results from the PVAR Granger causality Wald test suggest no endogenous pollution haven relationship between aggregate FDI and the two market based environmental policy variables. Rather, evidence of unidirectional Granger causality is observed from energy taxes to aggregate FDI inflows to the region. On the other hand, evidence of unidirectional Granger causality is evidenced from GFDI to environmental taxes implying support for endogenous pollution haven. While there is evidence of unidirectional Granger causality from environmental taxes to M&As but does not support endogenous pollution haven theory. Contrary, a bidirectional causality and endogenous pollution haven is evident in the relationship between energy taxes and the two entry modes of FDI. Implying that changes in GFDI influence EU governments and policy makers to make changes to their environmental taxes and energy taxes. While changes in M&As influence EU governments and policy makes to make changes in their energy taxes only.

Table 5.7.

PVAR Granger causality Wald test estimation results for FDI % GDP and Environmental Tax % GDP (2003 – 2019) – Estimation 1.

Panel A Equation	Excluded/Regressors	
	FDI%GDP	Env. Tax
FDI % GDP		(0.818)
Env. Tax	(0.065)	

Note: The p-values are in the brackets and the symbols represent ***, and ** represent 1%, and 5% significance level respectively. The Excluded variables are on the horizontal axis and the Equation variables are on the vertical axis. Ho: Excluded variable does not Granger-cause Equation variable. Ha: Excluded variable Granger-causes Equation variable. The variables of interest include FDI and Environmental tax. Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

Table 5.8.

PVAR Granger causality Wald test estimation results for FDI % GDP and Energy Tax % GDP (2003 - 2019) – Estimation 2.

Panel A Equation	Excluded/Regressors	
	FDI%GDP	Ener. Tax
FDI % GDP		(0.000) ***
Ener. Tax	(0.512)	

Note: The p-values are in the brackets and the symbols represent ***, and ** represent 1%, and 5% significance level respectively. The Excluded variables are on the horizontal axis and the Equation variables are on the vertical axis. Ho: Excluded variable does not Granger-cause Equation variable. Ha: Excluded variable Granger-causes Equation variable. Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

Table 5.9.

PVAR Granger causality Wald test estimation results for GFDI % GDP, Mas% GDP, and Environmental Tax % GDP (2003 – 2019) – Estimation 3.

Panel B Equation	Excluded/Regressors		
	GFDI%GDP	M&As%GDP	Env. Tax
GFDI % GDP			(0.340)
M&As%GDP			(0.000) ***
Env. Tax	(0.000)***	(0.823)	

Note: The p-values are in the brackets and the symbols represent ***, and ** represent 1%, and 5% significance level. The Excluded variables are in the horizontal axis and the Equation variables are in the vertical axis. Ho: Excluded variable does not Granger-cause Equation variable. Ha: Excluded variable Granger-causes Equation variable. Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

Table 5.10.

PVAR Granger causality Wald test estimation results for GFDI % GDP, M&As% GDP, and Energy Tax % GDP (2003 – 2019) – Estimation 4.

Panel B Equation	Excluded/Regressors		
	GFDI%GDP	M&As%GDP	Ener. Tax
GFDI % GDP			(0.000)***
M&As%GDP			(0.000) ***
Ener. Tax	(0.004)***	(0.000)***	

Note: The p-values are in the brackets and the symbols represent ***, and ** represent 1%, and 5% significance level. The Excluded variables are in the horizontal axis and the Equation variables are in the vertical axis. Ho: Excluded variable does not Granger-cause Equation variable. Ha: Excluded variable Granger-causes Equation variable. Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

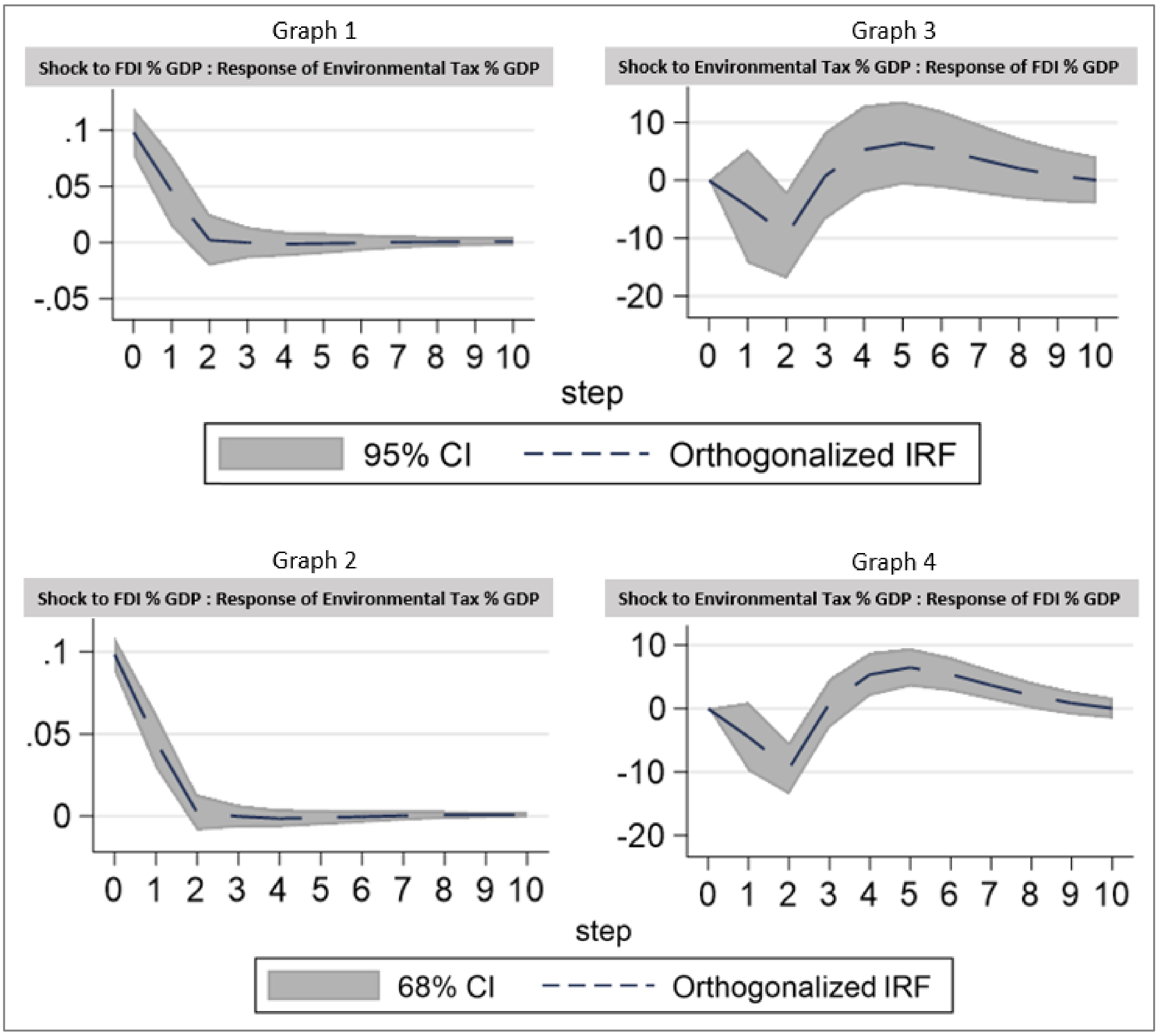
5.5.5. Discussion of Impulse Response Function (IRFs) Graphs Results.

In this section the IRFs graphs show a one standard deviation shock and corresponding 10 years forecasted responses that occur among the three FDI variables (aggregate FDI inflows, GFDI and M&As) and the two environmental policy proxies (environmental taxes and energy taxes). Each results demonstrates graphs that are numbered 1 to 4. The graphs numbered 1 and 3 are estimated at 95% CI, whereas the graphs numbered 2 and 4 are estimated at 68% CI. Among the 10 years forecasted, between 0 and 5 years is classified as early period and between 6 and 10 years is latter period.

5.5.5.1. *Results showing shocks and corresponding responses between aggregate FDI % GDP and Environmental policy variables using data from 2003 to 2019.*

Fig 5.2.

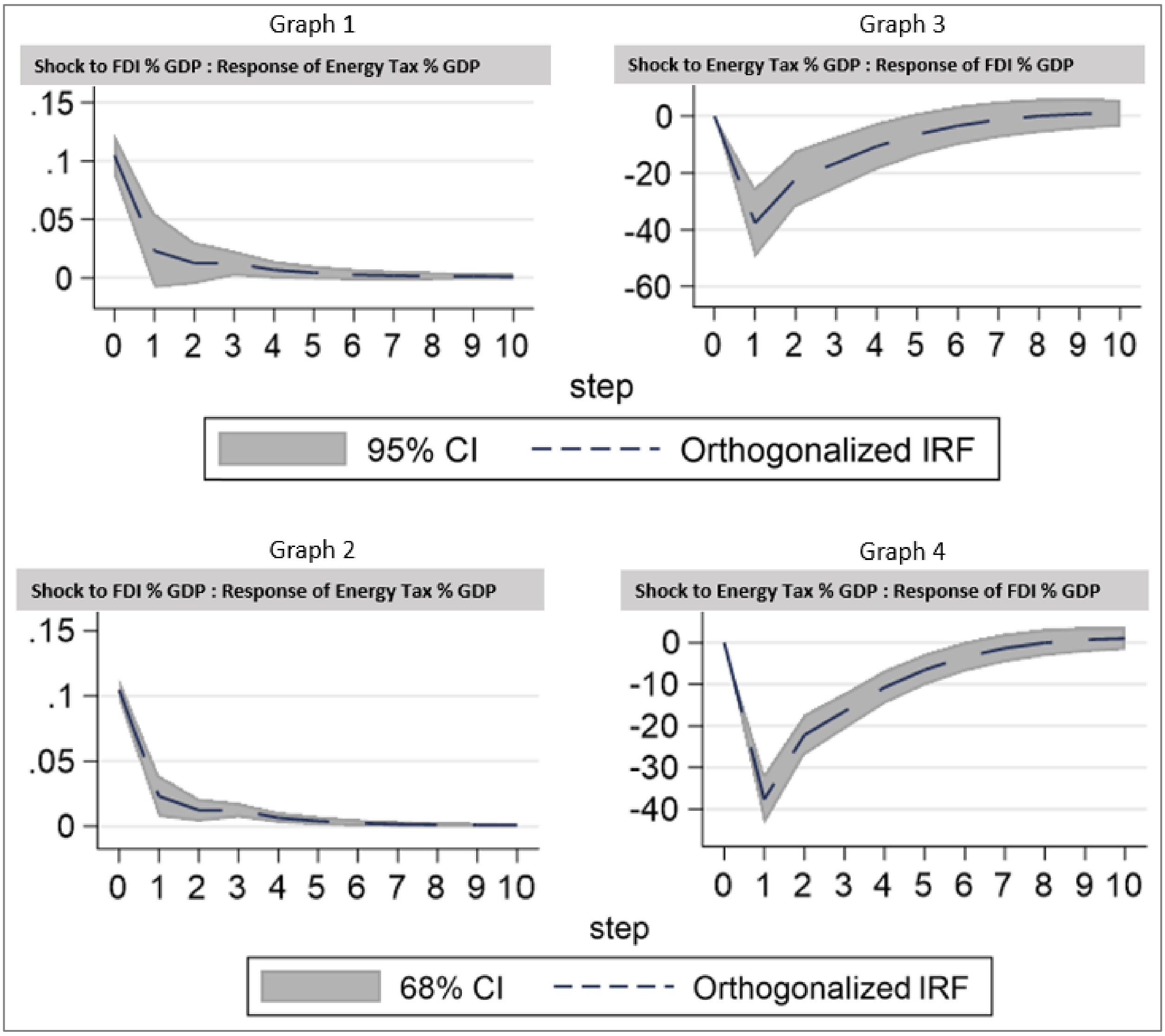
IRFs graphs between aggregate FDI %GDP and Environmental tax based on Estimation 1.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E1a and Fig E1b) for graphs for all variables in the estiamtion.

Fig 5.3.

IRFs graphs between aggregate FDI%GDP and Energy tax based on Estimation 2.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E2a. and Fig E2b) for graphs for all variables in the estiamtion.

In graph 1 and 2 of Fig 5.2 above, the results suggest that the response of environmental taxes to a one standard deviation shock to aggregate FDI exhibit significant positive effect at the initial period of 0 and the 1^{st} year of the early period. However, the response of environmental taxes is insignificant for the remaining forecasted years at both 95% CI and 68% CI. On the other hand, in graph 1 of Fig 5.3, the results suggest that the response of energy taxes to a one standard deviation shock to aggregate FDI is significantly positive at the initial period of 0 but insignificant in all the 10 forecasted years at 95% CI. While in graph 2 of Fig 5.3 estimated at 68% CI, the response of energy taxes demonstrates weak significant positive effect for four years in the early period (from 0 to 4^{th} year). But in the latter period of the 10 forecasted years the response of energy taxes is insignificant. These results imply that there is a weak positive endogenous pollution haven in the early period. Thus, supporting studies like Cole et al. (2006), Ferrara et al. (2015), Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that increase in FDI inflows can also influence the host countries environmental policy strictness. In this case, the influence led to a rise in the strictness of environmental policy through the increase in environmental taxes and energy taxes. The reason for the increase in the environmental policy as a result of the increase in FDI may be attributed to the low level of institutional corruption in EU countries. These uncorrupted institutions successfully prevent foreign firms from engaging in collaborative lobbying meant to undermine the strictness of the environmental taxes (Cole et al. 2006; Ferrara et al. 2015). Therefore, when FDI inflows increases, the environmental policy makers are predicted to add a more strictness or increase the abatement taxes to protect the environmental quality. It also supports the argument by Cole et al. (2006) that unlike developing countries where environmental policy is made weaker to ensure continuous increase in foreign investments, in developed countries like the EU countries environmental policy is made stricter to achieve sustainable development when foreign investments increase.

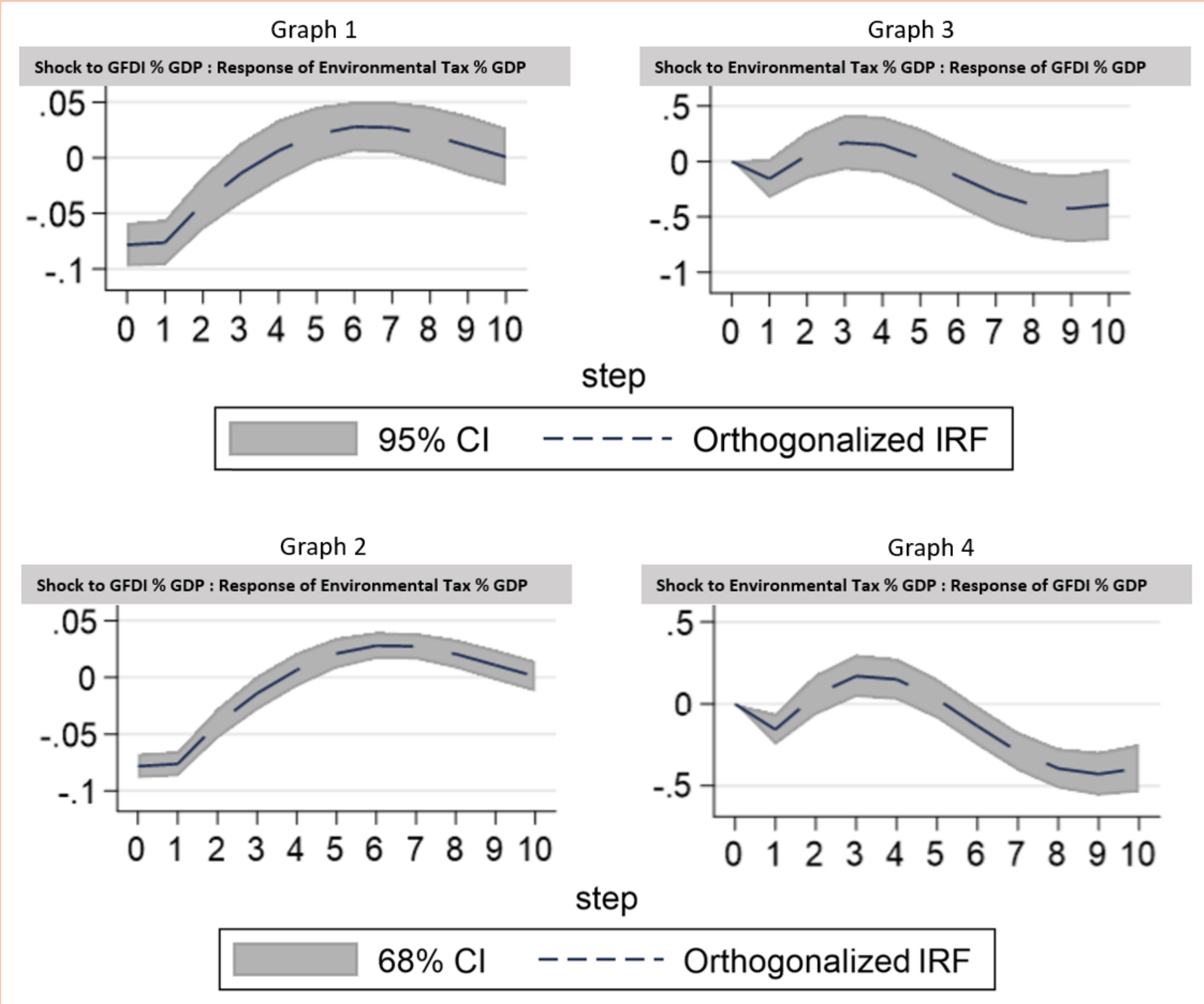
Moreover, in graph 3 and 4 of Fig 5.2 estimated at 95% and 68% CI respectively, the results suggest that with a one standard deviation shock to environmental taxes the response of aggregate FDI demonstrate significant decrease for only one year in the 2nd year of the early period supporting pollution haven theory. But in the latter period of graph 3 estimated at 95% CI the results suggest no significant response of aggregate FDI. Furthermore, in graph 4 estimated at 68% CI the response of aggregate FDI demonstrate significant decrease in the 1st year and followed by four years of increase (from 4th year to 7th year). These results suggest evidence of pollution haven hypothesis in the aggregate FDI for one year in the early period and followed by weak significant evidence of pollution halo for four years in the latter period. Hence, the result for the early period support studies like Becker and Henderson (2000), Greenstone (2002), List et al. (2003), Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020) that argue that multinationals will not investments in locations with stricter or higher environmental abatement cost (see literature review at subsection 4.3.1 of this studies). The results further imply that, multinationals engaging in foreign investments in the EU countries are sensitive to stricter environmental policy and perceive it as a deterrence only in the early period. Notwithstanding this, the response of aggregate FDI in the latter period support studies like Kim and Rhee (2019) and Fahad et al. (2022) that assert to pollution halo hypothesis. Implying that, in the latter period of the 10 forecasted years aggregate FDI experience weak significant rise due to a one standard deviation shock to EU environmental taxes.

However, results from Fig 5.3 shows that in graph 3 aggregate FDI respond to one standard deviation shock to energy taxes by significantly decreasing for four years (from 0 to 4th year) in the early period suggesting evidence of pollution haven hypothesis at estimated 95% CI. Similarly in graph 4, aggregate FDI respond to one standard deviation shock to energy taxes by significantly decreasing for five years (from 0 to 5th year) in the early period at estimated 68% CI. But in both graph 3 and 4 there is no significant response from aggregate FDI in the latter period of the forecasted years. This results further support the earlier findings that pollution haven is evident in the relationship between environmental policy of the EU and the aggregate FDI inflows in the early forecasted period. Thus, supporting studies like Becker and Henderson (2000), Greenstone (2002), List et al. (2003), Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020) that argue that multinationals are deterred from investing in a host country with strict environmental policy.

In summary, the results suggest that when EU environmental policy gets stricter the total FDI inflows into the region subsequently reduces both in the early period of the 10 forecasted years. However, in the latter years total FDI inflows continue decline with increase energy taxes, while total FDI inflows experience weak increase in the latter years due to rise in total environmental taxes. On the other hand, the IRFs results suggest that rise in aggregate FDI will influence the EU environmental policy by making it stricter within the first 5 years especially with the energy taxes.

5.5.5.2. *Results showing shocks and corresponding responses between GFDI %GDP and Environmental policy variables using data from 2003 to 2019.*

Fig 5.4.
IRFs graphs between GFDI%GDP and Environmental tax based on Estimation 3.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E3a. and Fig E3b) for graphs for all variables in the estiamtion.

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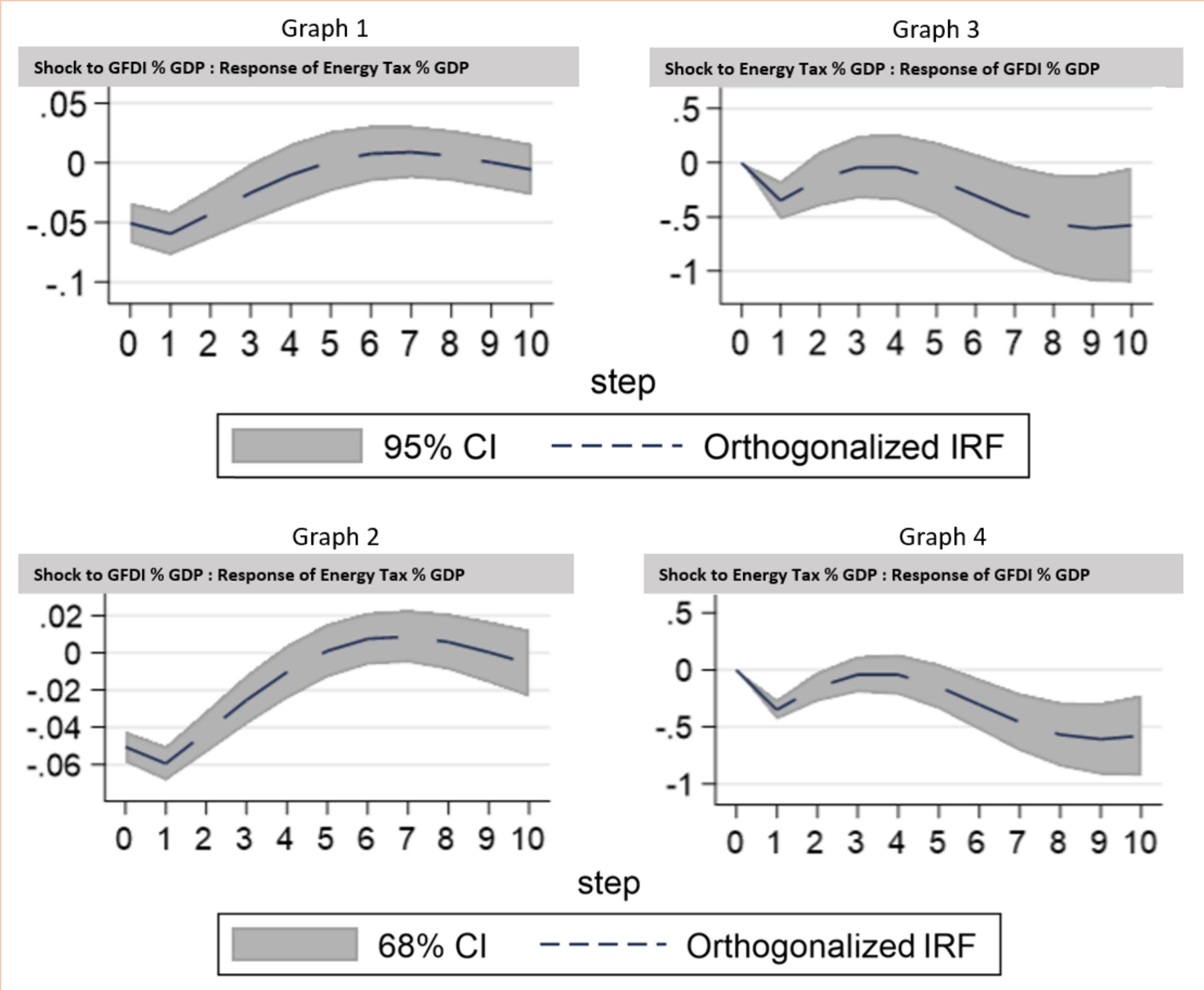
Fig 5.5.
IRFs graphs between GFDI%GDP and Energy tax based on Estimation 4.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E4a. and Fig E4b) for graphs for all variables in the estiamtion.

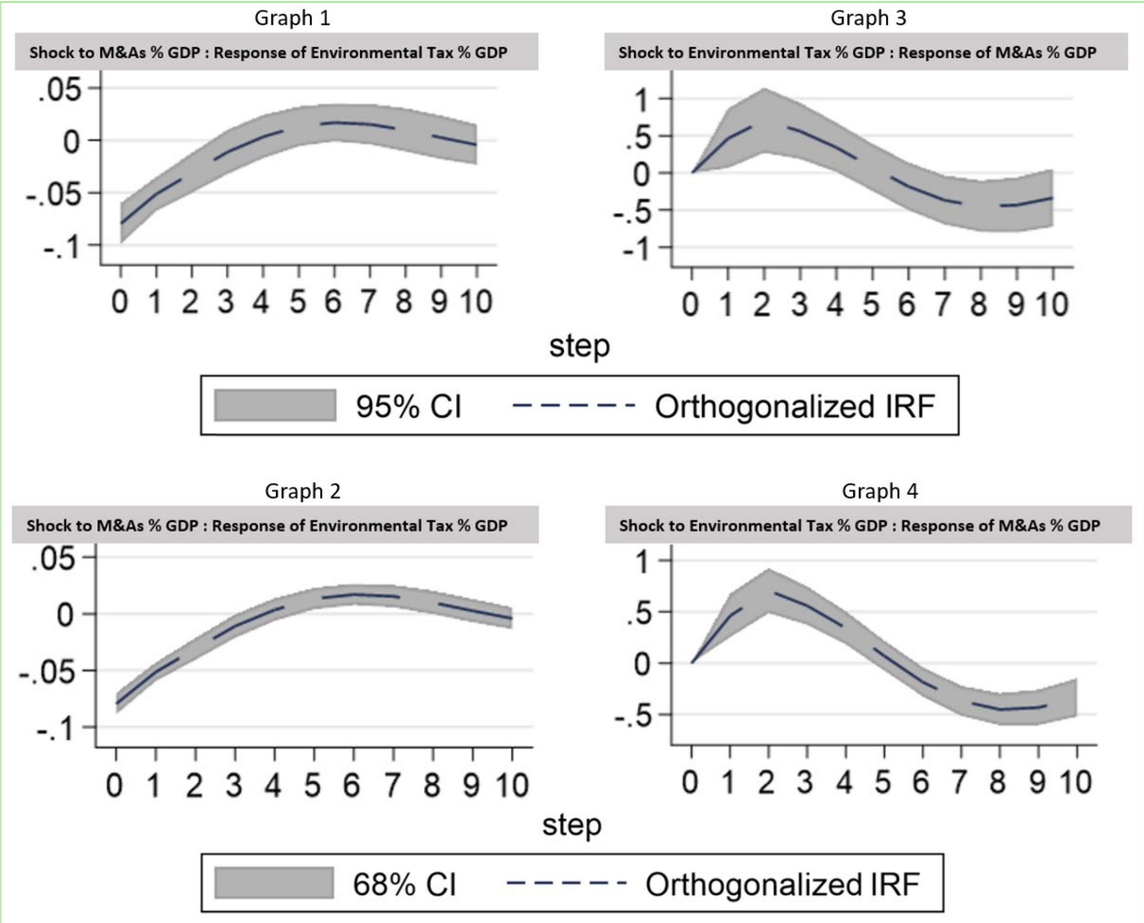
In both Fig 5.4 and 5.5 above, graph 1 shows that both environmental taxes and energy taxes respond with significant decrease for two years (from 0 to 2nd year) in the early period at estimated 95% CI. But in the latter period environmental taxes significantly increase for one year in the 6th year while energy taxes remain entirely insignificant. However, graph 2 of Fig 5.4 estimated at 68% CI show that the response of environmental taxes still demonstrated significant decrease for two years (from 0 to 2 years) in the early period. But in the latter period, environmental taxes respond with weak significant increase for four years (from 5th to 8th year). While, in graph 2 of Fig 5.5 which is estimated at 68% CI shows that the response of energy taxes demonstrates significant decrease for three years (from 0 to 3rd year) in the early period but there is no significant response in the latter period. These results provided evidence for endogenous pollution haven and support studies like Cole et al. (2006), Ferrara et al. (2015) Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that increase in FDI inflows can also influence the host countries environmental policy strictness. However, further insight into the forecasted results suggest that one standard deviation point increase in GFDI will result in policy makers of EU countries responding by reducing the environmental policy strictness in the early period while increasing the strictness in the latter period. This may possibly be a mechanism that help to avoid scaring away foreign investments. The response in the latter period supports the argument by Cole et al. (2006) that in developed countries like the EU countries environmental policy is made stricter to achieve sustainable development when foreign investments increase. But at the early period it does not support Cole et al. (2006) argument.

On the other hand, graph 3 of Fig 5.4 which is estimated at 95% CI demonstrates that at one standard deviation shock to environmental taxes the response of GFDI is insignificant in the early period but in the latter period it significantly declines for three years (from 8^{th} to 10^{th} year). Thus, suggesting evidence of pollution haven hypothesis in the latter period. However, at 95% CI graph 3 of Fig 5.5 suggest that at a one standard deviation shock to energy taxes the response of GFDI exhibit significant decline for one year (1^{st} year) in the early period and significantly decline again for three years (8^{th} to 10^{th} year) in the latter period. Therefore, suggesting evidence of pollution haven in both the early period and latter period. Also, in graph 4 of Fig 5.4 which is estimated at 68% CI showed that at a one standard deviation shock to environmental taxes the GFDI significantly declined in the 1^{st} year suggesting evidence of weak pollution haven hypothesis, but GFDI significantly increased in the 3^{rd} and 4^{th} year suggesting weak evidence of pollution halo hypothesis within the early period. But, in the latter period GFDI significantly decline again for four years (7^{th} and 10^{th} year). These results imply weak evidence of both pollution haven and pollution halo hypothesis in the early period but in the latter period only pollution haven hypothesis is evident. Graph 4 of Fig 5.5 also showed that at one standard deviation shock to energy taxes the response of GFDI exhibit significant decline for one year (1^{st} year) in the early period and in the latter period it significantly declines for four years (7^{th} and 10^{th} year). This results generally demonstrated significant pollution haven hypothesis both in the early period and latter period within the ten forecasted years. Therefore, supporting studies like support Becker and Henderson (2000), Greenstone (2002), List et al. (2003), Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020). While rejecting pollution halo hypothesis and studies like Kim and Rhee (2019) and Fahad et al. (2022) that assert that increase in environmental policy strictness promote foreign investment inflows.

In summary, the results shows that when the EU countries' increase environmental policy strictness in the region it becomes a deterrence to multinational companies' investment decisions in the region for the early and later periods of the 10 forecasted years. It is also evident from the results that increase in GFDI in the EU countries influence environmental policy strictness in the region. But the influence provided by the results suggest that environmental policy get weaker at the early period before it become stricter in the latter period of the 10 forecasted years.

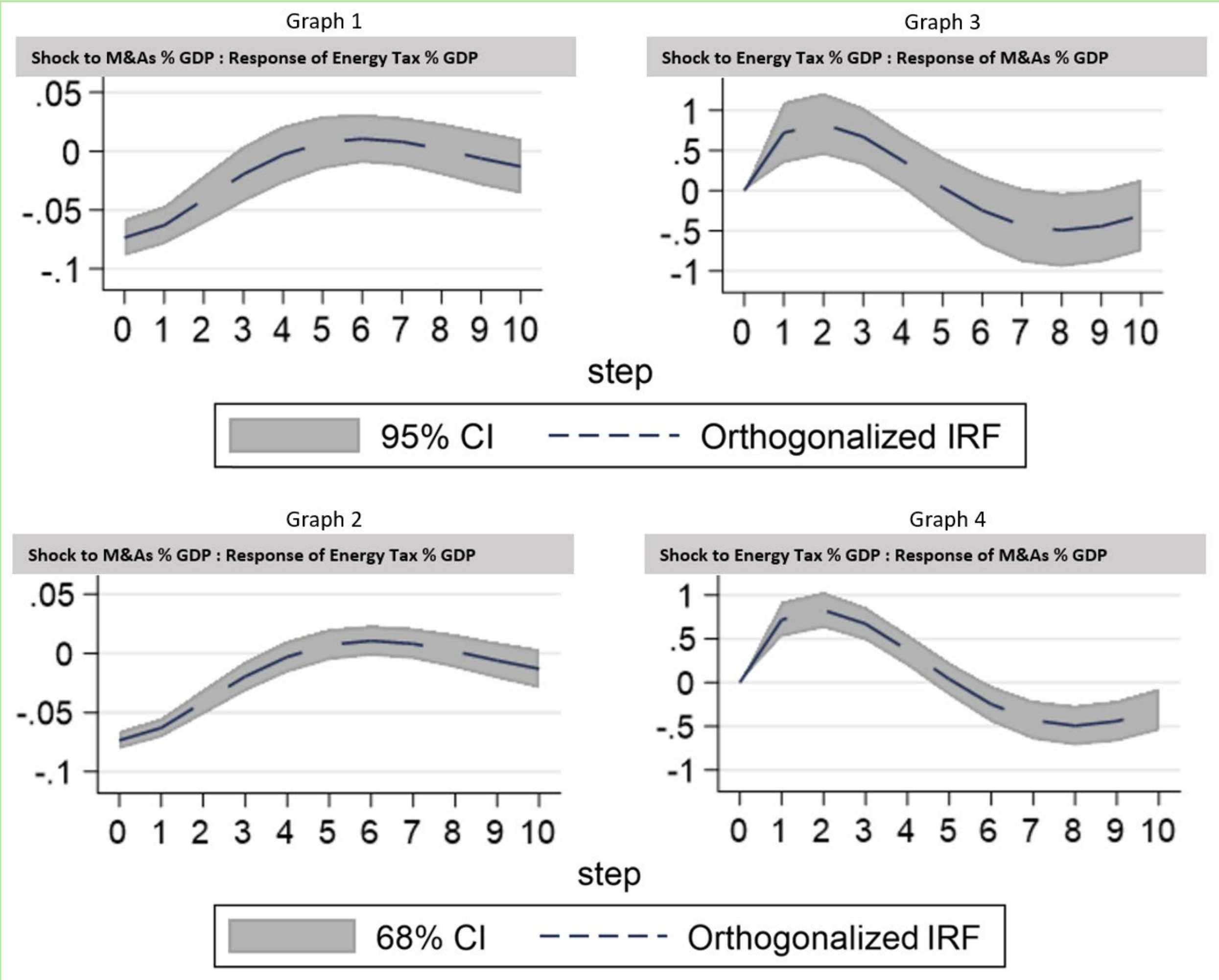
5.5.5.3. *Results showing shocks and corresponding responses between M&As%GDP and Environmental policy variables using data from 2003 to 2019.*

Fig 5.6.
IRFs graphs between M&As%GDP and Environmental tax based on Estimation 3.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E3a. and Fig E3b) for graphs for all variables in the estiamtion.

Fig 5.7.
IRFs graphs between M&As%GDP and Energy tax based on Estimation 4.



Note: The variables at the top of each graph include impulse variable experiencing the shock at the left and the response variable at the right. The horizontal axis shows 0 to 10 years period. The values on the vertical axis reveal the rate of increase or decrease that occur in the response variable because of 1% standard deviation shock to the impulse variable until it reaches a stable state. See appendix C (Fig E4a. and Fig E4b) for graphs for all variables in the estiamtion.

Graph 1 of both Figs 5.6 and 5.7 which are at estimated 95% CI show that, at a one standard deviation shock to M&As the response of both environmental taxes and energy taxes exhibit significant decline for two years (from 0 to 2 years) in the early period but in the latter period there is insignificant change. This suggests evidence of endogenous pollution haven in the early period and support studies like Cole et al. (2006), Ferrara et al. (2015), Millimet and Roy (2016), Kathuria (2018), and Singhania and Saini (2021) who claim that foreign investment inflows can also influence the host country's environmental policy strictness. Graph 2 of Fig 5.6 also showed that at one standard deviation shock to M&As the response of environmental taxes exhibit significant decline for two years (from 0 to 2nd year) in the early period but in the latter period there is weak significant increase for two years (6th and 7th year) at estimated 68% CI. While in graph 2 of Fig

5.7, at one standard deviation shock to M&As the response of energy taxes exhibit weak significant decline for two years (from 0 to 3 years) in the early period but in the latter period it exhibits insignificant response at estimated 68% CI. These results generally support endogenous pollution haven hypothesis. However, the likely reason why the increase in M&As lead to decline in environmental policy in the early period could be attributed to the environmental friendliness of M&As as argued by studies like Ashraf et al. (2020) and Doytch and Ashraf (2022).

Moreover, graph 3 of both Fig 5.6 and 5.7 estimated at 95% CI show that, at one standard deviation shock to both environmental taxes and energy taxes the response of M&As exhibit significant increase for three years (from 0 to 3rd year) in the early period. These results provide support for pollution halo hypothesis and align with studies like Kim and Rhee (2019) and Fahad et al. (2022) that assert that increase in environmental taxes promote foreign investment inflows. However, these results reject the pollution haven hypothesis and contradict studies like Becker and Henderson (2000), Greenstone (2002), List et al. (2003) and Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020). But in the latter period of graph 3 of Fig 5.6, environmental taxes decline for two years (8th and 9th year) supporting the pollution haven hypothesis and aligning with the studies of Becker and Henderson (2000), Greenstone (2002), List et al. (2003) and Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020). While in the latter period of graph 3 of Fig 5.7 energy taxes exhibit no significant changes. Lastly in graph 4 of both Fig 5.6 and 5.7 estimated at 68% CI, the results show that at one standard deviation shock to both environmental taxes and energy taxes the response of M&As exhibit weak significant increase for four years (from 0 to 4th year) in the early period but in the latter period it exhibit weak significant decrease for four years (from 7th to 10th year). These generally confirm evidence of pollution halo hypothesis in the early period and evidence of pollution haven hypothesis in the latter period.

In summary, the results suggest that when policy makers of EU countries make environmental policy stricter, it leads to increase in M&As in the first early period and decrease in the latter within the 10 forecasted years. Therefore, supporting pollution halo hypothesis in the early years and pollution haven in the latter years. In addition, the results indicates that increase in M&As influence the environmental policy of EU countries by rendering it weaker in the early period. Though environmental policy of the EU countries is suggested to be stricter in the latter period, the support for the evidence is weak.

5.5.6. Discussion of Forecast Error Variance Decompositions Results.

Despite the useful information provided by the IRFs graphs in the previous section. The IRFs graphs are not able to offer insight into the degree of change in a response variable. This degree or extent of change is determined by the FEVDs method. Therefore, the subsections below present the discussions of the results for the four various estimations that seeks to explore the degree of changes that occur to environmental policy and FDI when either of the two experience a one standard deviation shock. Like the IRFs graphs, the forecasted period from 0 to 5 years is classified as early period and from 6 to 10 years are the latter periods.

5.5.6.1. *FEVDs results for FDI and Environmental tax using data from 2003 to 2019.*

Table 5.11.

Forecast Error Decomposition between FDI % of GDP and Environmental Tax % of GDP – Estimation 1

Response Variable	Forecast Year / Period	Impulse Variables	
		FDI	Environmental tax
FDI			
	0		0.00 %
	1		0.00 %
	2		0.16 %
	3		0.80 %
	4		0.75 %
	5		0.89 %
	6		1.14 %
	7		1.31 %
	8		1.39 %
	9		1.41 %
	10		1.42 %
Environmental tax			
	0	0.00 %	
	1	17.27 %	
	2	18.18 %	
	3	17.28 %	
	4	16.70 %	
	5	16.34 %	
	6	16.13 %	
	7	16.02 %	
	8	15.96 %	
	9	15.92 %	
	10	15.90 %	

Note: Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

Table 5.12.

Forecast Error Decomposition between FDI % of GDP and Energy Tax % of GDP – Estimation 2

Response Variable	Forecast Year / Period	Impulse Variables	
		FDI	Energy tax
FDI			
	0		0.00 %
	1		0.00 %
	2		4.51 %
	3		9.25 %
	4		12.27 %
	5		14.02 %
	6		15.08 %
	7		15.75 %
	8		16.20 %
	9		16.51 %
	10		16.72 %
Energy tax			
	0	0.00 %	
	1	25.90 %	
	2	24.14 %	
	3	23.52 %	
	4	23.24 %	
	5	23.06 %	
	6	22.97 %	
	7	22.91 %	
	8	22.87 %	
	9	22.84 %	
	10	22.82 %	

Note: Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

In Table 5.11 the findings from the variance decompositions reveal that, a one standard deviation shock to environmental taxes is responsible for no changes to aggregate FDI from the initial period 0 to 1st year. However, environmental taxes contribute to 0.16% of changes in aggregate FDI in the 2nd year and slightly increase to 0.89% in 5th year of the early period. While in the later period the contribution rate to the changes in FDI increase further to 1.42% in the 10th year. The continuous rise in the contribution rate of environmental taxes to the changes in FDI indicate that Multinationals investing in the EU countries are increasingly sensitive to stricter environmental policy. On the other hand, the variance decomposition results demonstrate that a one standard deviation shock to FDI contribute to 17.27% increase in the changes in environmental taxes in the 1st year, but the contribution rate decreases slightly to 16.34% in the 5th year of the early period and then decrease further to 15.90% in the 10th year of the latter period.

Similarly, in Table 5.12, the findings from the variance decomposition demonstrate that a one standard deviation shock to energy taxes contribute to no rate of change in aggregate FDI from 0 to 1st year. However, energy taxes contribution rate to the changes in FDI in the 2nd year is 4.51% and this is followed by huge increase in the rate to 14.0% in the 5th year of the early period. Also in the latter period, the contribution rate increases further to 16.72% in the 10th year. On the other hand, a one standard deviation shock to FDI contribute to 25.90% of the changes in energy taxes in the 1st year and then slightly decline to 23.06% in the 5th year of the early period. This is followed by further decline in the contribution rate to 22.82% in the 10th year of the later period.

In general, the results reveal that the contribution rate of environmental policy to the changes in FDI is smaller compared to the contribution rate of aggregate FDI to the changes in environmental policy. However, the contribution rate of EU environmental policy to the changes in aggregate FDI increase continuously over the 10 forecasted time. While the contribution rate of aggregate FDI to the changes in environmental policy decrease the 10 forecasted years. These results also support the earlier findings that the endogenous relationships exist between FDI and environmental policy.

5.5.6.2. *FEVDs results for GFDI, M&As and Environmental Policy using data from 2003 to 2019.*

Table 5.13.

Forecast Error Decomposition between GFDI % of GDP, M&As % of GDP, and Environmental Tax % of GDP – Estimation 3

Response Variable	Forecast Year / Period	Impulse Variables		
		GFDI	M&As	Environmental tax
GFDI				
	0			0.00 %
	1			0.00 %
	2			0.25 %
	3			0.24 %
	4			0.43 %
	5			0.55 %
	6			0.52 %
	7			0.58 %
	8			1.01 %
	9			1.80 %
	10			2.62 %
M&As				
	0			0.00 %
	1			0.00 %
	2			0.52 %
	3			1.60 %
	4			2.19 %
	5			2.34 %
	6			2.27 %
	7			2.25 %
	8			2.43 %
	9			2.75 %
	10			3.04 %
Environmental tax				
	0	0.00 %	0.00 %	
	1	13.27 %	13.64 %	
	2	16.79 %	12.54 %	
	3	15.33 %	11.14 %	
	4	13.42 %	9.73 %	
	5	12.08 %	8.74 %	
	6	11.41 %	8.14 %	
	7	11.09 %	7.72 %	
	8	10.78 %	7.31 %	
	9	10.35 %	6.89 %	
	10	9.88 %	6.54 %	

Note: Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

Table 5.14.

Forecast Error Decomposition between GFDI % of GDP, M&As % of GDP, and Energy Tax % of GDP – Estimation 4

Response Variable	Forecast Year / Period	Impulse Variables		
		GFDI	M&As	Energy tax
GFDI				
	0			0.00 %
	1			0.00 %
	2			1.21 %
	3			1.21 %
	4			1.08 %
	5			1.00 %
	6			1.06 %
	7			1.53 %
	8			2.59 %
	9			4.13 %
	10			5.82 %
M&As				
	0			0.00 %
	1			0.00 %
	2			1.15 %
	3			2.47 %
	4			3.23 %
	5			3.37 %
	6			3.27 %
	7			3.53 %
	8			3.89 %
	9			4.18 %
	10			
Energy tax				
	0	0.00 %	0.00 %	
	1	8.45 %	17.88 %	
	2	11.56 %	17.80 %	
	3	11.26 %	15.79 %	
	4	10.11 %	13.57 %	
	5	8.95 %	11.88 %	
	6	8.07 %	10.76 %	
	7	7.45 %	9.97 %	
	8	6.97 %	9.28 %	
	9	6.53 %	8.67 %	
	10	6.17 %	8.21 %	

Note: Additional controlled variables in the estimation include GDP per capita constant, Trade as % of GDP, Unemployment rate, financial freedom index, and Government integrity index.

According to Table 5.13 below, the variance decomposition results reveal that a one standard deviation shock to environmental taxes contribute to no changes in GFDI from 0 to 1st year. However, it contributes to the changes in GFDI by 0.25% in the 2nd year and then increase to 0.97% in the 5th year of the early period. In the latter period the contribution rate increases further to 1.06% in the 10th year. Hence, the general view from the results implies that the contribution rate of environmental taxes to the changes in GFDI continuously increase over the 10 forecasted years and implying multinationals become increasingly sensitivity to stricter EU environmental policy measures over longer periods when making GFDI location decisions. Likewise, in Table 5.14 the variance decomposition results demonstrate that a one standard deviation shock to energy taxes contribute to no changes in GFDI from 0 to 1st year. However, the contribution rate to the changes in GFDI increase to 1.21% in the 2nd year but decline to 1.00% in the 5th year of the early period. Yet in the latter period the contribution rate increase from 1.06% in the 6th year to 5.82% in the 10th year. Again, the general observation from the results imply that multinationals are increasingly sensitive to stricter environmental policy in EU countries when considering the region as investment location.

On the contrary in Table 5.13, a one standard deviation shock to GFDI is responsible for changes in environmental taxes by 13.27% in the 1st year and this increases to 16.79% in the 2nd year. However, the contribution rates in the changes in environmental taxes decline persistently to 12.08% in the 5th year of the early period and decline further to 9.88% in the 10th year. Similarly in Table 5.14, a one standard deviation shock to GFDI contributes to the changes in energy taxes by 8.45% in the 1st year and increase to 11.56% in the 2nd year. However, the contribution rates in the changes in energy taxes persistently decline to 8.95% in the 5th year of the early period and decline further to 6.17% in the 10th year of the latter period. These results explain that though policy makers of EU countries initially respond to the rise in GFDI with increasing strictness of environmental policy, this do not last longer but the strictness rather decline over most of the forecasted period.

Moreover, in Table 5.13, the variance decomposition results reveal that a one standard deviation shock to environmental taxes does not contribute to the changes in M&As from 0 to the 1st year. However, it contributes to 0.52% changes in M&As in the 2nd year and then the rate increase to 2.34% in the 5th year of the early period. In the latter period, the contribution rate in the changes in M&As persistently decrease from 2.27% in the 6th year to 2.25% in the 7th year and increase again from 2.43% in the 8th year to 3.04% in the 10th year. Generally, the results provide evidence of regular increase in the rates of change in M&As due to rise in environmental policy in the EU countries. Similarly in Table 5.14, the evidence from the variance decomposition demonstrates that a one standard deviation shock to energy taxes does not contribute to the changes in M&As from 0 to the 1st year. However, it contributes to the changes in M&As by 1.15% in the 2nd year and increase to 3.37% 5th year of the early period. Though in the latter year the contribution rate decline in the 6th year to 3.27%, there is evidence of persistent increase in the contribution rates after to 4.18%. Hence, generally implying that multinationals engaging M&As in the EU countries experience persistent increasing sensitivity to the strictness in environmental policy when making location decisions.

Also in Table 5.13, the variance decomposition results reveal that a one standard deviation shock to M&As contribute to 13.64% of the changes in environmental taxes in the 1st year but the rate decrease continuously in the remaining forecasted years to 8.74% in the 5th year of the early period. This is followed by a persistent decline in the contribution rate from 8.14% in the 6th year to 6.54% in the 10th year. Likewise in Table 5.14, the variance decomposition results reveal that a one standard deviation shock to M&As contribute to 17.88% of the changes in energy taxes in the 1st year but the rate decrease continuously in the remaining forecasted years to 11.88% in the 5th year of the early period. This is followed by a persistent decline in the contribution rate from 10.76% in the 6th year to 8.21% in the 10th year.

In summary, the evidence from these results also demonstrates that a change in both GFDI and M&As by one standard deviation point contribute higher rate of change in the environmental policy of the EU countries for the 10 forecasted years. While the change in environmental policy by one standard deviation point contribute lower rate of change in both GFDI and M&As for the 10 forecasted years comparatively. Also, the contribution rate of EU environmental policy to the changes in both GFDI and M&As increases over the 10 forecasted years. While the contribution rate of both GFDI and M&As to the changes in EU environmental policy is high at the early period and get lower at the latter period.

5.6. CONCLUSION AND RECOMMENDATIONS

This chapter extends the aim of this thesis which is to investigate the relationship between FDI into EU countries and the strict EU environmental policy. Also, it complements the findings in chapter 4 by offering additional results that suggest whether the relationship between the EU environmental policy and FDI align with either the pollution haven hypothesis, the pollution halo hypothesis and whether there is a reverse causality or endogenous pollution haven. The empirical models that have been adopted for this analysis include the PVAR GMM style estimation, Impulse response functions and the forecast errors variance decomposition.

5.6.1. Summary of Findings

Initial findings suggested unidirectional Granger causality from environmental policy to FDI. Whereas a bidirectional Granger causality is observed in the relationship between environmental policy of the EU and the two entry modes of FDI. Therefore, supporting evidence of endogenous pollution haven. The findings further suggest that the strict environmental policy of the EU discourage multinational companies from considering member countries when making investment location decisions. However, this decrease is much evident in investments in the form of GFDI for both the early period and the latter period after a change in the environmental policy. But the direct investment in the form of M&As increase in the early period and only decrease in the latter period. Therefore, the results supported pollution haven hypothesis when foreign investments enter in the form of GFDI for the entire forecasted period. While the results supported pollution halo hypothesis in the early period and pollution haven in the later period of the 10 forecasted years when direct investments are in the form of M&As. These are quite consistent with the findings realised in chapter 4 previously. It is also evident from the results that foreign investments into the EU influence or contribute to the rate of change in the environmental policy. This endogenous pollution haven effect is reported to be high at the early period but decrease over the 10 forecasted years. But the rate at which environmental policy influence or contribute to the changes in foreign investment increase over the 10 forecasted years. Lastly, the results suggest that the EU environmental policy becomes stricter due to increase in total FDI inflows. While the increase in both GFDI and M&As weakens the EU environmental policy at the early period before it becomes stricter in the latter period of the 10 forecasted years.

5.6.1. Policy Recommendations

The findings from this chapter of the thesis can be used as inference for European parliament or policy makers of member states to develop short and long-term goals to support the achievement of sustainable development. Moreover, this chapter recommends that the differences in the effects of EU environmental policy to the three different FDI variables adopted in this study and vice versa should be given much consideration when developing environmental policy. This will foster developing policies based on the type of direct investments the EU countries will want to attract.

For example, this chapter like the previous chapter has demonstrated that if the EU wants to attract direct investments in the form of GFDI then stricter environmental policy in the form of taxes may not be the only ideal option to attract investments and protect the environmental concurrently. However other options such as green technological incentives, promoting research and development, employing trading schemes, or offering easy access to cheap loans for acquiring advance environmentally efficient technologies may as well be considered alongside environmentally related taxes. This is because these other options may ease the financial pressure and rather encourage multinational companies to transition to advance environmentally friendly technologies. On the other hand, policy to increase environmentally related taxes may be encouraged if the EU countries have interest in increasing M&As in the future. However, it is important for policy makers to note that in the latter period even the M&As starts declining due to the increase in the environmentally related taxes.

Chapter 6

Entry Modes of FDI and Environmental Policy Nexus: the Moderation Effects on Population Health and Employment among EU Countries.

6.1. INTRODUCTION

This chapter examines the role of EU environmental policy as a moderating mechanism for population health and employment by regulating the operational activities of foreign investment firms in the form of GFDI and M&As. In recent years, enhancing population health has emerged as a significant societal priority, garnering the attention of scholars, environmental advocates, and government officials (Lopez et al. 2006, Patton et al. 2009; McMichael and Butler, 2011; Jaul and Barron, 2017; Doytch and Ashraf, 2022; Bayar et al. 2023). For instance, Vytenis (2019) contends that the EU's health policy emphasises the safeguarding and enhancement of health by ensuring equitable access to advanced and effective healthcare for all Europeans and orchestrating initiatives to tackle significant health threats affecting numerous EU countries.

Environmental policy serves as a useful mechanism for enforcing a large part of EU health policy by regulating pollutants, resource usage, and waste management that result from the operational activities of firms that are harmful to public health (Yu and Jin, 2022; Buse et al., 2023). Research has linked firms' polluting activities to numerous diseases and sicknesses (Wu et al. 1999; Jorgenson, 2009; Siddique and Kiani, 2020). For instance, studies like Tran et al. (2023) have shown that polluting activities in firms are associated with many respiratory diseases, like chronic obstructive pulmonary disease, which is caused by long-term exposure to air pollutants like fine particulate matter and carbon emissions. Environmental pollution from firms' polluting activities is also associated with conditions such as asthma, lung cancer, hypertension, children's developmental disorders, and skin diseases (Cortes-Ramirez et al. 2021; Ibrahim et al. 2022). The 2020 report from the European Environmental Agency (EEA) reveals that environmental pollution in the EU accounts for one out of every eight deaths. This has necessitated the EU countries continuously putting in place strict environmental interventions to regulate these polluting activities and ensure improved public health (Chen and Kan, 2008; Xia et al., 2017; Bai et al., 2020; Yuan and Zhang, 2020; European Environmental Agency, 2025; Shah, 2021). Some researchers strongly suggest that foreign investment firms or FDI, which may be in the form of GFDI or M&As, are typical of introducing polluting activities that have adverse effects on the host country’s environmental quality (Zhu et al. 2016; Cole et al. 2011; Pao and Tsai, 2011; Herzer and

Nunnenkamp, 2012; Nagel et al. 2015; Giammanco and Gitto 2019). Notwithstanding, previous research investigating the impact of FDI on population health has seen mixed results and inconsistencies. Some studies (Alam et al. 2016; Burns et al. 2017; Raza et al. 2021) suggest that FDI promotes the population health of host countries. On the other hand, some studies (Herzer and Nunnenkamp, 2012; Nagel et al., 2015; Giammanco and Gitto, 2019) argue that the health effects of FDI are detrimental.

While job creation remains one of the valuable benefits that FDI can introduce to stimulate the economic activities of host countries (Hale and Xu, 2016; Wang and Choi, 2021), The possibility of reducing this positive spillover due to strict environmental policy in the host country is also a concern for policymakers (Caves, 1974; Chang & Xu, 2008; Ayyagari and Kosová, 2010; Xiao and Park, 2018; Slesman et al., 2021). Some argue that environmental policy promotes employment in renewable energy and environmentally efficient companies but reduces employment in polluting companies (Evan and Bolotov, 2022). Others believe environmental policy could create employment shifts among different sectors, including the industry sector, agriculture sector, and service sector (UNCTAD, 1994; Jenkins, 2006). Job creation is declining in the sectors with the most polluting activities, while jobs are being created in sectors with little or no polluting activities. While some argue that strict environmental policies might hinder employment in polluting industries, others point out that weak or non-existent policies can lead to a decline in public health.

To the best of the author's knowledge, despite the ongoing research on the relationship between FDI and population health, as well as FDI and employment rates, the role of environmental policy measures has not been addressed in existing literature. Such research may provide useful insight on how the environmental policy of the EU moderates the effect of FDI on public health quality and employment rates. As a result, this can help EU countries' environmental policymakers set the right level of strictness for their goals, which could be to improve public health or create jobs by controlling the activities of multinational investors. Therefore, drawing on the institutional-based theory of FDI discussed in chapter 3, subsection 3.3.4 of this thesis, and following studies like Xiao and Park (2018) and Slesman et al. (2021). This chapter of the thesis empirically examines whether the effect of FDI on health and employment rates in host countries depends on the role of local institutions, which are represented by environmental policy in the form of environmental taxes. This chapter will further complement existing literature on FDI spillover effects, which is part of the underlined objective.

6.1.1. Contribution to Existing Literature.

To contribute to literature, this chapter employs all two population health indicators usually utilised in existing literature. These include infant mortality rate and the life expectancy at birth, expressed in total years (Herzer and Nunnenkamp, 2012; Nagel et al., 2015; Giammanco and Gitto 2019). Furthermore, four employment variables which are total employment to population ratio, employment in agriculture, employment in industry, and employment in services are all adopted as dependent variables. The goal is to ensure that the moderation role is thoroughly examined in the effects on the population health and employment. This is to generate extensive insights that can add to the information toolkit of EU policy makers in ways that assist them to device practical and realistic policies to promote the positive spill overs or minimise the negative spill overs that accompany FDI activities in the EU countries.

In addition, the 28 member countries of the EU are categorised into two separate groupings to account for their heterogenous difference in terms of economic development and period of accession. The initial group includes 15 countries that joined the union latest by 1995, while the subsequent group consists of 13 countries that entered the union between 2004 and 2013. In chapter 2 subsection 2.3.3, it is clearly observed that the 15 member countries that entered the union latest by 1995 are economically advance compared to the 13 EU countries that joined latter. Therefore, the analysis of the moderation effect is separately conducted for these two groups and the findings are compared by considering differences or similarities. Moreover, this chapter employs the Feasible Generalised Least Squares model (FGLS) that can deal with cross-sectional dependence, autocorrelation, and heteroskedasticity in panel data (Hausman and Kuersteiner, 2008; Miller and Startz, 2019; Bai et al., 2021; Mumuni and Mwimba, 2023). The model is particularly appropriate for panels with minimal cross-sectional dimensions and larger timeframes, making it an optimal selection for the panel data employed in this investigation.

The subsequent sections of this chapter are structured as follows: Section 6.2 will present a theoretical emphasis and a literature review that underpin the empirical analysis. Section 6.3 provides the definitions of the data variables used in this investigation. Section 6.4 also explain the empirical methodology employed to derive the findings. Section 6.5 discusses the results derived from the empirical estimations. Section 6.6 concludes the chapter by describing the findings and proposing policy suggestions.

6.2. THEORETICAL EMPHASIS AND LITERATURE REVIEW

6.2.1. FDI and Population Health Literature.

Over several decades, the empirical literature on FDI have largely focused on its connection with economic development or environmental degradation (Immurana, 2022). Examples of the studies on the link between FDI and the economy include Alfaro et al. (2004), Chakraborty and Nunnenkamp (2008), Har et al. (2008), Wang (2009), Herzer (2010), Bashir et al. (2014), Popescu (2014), Nistor (2015), Pegkas (2015), Siddique et al. (2017), Chaudhury et al. (2020), Adedoyin et al. (2020), Yimer (2023), and Rao et al. (2023). Others that have focused on the link between FDI and environmental degradation which include papers like Cole et al. (2006), Zhang and Fu (2008), Neequaye and Oladi (2015), Doytch and Uctum (2016), Zheng and Sheng (2017), Sabir et al. (2020), Demena and Afesorgbor (2020), Adeel-Farooq et al. (2021), Dornean et al. (2021), Fahad et al. (2022), and Rahman et al. (2023).

However, it is only recently that researchers have giving attention to the link between FDI and population health (Herzer and Nunnenkamp, 2012; Nagel et al. 2015). Most of these empirical studies have largely relied on the aggregate FDI variable and giving almost no attention to the inherent heterogeneity that exist because of the two different modes of entry (Loayza et al. 2004; Raza et al. 2020a). Despite this, the link between aggregate FDI and population health remains inconclusive which is often due to the variable chosen as a proxy for population health and the country or region being studied (Jorgenson, 2009a; 2009b). The two often adopted population health proxies are life expectancy of adult's years or infant mortality rate. For example, the study of Jorgenson (2009a; 2009b), finds that FDI in the textile industry resulted in pollution that led to increase in infant mortality rate. While Herzer and Nunnenkamp (2012) finds that for their sample of 14 developed economies FDI significantly causes decline to life expectancy adopted as population health proxy. The possible rationale behind the results is that FDI is capable of exerting pressure on skilled-labour wages given that foreign companies are characterized with being highly labour intensive compared to local businesses (Chiappini et al. 2022). The repercussions for that are increasing levels of income inequalities between skilled labours and unskilled labours within the host economy with obvious impact on self-assessed health care (Karlsson et al. 2010; Chiappini et al. 2022). Nagel et al. (2015) also extended the investigation on the effects of FDI on population health by using a panel data for 179 countries and adopted both life expectancy and infant mortality rate as proxies for population health. Unlike Herzer and Nunnenkamp (2012) which did not utilize any controlled variable in their model specification, Nagel et al. (2015) controlled for population growth, secondary school enrolment and GDP per capita in the panel fixed effect model estimation adopted. The findings from Nagel et al. (2015) shows that in high income economies FDI undermine population health whereas in low-income economies FDI improve population health. Yet for the mixed sample of both developed and developing countries Nagel et al. (2015) finds FDI to reduce infant mortality rate whereas life expectancy of adult years increases with increasing amount of FDI. They argue that FDI can have positive effects on population health through increased wages or income, rise in demand for heath related goods and services and encouraging increasing supply of these goods and services.

Alam et al. (2016) also considered Pakistan and explored the impact of FDI on the life expectancy of the country. They controlled for trade openness and national health quality while utilising autoregressive distributed lag (ARDL) model. The results evidence that the positive effects FDI have on population health occurs only in the long run. In another study, Burns et al. (2017) used 85 low- and middle-income countries and employed instrumental variable (IV) fixed effect estimator. Also, the study decomposed mortality rate and life expectancy into different ages while controlling for GDP per capita, urban population, and years of schooling. The results showed that FDI enhances population health of the low- and middle-income countries by increasing life expectancy and reducing adult mortality. Yet, the results did not provide any significant effect of FDI on infant mortality. Golkhandan (2017) also finds that FDI significantly decrease in infant mortality rate using a panel of 25 developing countries. A study of 45 African countries by Immurana (2020) also produced results that FDI have significant positive effects on life expectancy while exerting negative effects on mortality rate. Likewise, Salahuddin et al (2020) also finds that FDI decreases the infant mortality rates in South Africa. Again, Immurana (2022) investigated the effects of FDI inflows on life expectancy and death rate in Ghana. While, controlling for endogeneity issues and the results indicated that FDI improves population health by reducing death rate and increasing life expectancy. This shows that increasing FDI inflows can serve as useful mechanism for enhancing population health in Ghana. The recent studies of Chiappini et al. (2022) also utilised a panel data for 143 countries to examine the effect of FDI on population health. They adopted a variable that combines both life expectancy and mortality rate to be a measure for population health. The findings from the instrumental variable approach which account for endogeneity revealed a positive effect of FDI on population health for the overall sample. However, the results for sub samples showed that FDI is negatively associated with population health among the sample of developed economies but positively associated with the population health for the sample of developing countries.

Only a handful of studies have gone beyond the aggregate FDI to examine the link between the GFDI and population health. The existing studies include Raza et al. (2020a; 2020b), and Raza et al. (2021). Raza et al. (2020a) examined the impact of GFDI on the health of Middle East and North African countries. Their finding showed that GFDI promote the health of these countries. Moreover, Raza et al. (2020b) also investigated the effects of GFDI on the life expectancy rate of Pakistan. The Auto Distributive Lag model (ARDL) and the Error Correction Model (ECM) results revealed that in the long-run GFDI significantly promote population health by increasing life expectancy in Pakistan. Similar finding was realised in the study of Raza et al. (2021) that used a panel of 10 developing countries and a Pooled Mean Group (PMG) estimation model to assess the effects of GFDI on population health. Their findings also revealed a significant improvement in the population health of these developing countries in the long run.

In summary, the existing literature show that FDI promotes population health in developing countries by reducing infant mortality rate while increasing life expectancy of adults' years. However, in developed countries FDI have adverse effects on population health by increasing infant mortality rate and promoting life expectancy of adults' years. Therefore, the following hypothesis is stated to be tested.

Hypothesis 1: Increase in direct investments have adverse effects on the population health of developed countries.

6.2.2. FDI and Employment Literature

Direct investments of MNCs are known to be significant factor that tremendously changes the domestic employment levels of host countries and so have become very important economic topic to economist and policy makers (Hale and Xu, 2016; Wang and Choi, 2021). However, the findings from existing literature on FDI and employment remain inconclusive (Evan and Bolotov, 2022). For instance, UNCTAD (1994) and Jenkins (2006) argue that the possible effects of FDI inflows could be direct or indirect, and positive or negative. Also, these effects can vary based on location of employment, quality of employment, and quantity of employment. The positive employment location effect of FDI inflows is where additional jobs which can be better is created in areas with high unemployment.

Country specific studies like Nyen and Tang (2011) finds that the aggregate FDI inflows to Singapore significantly increases the domestic employment of the country's industry and service sectors. Also, FDI inflows exert long-run increase on Singapore's employment in the industry sector. But the findings of Saucedo et al. (2020) suggested that FDI inflows to Mexico only increased the domestic employment in industry sector but has no significant impact on the service sector. Moreover, Nyen and Tang (2011) argue that the increased in the domestic employment in industry sector by FDI inflows can be attributed to the complementing factor of the service sector employment to the industry sector employment.

Mishra and Palit (2020) also argued that FDI have high tendency of providing several job opportunities in the service sector compared to the industry sector and agricultural sector. This is in line with the study of Rozen-Bakher (2017) that examined whether FDI is a factor in accelerating employment shifts from industry sector to the services sector. The conclusive statement by Rozen-Bakher (2017) based on empirical findings is that FDI is the results of employment shifts from industry sector to the service sector. The rational is credited to employment opportunities from FDI usually benefiting the skilled labour within the host country. Despite this, Mishra and Palit (2020) also suggest that the link between FDI and employment can be complex because FDI may not necessarily be the major factor for the increase in employment levels in the host economies. Notwithstanding, they did not disqualify the role of FDI as an important factor in the increase in employment in host economies. This is very important because the increase in employment in an economy is directly associated with economic growth of the host country and can lead to improved standard of living of the people in the country (Mishra and Palit, 2020).

To add to the findings of Rozen-Bakher (2017), the study of Wang and Choi (2021) also finds that FDI promote the total level of domestic employment of highly developed 26 OECD countries. Thereby indicating that FDI is a significant factor for the persistent increase realised in the highly skilled employment opportunities and some increase in low skilled employment opportunities. Meanwhile, Jude and Silaghi (2016) find that the initial impact of FDI inflows on the domestic employment of 20 EU countries is negative but later become significantly positive in the long run. Likewise, Schmerer (2014) find that FDI inflows significantly decrease the employment of 19 OECD countries. But the study of Marelli et al. (2014) divided the EU countries into four dummy variables to control for similar labour market features and institutions. The findings suggested that though the total positive indirect effect of FDI on domestic employment is small, the effect is very significant. Uddin and Chowdhury (2020) also understudied the impact of FDI on the employment levels of Bangladesh using Vector Error Correction Model (VECM). Their findings revealed that

FDI inflows to Bangladesh significantly increases employment levels in the long run. They also concluded by suggesting to government to encourage GFDI which can offer more increase in employment levels. Moreover, Jenkins (2006) asserts that FDI in the form of GFDI have direct potential to positively impact employment levels especially in labour intensive industries. Yet, when FDI mode of entry is M&As then it could lead to direct negative impact on employment due to possible job rationalisation or job loses or retrenchment (Brincikova and Darmo, 2014). The next subsections provide insight into existing literature for the two modes of entry.

6.2.2.1. *Linkages of Cross Border M&As and Employment*

Earliest studies like Brown and Medoff (1988), Bhagat et al. (1990), and Lichtenberg and Siegel (1990) produced results that support significant decline in employment in the USA due to increase in M&As. On the contrary, positive effects of M&As to domestic employment in the USA have been reported in studies like McGuckin and Nguyen (2002), and Ollinger et al. (2005). A typical reason leading to differences in the findings can be attributed to state specific sample of companies adopted for their studies. Like in the study of Brown and Medoff (1988) they used companies that are situated in Michigan state for their analysis.

Also, mixed findings have been reported for studies that have focussed on European countries. Using a sample of data for 277 listed companies Conyon et al. (2001, 2002) produced results that supported decreasing effects of cross border M&As on employment levels in the UK. These negative effects were found to be predominant in transactions that were classified to be hostile. Similarly, Girma and Gorg (2004) adopted data for companies in the electronic industry of UK. They discovered reduction in employment growth in the UK due to M&As and the effect is much pronounced for jobs that require unskilled labour. Additionally, Girma (2005) also finding M&As to decrease employment levels when there are larger foreign takeovers in the UK. However, they noticed that in smaller foreign take-overs the employment effects of M&As can be positive in the UK. The disparity may arise from larger multinational companies engaged in significant takeovers, which typically possess highly skilled management and advanced technologies necessitating new, highly skilled personnel. In contrast, the domestic firm being acquired often lacks this level of expertise among its existing employees. So, laying off low skilled employees becomes a necessity for the multinational to operate. But in smaller cross border M&As, less skilled employees could be retained and others employed but significant operational changes may not be required. In France, Margolis (2006) also finds that M&As decline employment rate in the short run. Lehto and Böckerman (2008) use data for Finland's M&As for all sectors to analyse the effects on domestic employment. Their finding revealed that cross border M&As lead to downsizing of employment in the manufacturing or industry sector, but the effect is very feeble in other sectors. Seigel et al. (2009) conducted research using data from Swedish manufacturing plants and found that M&As negatively impact employment while enhancing productivity and efficiency in acquired domestic manufacturing facilities.

Aside the above studies that found negative effects of M&As on employment, some studies also found positive effects. Studies like Piscitello and Rabbiosi (2005) report positive effect of M&As on employment levels in Italy after few years of foreign acquisition. They also used firm level data for their analysis. Bandick and Karpaty (2011) also investigated the employment effects in Swedish Manufacturing, but their findings contradicted earlier finds of Seigel et al. (2009). Bandick and Karpaty (2011) results showed positive effects of M&As in employment, particularly in highly skilled labour. Oldford and Otchere (2016) also found cross border M&As in Canada to reduce unemployment rate, reallocate labour, increase labour wages and promote higher labour productivity. From the above existing literature, the following hypothesis is stated.

Hypothesis 2: M&As reduce total employment in developed countries. Also, the reducing effect is largely felt in the employment in industry while the employment in sectors like agriculture and service may increase or become insignificant.

6.2.2.2. *Linkages of Greenfield FDI and employment*

Despite several studies investigating the role of GFDI in the economic development such as Loayza et al. (2004), Nanda (2009), Wang and Sunn (2009), Bayar (2017), Gopalan et al. (2018), Harms and Méon (2018), Nguyen et al. (2021), Raza et al. (2021), Ashraf et al. (2021), Kwilinski et al. (2023), Aziz et al. (2023), and so on. Yet very few studies have considered the relationship between GFDI and employment. Among the few, Amoroso and Moncada-釜Paternò-Castello (2018) conducted empirical studies to investigate the impact of GFDI on the patterns of job polarisation while comparing USA and European countries. Their results indicated that when GFDI are low skilled investments they shift high skilled employment opportunities down to medium or low skilled jobs. While a high skilled GFDI improve low skilled jobs to an upgraded level. In other words, the changes in the labour market when taking to account skills of potential employees are determined by the type of GFDI investments taking place. Specifically, their findings evidence job polarisation in both USA and European countries.

Also, Lee and Park (2020) utilised a panel of 1328 South Korean multinational companies to empirically examine the effects of these companies on the country's domestic employment levels. Their finds suggest that GFDI inflows to South Korea positively and significantly impact domestic employment levels in the industry sector or firms that undertake primary and manufacturing activities. Further observation from the results indicated that there is larger increase in employment when the source of country of the multinationals involved in the GFDI are highly developed economies. Koczan et al. (2021) also investigated how the GFDI inflows to the European Bank for Reconstruction and Development (EBRD) region has impacted employment generation. Their results show that increase in jobs creation is evident due to GFDI, however there have been decline in labour intensive jobs over the period from recent GFDI projects. While understudying Ghana, Assamah and Yuan (2024) examined the impact of GFDI on job creation using data for 386 multinational companies operating in the country. Their OLS findings report that GFDI significantly increased employment levels in the African country. Basically, the increase in employment is observed in the industry sector that engages in consumer products, food and beverage, industrial equipment, and non-automative transport for original equipment manufacturer. From the above existing literature, the following hypothesis is stated.

Hypothesis 3: GFDI promote employment levels in host countries irrespective of the economic size. Also, the increase in employment levels is strongly felt in the employment in industry but employment in agriculture and in service could be insignificant or negative.

6.2.3. Moderation Role of Environmental Policy on FDI Spillover Effects in the EU

The influx of FDI into the EU countries is widely regarded as an important channel for restructuring state-owned enterprises, fostering competition in the investment market, receiving significant capital inflows, modern technology, and managerial knowledge across country boundaries (MedveBálint, 2014; Crescenzi et al., 2021). FDI is perceived as a prerequisite for further economic development in several EU countries without sufficient domestic reserves (Nicolini and Resmini, 2010; MedveBálint, 2014; Makhavikova, 2018; Burrell and Hopkins, 2019; Chopin and Lequesne, 2021). However, the EU advocates and enforce strict environmental policy as government or institutional control mechanism to regulate the negative spillover from

FDI inflows due to production activities that are deleterious to the environment of member countries (Bickenbach and Liu, 2018; Doytch and Ashraf, 2022). This stringent environmental policy is among the integrated regulatory policies shared commonly among the EU countries and are vehemently enforced across Member States. This has earned the union an international reputation as being environmental protectionist bloc (Burns et al. 2020). Davies and Mazumder (2003) assert that governments and international institutions are crucial to good management of environmental resources and consequently improving the health conditions of their citizens. Landrigan and Goldman (2011) adds to Davies and Mazumder (2003) assertion by arguing that children are more vulnerable to the toxic chemical waste from industrial activities and government environmental policy serves as the useful mechanism for dealing with the magnitude of the impact to health. Both chapter 4 and 5 of this thesis have provided evidence that indicate that the EU environmental policy exerts significant influence on direct investment inflows into member countries. The evidence further show that the influence of the EU's environmental policy demonstrates deterring effects on GFDI, while it demonstrates increasing effects on M&As. These findings are supported by studies like Abdo et al. (2020), Ge et al. (2020), Bekun et al. (2021), Becker and Henderson (2000), Greenstone (2002), List et al. (2003), Fredriksson et al. (2003), Zhang and Fu (2008), Yang et al. (2018) and Ge et al. (2020). The negative effect is also due to GFDI's high likelihood to degrade the environment as suggested by studies like Ashraf et al. (2021), and Doytch and Ashraf (2022). While M&As constitute direct investments that are environmentally friendly. Therefore, this study expects negative effects of GFDI on life expectancy while expecting positive effects on infant mortality rate but the vice versa is expected for M&As. That is, increase in GFDI will lead to a significant increase in infant mortality rate and significantly decrease life expectancy, whereas increase in M&As will favourably promote life expectancy and decrease infant mortality.

Since this study is primarily set to examine the moderation effect of FDI modes of entry and environmental policy on population health and employment. It is further expected that environmental policy variable will significantly moderate the possible negative impacts of GFDI to promote population health within the countries. Also, it is expected that the moderating effect of environmental policy on GFDI will result in decreasing levels of total employment rate and employment in industry while increasing employment levels in agriculture and the service sector. The rationale is based on the evidence that environmental policy deters MNC's from choosing to locate in the EU countries via GFDI whose activities endangers the environment. Hence, jobs that could have been generated from GFDI will move to countries or regions that adopt less stringent environmental policy compared to the EU countries. Contrary, it is expected that environmental policy variable will significantly moderate the potential impacts of M&As to promote both population health and employment within the countries. It is further anticipated in this chapter that; the EU environmental policy variable will exert significant direct decrease in infant mortality rate while directly increasing life expectancy significantly. The rationale is that environmental taxes serve as tools to discourage environmental pollution and consequently enhancing population health. But due to its ability to deter investments from polluting industries, environmental policy is expected to exert decreasing effects on employment.

Therefore, the following hypothesis is stated to test whether the effects of the two FDI modes of entry on population health and employment rates are contingent on the moderating role of EU environmental policy.

Hypothesis 4: Environmental policy directly promotes population health and decrease employment rates in developed countries.

Hypothesis 5: The effects of GFDI on both population health and employment rates are contingent on the moderating role of EU environmental policy. Also, the moderation effect of the environmental policy ensures that GFDI promote population health but then reduce the employment opportunities from GFDI.

Hypothesis 6: The effects of M&As on both population health and employment rates are contingent on the moderating role of EU environmental policy. Also, the moderation effect of the environmental policy ensures that M&As promote population health and increase the employment opportunities from M&As.

6.3. EMPIRICAL DATA

This study uses a balanced annual macroeconomic panel data from the period of 2003 to 2019 for the 28 EU countries which existed before 2020. The study chooses the time span based on maximum data availability. Specifically, GFDI which is a variable of interest had limited data availability and this led to the use of fewer periodic data than would have wanted. Notwithstanding, the data is still suitable and sufficient to produce robust empirical results for the desired analysis. Also, the 28 member states of the EU are classified into two distinct groups based on the accession period. The first group consists of 15 countries that became part of the union latest by 1995, while the second group comprises 13 countries that joined the union between 2004 and 2013. A comprehensive analysis of the distinct attributes of these two cohorts have been extensively examined in chapter 2, specifically in section 2.3.

6.3.1. Dependent Variables

The dependent variables adopted for this study are six variables; they are four employment variables and two population health variables of the EU countries. The four employment variables include the total employment to population ratio, employment in agriculture as a percentage of total employment, employment in industry as a percentage of total employment, and employment in service as a percentage of total employment. Moffitt et al. (2012) and Abraham and Kearney (2020) are among the many literatures that commend total employment to population ratio as the employment proxy that best reflect labour force participation rate and serves as a common measure of labour supply. However, to understand the cyclical changes in the labour market then unemployment rate would have been a useful proxy but in the aspect of trends in the labour market and estimating quantity of labour supply then employment as a ratio of total population is the best indicator (Moffitt et al., 2012). Since, the purpose of this study is not about examining the changes in the employment cycles but rather investigating the changes in employment rates it makes the use of employment as a ratio of population useful employment proxy for this study. Moreover, it helps to elucidate the structural shift in employment rates across the agriculture, industry and service sector due to the moderating effect of environmental policy on GFDI and M&As. These variables are all collected from World Bank-WDI database (2023).

Also, the two population health variables chosen as proxies include life expectancy at birth measured in total years, and infant mortality rate. These variables are also sourced from the World Bank database (2023). The World Bank–WDI database (2023) define life expectancy at birth to be the measure in total years as simply the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Also, infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births each year (World Bank–WDI database, 2023). These two proxies have been widely used in population health literatures and some of those studies include Golkhandan (2017), Immurana (2021), Ma et al., (2022); Chiappini et al., (2022), Zhang et al., (2023), Nguegang (2023), Immurana et al., (2023).

6.3.2. Independent Variables of Interest

The independent variables of interest include GFDI as a percentage of GDP, M&As as a percentage of GDP, environmental taxes as a percentage of GDP, GDP per capita in constant US dollars, trade as a percentage of GDP, and population growth rate. The GFDI and M&As data are collected from UNCTAD database (2022) and are scaled using GDP in current US dollars which is collected from WDI (2022). The environmental policy variable that represents the institutional factor adopted for this empirical chapter is the total environmental taxes as % of GDP used in previous chapters. This variable is collected from OECD Database (2023).

6.3.3. Control Variables

Moreover, the three control variables adopted and included in the model estimations as dependent variables are selected while considering existing literature. These variables are all sourced from WDI database (2023) and they include GDP per capita in constant US dollars, Trade as a percentage of GDP and Population growth (Owen and Wu, 2007; Nagel, 2015; Burns et al., 2017; Herzer, 2017; Chiappini et al., 2022; Yildirim et al., 2022; Khan et al., 2023). GDP per capita is defined by WDI (2023) as gross domestic product divided by midyear population. GDP is also the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The data are in constant 2010 U.S. dollars. Evidence from existing literature such as Owen and Wu (2007), Nagel (2015), Burns et al., (2017), Herzer (2017) and Chiappini et al., (2022) claim that population health of a country increases with increasing national economy. In other words, improved economy of a country will lead to increase in both public and private health expenditure in critical areas like improved infrastructure for sanitation and health. Therefore, this study anticipates that GDP per capita will lead to decrease in infant mortality rate while improving life expectancy. Also, studies like Yildirim et al. (2022) and Khan et al. (2023) find GDP per capita of a sound economy to have significant positive effects on employment levels and opportunities in a country. Therefore, this study expects positive effects of GDP per capita on the employment variables because the EU countries generally are advance economies.

Trade is also the sum of exports and imports of goods and services measured as a share of gross domestic product (WDI, 2021). Most existing literature suggest that the population health of a country can benefit from trade through the latter's ability to promote economic growth, and import of medical supplies, drugs, or vaccines (Levine and Rothman, 2006; Alam et al., 2016; Byaro et al., 2021). For instance, increase trade can promote income growth which implies that households can afford quality health care, nutritious meal, clean water and achieve higher standard of living. Technology and innovation transfer of advance pharmaceutical research development can be realised through trade to improve medical treatments (Xu and Wang, 2000; Owen and Wu, 2007; Smith et al., 2009; Stevens et al., 2013; Novignon et al., 2018). To this end, this chapter expects trade to increase life expectancy and decrease infant mortality. Also, trade is expected to increase total employment as studies like Newfarmer and Sztajerowska (2012) and Li and Whalley (2021) suggest.

Annual population growth rate as defined by WDI (2024) for year t is the exponential rate of growth of midyear population from year t(-1) to t, expressed as a percentage. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. Barman and Talukdar (2014) and Fabella (2008) are among literature that suggest that rise in population growth decreases infant mortality, while Popoola (2018) suggest positive effects of population growth on life expectancy. Therefore, this chapter also expects similar effects of population growth on infant mortality and life expectancy. Lastly, population growth is included as controlled variable due to studies like Abraham and Kearney (2020) and Maestas et al., (2023).

6.3.4. Descriptive Statistics of the Data

Table 6.1.
Descriptive Statistics for Variables of 15 EU Countries Joining Latest by 1995.

Variable	Designated	Obs.	Mean	Std. Dev.	Min	Max
Life Expectancy at Birth	Lex	255	80.717	1.367	77.144	83.832
Infant Mortality Rate	IMR	255	3.362	0.66	1.900	5.300
Employment Total % Total Population	ETot	255	54.075	5.716	37.72	63.359
Employment in Agric % Total Employment	EAgric	255	4.12	3.184	.682	15.032
Employment in Industry % Total Employment	EIndus	255	22.368	4.666	10.763	32.661
Employment in Service % Total Employment	Eserv	255	73.512	6.056	54.366	88.506
GFDI % GDP	GFDI	255	0.927	0.778	0.078	5.576
M&As % GDP	M&As	255	2.041	5.899	-6.284	81.041
Environmental Tax % GDP	EnvTaxGDP	255	2.616	0.667	1.410	4.990
GDP per capita constant	GDPpccons	255	47050.099	19194.604	21256.76	111968.35
Trade % GDP	TradeGDP	255	106.264	68.792	45.419	380.104
Population Growth rate	PopGrowth	255	0.574	0.648	-1.854	2.891

Table 6.2.
Descriptive Statistics for Variables of 13 EU Countries Joining from 2004 to 2013.

Variable	Designated	Obs.	Mean	Std. Dev.	Min	Max
Life Expectancy at Birth	Lex	221	76.206	2.88	70.866	82.859
Infant Mortality Rate	IMR	221	5.328	2.647	1.800	16.900
Employment Total % Total Population	ETot	221	51.886	4.476	42.07	61.866
Employment in Agric % Total Employment	EAgric	221	8.446	7.078	.996	37.684
Employment in Industry % Total Employment	EIndus	221	29.96	5.426	16.225	40.526
Employment in Service % Total Employment	Eserv	221	61.594	8.811	33.181	81.173
GFDI % GDP	GFDI	221	3.913	4.597	0.071	44.848
M&As % GDP	M&As	221	0.708	1.638	-1.84	14.448
Environmental Tax % GDP	EnvTaxGDP	221	2.671	0.509	1.630	3.920
GDP per capita constant	GDPpccons	221	16529.047	6523.884	4842.886	32725.634
Trade % GDP	TradeGDP	221	133.76	52.159	56.180	322.676
Population Growth rate	PopGrowth	221	-0.090	0.877	-2.259	3.931

Tables 6.1 and 6.2 present the descriptive statistics of the two panels adopted for this study. All the values for the data are untransformed. Comparing the values in Table 6.1 which constitute the panel of 15 EU countries with Table 6.2 which is a panel of 13 EU countries, it is noticed that the average life expectancy at birth for the 15 EU countries joining latest by 1995 is around 80.72 years. This is higher than that of the 13 EU countries joining from 2004 to 2013 whose value is 76.21 years. The standard deviation from the two tables also reveals that the life expectancy at birth for the 15 EU countries are spread closer to the mean compared to that of the 13 EU countries. In other words, life expectancy at birth is observed to be higher among the 15 EU countries compared to the other 13 EU countries. Moreover, the average infant mortality rate in the 15 countries is 3.36% which is better compared to 5.32% for the 13 EU countries. Concerning the

employment rates, the mean rate of employment total as a percentage of the total population for the 15 EU countries is high at 54.075% compared to 51.886% for the other 13 EU countries. Based on sectoral distributions of employment, the panel of 15 countries and the panel of 13 EU countries their means indicate that countries in both panels have higher proportion of their employment in the service sector then followed by the industry sector and the least is agricultural sector. However, the 13 EU countries have higher means for both the percentage of employment in Agriculture and industry compared to the that of the 15 EU countries. But for employment in the service sector the mean of the 15 EU countries is higher compared to the mean of the other 13 EU countries. In other words, employment in the service sector is larger among the 15 EU countries compared to the service sector employment in the other 13 EU countries.

Furthermore, the mean of the GFDI as a percentage of GDP for the 15 EU countries is quite low compared to that of the 13 EU countries. Implying that the economy of the countries within the panel of 13 EU countries are largely driven by GFDI compared to that of the panel of 15 EU countries. Despite this, the average environmental taxes as a percentage of GDP and energy taxes as a percentage of GDP of the 15 EU countries are slightly lower than that of the 13 EU countries. In addition, minimum value of the GDP per capita for the panel of the 15 EU countries is \$21,256.76 which is higher than the maximum value of the GDP per capita of the 13 EU countries which is \$16,529.05. This shows that the economy of the panel of 15 EU countries reported in Table 6.1 is larger and more advance compared to the economy of the other 13 EU countries reported in Table 6.2.

6.4. EMPIRICAL METHODOLOGY

The presence of heteroskedasticity, cross-sectional and serial correlations in a model are critically problematic to error terms generated by the panel and therefore resulting to incorrect results (Petersen, 2008; Wooldridge, 2010). Most researcher have often adopted the ordinary least squares for this exercise but not without the use of robust standard errors to correct for heteroskedasticity and correlations (White, H., 1980; Newey and West, 1986; Liang and Zeger, 1986; Arellano, 1987; Driscoll and Kraay 1998; Hansen, 2007; Vogelsang, 2012; Petersen, 2008; Wooldridge, 2010; Cameron and Miller, 2015; Bai et al. 2020). However, Bai et al. (2021) after examining the efficiency of the feasible generalised least squares method acknowledge its superiority compared to ordinary least squares when dealing with issues of heteroskedasticity, serial and cross-sectional correlations. This study therefore uses the feasible generalised least squares method (FGLS) which is a Contemporaneous correlation model that imply that the equations are interconnected and cannot be independently approximated (Islam et al., 2021; Adeleye et al., 2023). In other words, there is interdependence among the individual units observed in a panel dataset and lack of independence among errors across sectional units, indicating the evidence of correlations in the panel. The FGLS model is also suitable for generating results for the long run and it is also appropriate for panels with a smaller cross-sectional dimension in comparison to the time dimension (Adeleye et al., 2023). Furthermore, it proves to be quite advantageous in cases where there is clear cross-sectional dependence in the panel data.

The initial baseline multivariate linear model estimated to test the hypothesis is as follows (Wooldridge, 2010).

$$Y_{it} = \alpha_{it} + \beta_1 GFDI_{it-1} + \beta_2 EnvTax_{it-1} + \beta_3 GFDI * EnvTax_{it-1} + \beta_4 \log GDPpccons_{it-1} + \beta_5 \log Trade_{it-1} + \beta_6 logTotPop_{it-1} + v_t + u_i + \varepsilon_{it} \quad \text{...eqtn.6.1}$$

$$Y_{it} = \alpha_{it} + \beta_1 M\&As_{it-1} + \beta_2 EnvTax_{it-1} + \beta_3 M\&As * EnvTax_{it-1} + \beta_4 \log GDPpccons_{it-1} + \beta_5 \log Trade_{it-1} + \beta_6 logTotPop_{it-1} + v_t + u_i + \varepsilon_{it} \quad \text{...eqtn.6.2}$$

Therefore:

the marginal moderated effect of GFDI is $\frac{\Delta Y_{it}}{\Delta GFDI_{it-1}} = \beta_1 + \beta_3 EnvTax_{it-1}$ … eqtn.6.3

and the marginal moderated effect of M&As is $\frac{\Delta Y_{it}}{\Delta M\&As_{it-1}} = \beta_1 + \beta_3 EnvTax_{it-1}$ … eqtn.6.4

Where Y_{it} represents the dependent variables which include Lex, IMR, ETot, EAgric, EIndus, and Eserv at i cross-section in time t. While $\beta_{1,2,..,n}$ represent the coefficient of the independent variables. In eqtn.6.1 β_3 is the coefficient of the interaction between GFDI and environmental taxes whereas in eqtn.6.2 β_3 is the coefficient of the interaction between M&As and environmental taxes. The interaction terms are the main variables of interest in this study and a significant β_3 at 1% to 10% levels indicate that the effect of the GFDI and M&As is contingent on the effect of environmental taxes of the EU countries. Also, v_t and u_i are the time specific effects and the cross-sectional fixed effects in the panel data set. The fixed effects variables are included because of the shared policies, integration, geographic location, and the similarities in experience over time among EU member countries. Also, the error term in the model is ε_{it}. Based on the empirical estimations each of the six dependent variables will have four estimated FGLS results.

Lastly, the results for equation 6.1 and 6.2 are robustly estimated by considering issues of endogeneity in the model using the first lags of all independent variables. It is argued by Byaro et al. (2021) that evidence of endogeneity may exist between trade openness and GDP per capita, and a possible reverse causality between trade openness and the population health variables. Also, studies like Alam et al. (2016), Salahuddin et al (2020) and Chiappini et al. (2022) assert that endogeneity issues will occur in the model between FDI and population health variables if it not considered. This explains the reason for executing the two estimations with the first lag of all regressors to eliminate any issue of endogeneity that can cause misleading results.

6.4.1. Preliminary Estimation Strategy

To understand the nature of the panel data set and the suitability of the adopted model, some series of preliminary tests are performed in this study. First, multicollinearity test is conducted using pairwise correlation matrix and variance inflation factor. Variables with high correlation value of 0.9 between independent variables are to be dropped and variance inflation factor value of 9.0 among the independent variables also indicate evidence of multicollinearity in the panel data which can create misleading results (Islam et al., 2021). Pesaran (2004) cross-sectional dependence test is also executed to determine whether there is cross-sectional dependence among the panel data set. That is whether any shock in a country could affect other EU countries in the panel. The likelihood of cross-sectional dependence among countries within the panels is very high due to the common regional integration and proximity characteristics they share. Importantly, the feasible generalised least squares model which is the main empirical model to generate reliable results requires the panel to have evidence of cross-sectional dependence to be robust and reliable (Adeleye et al., 2023). The null hypothesis of cross-sectional independence is rejected only at 1%, 5% and 10% significance level and it is expressed as follows.

$$CD = \sqrt{2T/N(N-N)}\left(\sum_{i=1}^{N-1}\sum_{k=i+1}^{N}\hat{\rho}_{i,k}\right) \text{ ...eqtn. 6.5}$$

This is then followed by unit root test for stationarity in the panel data. The Levin-Lin-Chu (2002), Harris and Tzvarlis (1999), Fisher-type (Choi, 2001), and the Im-Pesaran-Shin (2003) cross-sectional dependence test (CIPS) are estimated for each variable. The stationarity of the variable is determined at 5% significance level. All the variables are initially estimated at level and those found to be significant at 5% are I(0) series and meaning stationary at level. But those that are found to be insignificant at level are re-estimated using their first difference. If the first difference of a variable that failed to be stationary at level is found to be significant at first difference, then the variable is I(1) series. However, if a variable fails to be both I(0) and I(1) series then that variable cannot be included in the model estimation to avoid producing unreliable results. Again, in case the variables are all stationary at least at order one or I(1) series, then the next test for the analysis examines evidence of cointegration relationship in the model.

6.4.1.1. *Pedroni and Westerlund cointegration test*

Following studies like Adeleye et al. (2023), this study tests for the evidence of long run relationship in the panel based on Pedroni (1997, 1999, and 2004) cointegration test and Westerlund (2007) cointegration test. The advantages of the Pedroni (1997, 1999, and 2004) cointegration test are that: First, the test is effective in determining evidence of long run relationship in panel data sets unlike traditional cointegration test methods like Johansen which are typically applied to individual time series data (Neal, 2014). Secondly, the Pedroni (2004) cointegration test accounts for cross-sectional dependencies and heterogeneity across the units in the panel (Pedroni, 2019). Hence, making it very useful for panel data set. It is also effective in small sample sizes which usually a limitation in panel data. Some of the studies that have supported utilising Pedroni (2004) cointegration test include Ramirez (2007), Neal (2014) and Pedroni (2019).

In addition, the second-generation panel cointegration tests proposed by Westerlund (2007) is adopted in this study. The test is also effective in ascertaining evidence of cointegration in panels. The Westerlund (2007) cointegration test is designed to provide reliable results when panel sample size is relatively small, and it is also robust to cross-sectional dependence in the panel. The test is an improvement on the Pedroni (2004) because of its reliance on the error correction mechanism in the panel data to offer more comprehensive setup for testing cointegration. A crucial advantage of the Westerlund (2007) cointegration tests is its ability to deal with different variables in the panel that might have different stationarity properties, e.g. where some are stationary at level and others are stationary at first difference (Westerlund, 2007; Adeleye et al. 2023). For both Pedroni (2004) and Westerlund (2007) cointegration tests the null hypothesis of no cointegration is rejected at 1% and 5% significance levels. The evidence of cointegration will mean to produce results for long run which using Fully modified ordinary least squares estimations is suitable due to its effectiveness for undertaking such purposes (Adeleye et al., 2023).

6.4.1.2. *Fully modified ordinary least squares method*

The Fully modified ordinary least squares (FMOLS) was introduced by Phillips and Hansen (1990) to estimate evidence of long-run relationships in the cointegrated variables. The FMOLS has the advantage of improving robustness in estimating heterogenous panels, correcting endogeneity, and serial correlation in error terms which is common with ordinary least squares model (Phillips, 1995; Gregory and Hansen, 1996; Pedroni, 2001). Empirical studies like Phillips and Hansen (1990), Hargreaves (1994), Wagner and Hong (2016), Warsame (2022), and Stypka et al. (2024) suggest that the FMOLS offers a more unbiased and efficient parameter estimates for examining long run relationships in the presence of cointegrated process. The FMOLS utilises adjustment the estimator to account for the feedback among regressors and residuals, while utilising nonparametric techniques to ensure that the residuals are uncorrelated to ensure efficiency in the model (Phillips and Hansen, 1990; Hargreaves,1994). Additionally, FMOLS also improves robustness in estimating heterogenous panels. However, the FMOLS estimation is only considered valid when evidence of cointegration is supported in the relationship among the estimated variables.

6.5. EMPIRICAL RESULTS AND DISCUSSIONS.

6.5.1. Preliminary Test Results

Tables 6.3 and 6.4 below are the pairwise correlation and variance inflation factor for the panel of 15 EU countries and the panel of 13 EU countries respectively. In both tables the correlation among variables is not high and the variance inflation is also low among the controlled variables. These imply absence of multicollinearity among the variables. Also, Table 6.5 report the results for the Pesaran (2004) cross-sectional dependence test. Among the panel of 15 EU countries all the variables accept evidence of cross-sectional dependence at 1% significance level except for population growth which is insignificant at 10% level and therefore reject evidence of cross-sectional dependence. Moreover, among the panel of 13 EU countries, apart from environmental taxes, energy taxes and population growth, all remaining 11 variables support evidence of cross-sectional dependence at 1% significance level. In summary, there is evidence of cross-sectional dependence in some of the panels for the variables and these cannot be overlooked. So, it is suitable to employ Feasible Generalised Least Squares (FGLS) method for this empirical analysis. Table 6.6 and 6.7 also present the results for the unit root test. The summary of the two results tables indicates that, all the variables significantly achieve stationarity at either I(0) or I(1) series. This also implies that; it is appropriate to determine the existence of cointegration within the model. Therefore, the Pedroni (1997, 1999, and 2004) cointegration test and Westerlund (2007) cointegration are executed to determine the long run relationships in the panel. Following The results for cointegration are reported and discussed in subsequent subsections.

Table 6.3.

Pairwise correlations and Variance Inflation Factor for independent variables for 15 Countries Joining latest by 1995.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	**VIF (1)**	**VIF (2)**
(1) Lex	1.000													
(2) IMR	-0.580	1.000												
(3) ETot	-0.296	0.085	1.000											
(4) EAgric	-0.216	0.122	-0.392	1.000										
(5) EIndus	-0.378	0.288	-0.092	0.160	1.000									
(6) Eserv	0.405	-0.286	0.276	-0.649	-0.855	1.000								
(7) GFDI	-0.213	0.225	0.222	0.188	0.012	-0.108	1.000						1.360	
(8) M&As	-0.040	-0.107	0.072	-0.120	-0.224	0.236	-0.004	1.000						1.130
(9) EnvTaxGDP	-0.277	0.198	0.074	0.098	-0.092	0.019	-0.184	-0.032	1.000				1.190	1.190
(10) lnGDPpccons	0.052	-0.290	0.505	-0.666	-0.469	0.712	-0.014	0.311	0.021	1.000			3.580	2.980
(11) lnTradeGDP	0.010	-0.235	0.325	-0.309	-0.516	0.560	0.245	0.312	0.000	0.751	1.000		2.710	2.350
(12) PopGrowth	0.003	-0.116	0.342	-0.352	-0.253	0.380	0.278	0.231	-0.293	0.639	0.530	1.000	2.260	2.030
Mean VIF													**2.220**	**1.940**

Note: VIF (1) is estimated GFDI but does not include M&As, and VIF (2) is estimated with M&As but does not include GFDI.

Table 6.4

Pairwise correlations and Variance Inflation Factor for independent variables for 13 Countries Joining from 2003 to 2013.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	**VIF (1)**	**VIF (2)**
(1) Lex	1.000													
(2) IMR	-0.627	1.000												
(3) ETot	0.297	-0.436	1.000											
(4) EAgric	-0.465	0.652	-0.241	1.000										
(5) EIndus	-0.267	0.052	-0.025	-0.025	1.000									
(6) Eserv	0.539	-0.556	0.209	-0.788	-0.596	1.000								
(7) GFDI	-0.483	0.593	-0.241	0.211	0.209	-0.298	1.000						1.470	
(8) M&As	0.091	0.077	-0.049	-0.029	-0.201	0.147	0.174	1.000						1.020
(9) EnvTaxGDP	0.417	-0.255	-0.138	-0.215	-0.209	0.301	-0.160	0.073	1.000				1.090	1.090
(10) lnGDPpccons	0.802	-0.786	0.560	-0.610	-0.207	0.617	-0.533	0.057	0.231	1.000			3.050	2.270
(11) lnTradeGDP	0.514	-0.402	0.164	-0.764	-0.073	0.659	-0.200	-0.003	0.072	0.548	1.000		1.470	1.450
(12) PopGrowth	0.757	-0.344	0.359	-0.409	-0.198	0.451	-0.257	0.115	0.256	0.693	0.436	1.000	2.050	2.000
Mean VIF													**1.830**	**1.570**

Note: VIF (1) is estimated GFDI but does not include M&As, and VIF (2) is estimated with M&As but does not include GFDI.

Table 6.5.

Perasan's (2004) cross-section independence test for each variable.

Variables	15 Countries Joining latest by 1995		13 Countries Joining latest from 2004 to 2013	
	CD-test	P-value	CD-test	P-value
Lex	41.213	0.000***	35.277	0.000***
IMR	35.973	0.000***	34.899	0.000***
ETot	9.005	0.000***	17.287	0.000***
EAgric	29.230	0.000***	27.440	0.000***
EIndus	39.077	0.000***	21.230	0.000***
Eserv	39.999	0.000***	31.691	0.000***
GFDI (-1)	6.629	0.000***	15.486	0.000***
M&As (-1)	5.051	0.000***	2.458	0.014***
EnvTaxGDP (-1)	3.321	0.001***	0.598	0.550
EnvTaxGFDI*GFDI (-1)	5.101	0.000***	15.440	0.000***
EnvTaxGDP*M&As (-1)	4.717	0.000***	2.320	0.020**
lnTradeGDP (-1)	30.758	0.000***	26.285	0.000***
lnGDPpccons (-1)	20.632	0.000***	27.439	0.000***
PopGrowth (-1)	-1.167	0.243	0.005	0.996

Table 6.6.

Unit Root test for each variable for the panel of 15 Countries Joining latest by 1995.

Variables	LEVEL				1ST DIFFERENCE			
	LLC	HT	CIPS	Fisher-ADF	LLC	HT	CIPS	Fisher-ADF
Lex	-5.287***	0.661***	1.828	-1.820			13.291***	57.884***
IMR	-0.539	0.917	1.244	-0.950	-3.406***	0.216***	-3.536***	5.520***
ETot	-5.314***	0.892	-2.355***	2.228**		0.437***		
EAgric	0.908	0.920	0.833	0.037	-4.299***	0.146***	-5.767***	10.364***
EIndus	-4.116***	0.840	-1.936**	2.213**		0.195***		
Eserv	-3.697***	0.841	-1.920**	4.690***		0.095***		
GFDI (-1)	-11.354***	0.243***	-6.960***	17.430***				
M&As (-1)	-9.387***	0.126***	-6.934***	13.216***				
EnvTaxGDP (-1)	-0.347	0.954	2.121	-1.193	-5.481***	0.047***	-4.293***	7.178***
lnTradeGDP (-1)	-1.457	0.831	0.349	-0.701	-7.064***	0.103***	-5.527***	10.477***
LnGDPpccons (-1)	-2.970***	0.988	-0.958	0.898		-10.31***	-3.153***	3.912***
PopGrowth (-1)	-4.869***	0.751	-2.013**	1.863**		-0.055***		

Table 6.7.

Unit Root test for each variable for the panel of 13 Countries Joining latest from 2004 to 2013.

Variables	LLC	HT	CIPS	Fisher-ADF	LLC	HT	CIPS	Fisher-ADF
Lex	-4.107***	-2.101**	-2.313***	5.182***				
IMR	-5.768***	2.452	-1.636	5.881***		0.549***	-1.897**	
ETot	-2.945***	1.018	-1.383	1.791**		0.294***	-2.914***	
EAgric	-1.786**	0.812	0.999	-1.020		0.019***	-6.179***	11.890***
EIndus	-2.367***	0.796	-0.985	1.220		0.063***	-6.343***	12.840***
Eserv	-2.926***	0.800	-1.139	2.070**		0.082***	-6.941***	
GFDI (-1)	-2.696***	0.277***	-2.443***	4.575***				
M&As (-1)	-3.846***	0.052***	-3.095***	4724***				
EnvTaxGDP (-1)	-2.556***	0.771	-0.863	-1.469		0.048***	-4.305***	6.644***
lnTradeGDP (-1)	-2.326**	-2.208**	-1.818**	2.096**				
LnGDPpccons (-1)	-4.244***	0.842	-1.521	3.257***		0.375***	-4.184***	
PopGrowth (-1)	0.041	0.909	0.439	2.147**	-7.215***	0.156***	-4.954***	

6.5.2. Estimated Results for FGLS and Cointegration Tests.

In this subsection, the Pedroni (1997, 1999, and 2004) and Westerlund cointegration results, and the FGLS results for eqtn.6.1 which include the interaction of environmental taxes and GFDI, and eqtn.6.2 also including the interaction of environmental taxes and M&As are presented in Table 6.8 below for the panel of 15 EU countries and Table 6.9 below for the panel of 13 EU countries. Since there are six dependent variables, six results are presented for each of the two panels when any of the two equations are specified. Among the dependent variables, columns 1 and 7 are for life expectancy at birth to adult years (Lex), columns 2 and 8 are for infant mortality rate (IMR), columns 3 and 9 are for total employment rate (ETot), columns 4 and 10 are for employment in agriculture (EAgric), columns 5 and 11 are for employment in industry (EIndus), and lastly columns 6 and 12 are for employment in service (Eserv). The parameters of interest in all estimations include the coefficients and significance of the interactions between environmental taxes and GFDI (EnvtaxGDP*GFDI), and the interactions between environmental taxes and M&As (EnvtaxGDP*M&As). To interpret the results, it is important to keep in mind that all the two panels are made up of developed economies but the panel of 15 EU countries are more developed and advanced compared to the panel of 13 EU countries. Aside this, the M&As of the panel of 15 EU countries constitute larger proportion of most of these countries GDP compared to the proportion of GFDI to their GDP. Contrarily, GFDI have larger percentage share of the GDP of the panel of 13 EU countries compared to their M&As as a percentage of GDP. Moreover, in Tables 6.8 and 6.9 the Pedroni (1997, 1999, and 2004) cointegration results reports three results which include the modified Phillips-Perron results, Phillips-Perron results, and Augmented Dickey-Fuller results. These three cointegration results and the Westerlund (2007) results for the panel of 15 EU countries and 13 EU countries provide evidence of long run relationship in all the estimated panels in Tables 6.8 and 6.9.

Table 6.8.
FGLS and cointegration results for the impact of the interaction between GFDI and total environmental taxes on two population health variables and four employment variables.

	Panel of 15 EU countries joining latest by 1995.						13 EU countries joining from 2004 - 2013.					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Lex	IMR	ETot	EAgric	EIndus	Eserv	Lex	IMR	ETot	EAgric	EIndus	Eserv
GFDI (-1)	0.226***	0.087***	-1.440***	0.132***	0.485***	-0.660***	-0.049***	0.129***	0.122***	0.157***	-0.193***	0.091*
	(0.047)	(0.014)	(0.182)	(0.045)	(0.153)	(0.146)	(0.014)	(0.013)	(0.045)	(0.040)	(0.045)	(0.048)
EnvTaxGDP (-1)	-0.310***	0.009	0.211**	0.407***	0.811***	-1.338***	0.343***	-0.426***	-0.670***	-0.089	-0.123	0.193**
	(0.030)	(0.012)	(0.103)	(0.036)	(0.090)	(0.072)	(0.033)	(0.022)	(0.099)	(0.076)	(0.122)	(0.085)
GFDI* EnvTaxGDP (-1)	-0.104***	-0.033***	0.671***	0.064***	-0.062	0.015	0.023***	-0.040***	-0.030*	-0.061***	0.091***	-0.043**
	(0.017)	(0.005)	(0.071)	(0.018)	(0.055)	(0.057)	(0.005)	(0.005)	(0.018)	(0.016)	(0.017)	(0.018)
lnGDPpccons (-1)	-1.042***	-1.308***	20.54***	-0.370*	9.254***	-9.042***	-0.005	-6.234***	14.40***	-7.759***	8.330***	-0.316
	(0.14)	(0.051)	(0.660)	(0.200)	(0.667)	(0.460)	(0.149)	(0.184)	(0.617)	(0.289)	(0.496)	(0.530)
lnTradeGDP (-1)	0.360***	0.580***	-2.541***	-0.793***	-2.498***	4.041***	-0.513***	0.038	1.725**	1.272***	0.804	-1.470***
	(0.112)	(0.034)	(0.445)	(0.151)	(0.323)	(0.305)	(0.135)	(0.100)	(0.777)	(0.300)	(0.494)	(0.372)
PopGrowth (-1)	-0.143***	0.102***	1.753***	0.015*	1.281***	-1.286***	0.228***	0.461***	1.766***	1.446***	-1.256***	-0.168**
	(0.014)	(0.005)	(0.070)	(0.009)	(0.045)	(0.057)	(0.027)	(0.023)	(0.116)	(0.064)	(0.089)	(0.074)
_cons	89.50***	15.45***	-153.0***	11.60***	-61.62***	148.7***	73.21***	65.16***	-82.05***	72.53***	-42.47***	64.83***
	(1.590)	(0.556)	(7.197)	(2.261)	(7.272)	(5.617)	(1.316)	(1.616)	(5.206)	(2.451)	(3.958)	(5.413)
Pedroni Cointegration												
Modified Phillips-Perron	4.660***	5.653***	5.482***	5.725***	6.088***	5.939***	4.354***	4.745***	5.492***	5.249***	4.832***	5.446***
Phillips-Perron	-14.268***	-6.089***	-6.895***	-5.453***	-3.511***	-4.506***	-13.898***	-12.875***	-5.775***	-4.019***	-8.517***	-9.046***
Augmented Dickey-Fuller	-10.071***	-4.780***	-4.991***	-4.925***	-3.173***	-3.714***	-10.301***	-9.584***	-4.479***	-3.670***	-6.750***	-5.899***
Westerlund Cointegration	1.647**	7.376***	3.275***	2.312**	4.428***	4.416***	2.662***	7.355***	6.092***	3.619***	4.770***	3.053***
Observations	240	240	240	240	240	240	208	208	208	208	208	208

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Each Pedroni cointegration estimation includes 1 augmented lag, time trend, and subtraction of cross-sectional means. The Westerlund cointegration estimation includes 1 lag and time trend. The values for the cointegration results are the statistics, and the stars represent the significance of the p-values.

Table 6.9.
FGLS and cointegration results for the impact of the interaction between M&As and total environmental taxes on two population health variables and four employment variables.

	Panel of 15 EU countries joining latest by 1995.						13 EU countries joining from 2004 - 2013.					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Lex	IMR	ETot	EAgric	EIndus	Eserv	Lex	IMR	ETot	EAgric	EIndus	Eserv
M&As (-1)	0.041***	0.012***	-0.171***	0.040***	-0.070***	-0.055**	-0.214***	0.191***	0.265**	-0.026	0.167***	-0.313***
	(0.005)	(0.002)	(0.017)	(0.010)	(0.022)	(0.026)	(0.049)	(0.043)	(0.128)	(0.100)	(0.049)	(0.110)
EnvTaxGDP (-1)	-0.378***	-0.004	0.769***	0.567***	0.880***	-1.418***	0.347***	-0.590***	-0.782***	-0.362***	0.202***	0.070
	(0.026)	(0.008)	(0.026)	(0.024)	(0.054)	(0.078)	(0.039)	(0.027)	(0.134)	(0.061)	(0.066)	(0.096)
M&As* EnvTaxGDP (-1)	-0.018***	-0.005***	0.053***	-0.015***	0.029***	0.016	0.078***	-0.057***	-0.121***	0.004	-0.064***	0.107***
	(0.002)	(0.001)	(0.006)	(0.004)	(0.008)	(0.010)	(0.017)	(0.015)	(0.046)	(0.036)	(0.021)	(0.040)
lnGDPpccons (-1)	-0.996***	-1.302***	20.59***	-0.262*	9.030***	-9.086***	-0.283**	-6.536***	13.21***	-7.442***	7.795***	0.092
	(0.126)	(0.034)	(0.374)	(0.151)	(0.431)	(0.545)	(0.139)	(0.147)	(0.736)	(0.329)	(0.464)	(0.392)
lnTradeGDP (-1)	0.476***	0.615***	-2.309***	-1.056***	-2.744***	4.202***	-0.487***	0.034	2.464***	0.589*	1.164**	-1.743***
	(0.103)	(0.033)	(0.199)	(0.129)	(0.270)	(0.293)	(0.123)	(0.141)	(0.535)	(0.332)	(0.471)	(0.353)
PopGrowth (-1)	-0.165***	0.0968***	1.966***	0.030**	1.373***	-1.415***	0.247***	0.455***	1.865***	1.394***	-1.284***	-0.223***
	(0.014)	(0.005)	(0.034)	(0.012)	(0.054)	(0.046)	(0.022)	(0.029)	(0.102)	(0.062)	(0.071)	(0.071)
_cons	88.63***	15.25***	-155.8***	11.47***	-58.06***	148.1***	75.68***	68.46***	-74.13***	73.49***	-39.56***	62.47***
	(1.340)	(0.380)	(3.951)	(1.649)	(4.891)	(5.944)	(1.200)	(1.314)	(6.610)	(2.704)	(3.672)	(3.484)
Pedroni Cointegration												
Modified Phillips-Perron	4.875***	5.169***	5.277***	5.513***	5.213***	5.123***	4.255***	5.872***	5.296***	5.497***	5.346***	5.317***
Phillips-Perron	-10.83***	-7.080***	-4.870***	-6.025***	-6.764***	-7.592***	-12.29***	2.466***	-5.736***	-5.538***	-3.974***	-5.868***
Augmented Dickey-Fuller	-8.539***	-5.336***	-4.287***	-5.400***	-4.352***	-5.063***	-9.194***	2.221**	-2.096**	-2.155**	-3.109***	-1.809**
Westerlund Cointegration	2.328**	7.172***	4.170***	5154***	5.810***	5.781***	2.417***	7.554***	5.441***	3.550***	2.532***	3.380***
Observations	240	240	240	240	240	240	208	208	208	208	208	208

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The Pedroni cointegration estimation includes 1 augmented lag, time trend and subtraction of cross-sectional means. The Westerlund cointegration estimation includes 1 lag and time trend. The values for the cointegration results are the statistics, and the stars represent the significance of the p-values.

6.5.2.1. *Discussion of results for the effects on Population health*.

6.5.2.1.1. Effects of GFDI and M&As on Population health.

In Tables 6.8 and 6.9 above, the results reveal that GFDI and M&As of the panel of 15 EU countries increase both life expectancy at birth to adults' years (column 1) and infant mortality rate (column 2) at 1% significant levels. This increase in life expectancy at birth to adults' years is in contrast with hypothesis 1 and the results of Herzer and Nunnenkamp (2012) and Nagel et al. (2015) which finds decreasing effect. However, the findings of this chapter agree with studies like Burns et al. (2017) which finds foreign investments to be beneficial in increasing life expectancy at birth to adults' years. But when considering infant mortality, the findings from this study agrees with Nagel et al. (2015), Burns et al. (2017) and support hypothesis 1 that foreign investments increase infants' mortality rate significantly. This result means that, the effects of the foreign investments is beneficial towards adults' health of the 15 EU countries possibly through increased wages or income, rise in demand for heath related goods and services and encouraging increasing supply of these goods and services but adverse towards infants' health (Nagel et al. 2015). However, the adverse effects on infants' health are worrying but not surprising as infants lack stronger immune system compared to adults to cope with the pollution in the environment resulting from foreign investments (Davies and Mazumder, 2003; Landrigan and Goldman, 2011). Hence, population health is promoted in adult's lives but undermined in infants' lives for the panel of 15 countries. Also, the results from Tables 6.8 and 6.9 reveals that, for the panel of 13 EU countries both GFDI and M&As have significant decreasing effects on life expectancy at birth to adults' years and significant increasing effects on infant mortality rate at 1% levels. This means that, in general foreign investments whether in the form of GFDI or M&As have adverse effects on population health of these countries and this supports hypothesis 1 of this thesis. This results fully support the findings from studies like Herzer and Nunnenkamp (2012), Nagel et al. (2015) and Burns et al. (2017). Unlike the case of the panel of 15 countries, these results show that not only infants' lives are in danger due to direct investment activities in the panel of 13 EU countries but also in adult lives. From these findings, hypothesis 1 of this chapter which states that direct investments have adverse effects on population health of developed countries is fully supported in the panel of 13 EU countries but partially supported in the panel of 15 EU countries.

6.5.2.1.2. Effects of Environmental taxes on Population health.

Additionally, for the panel of 15 EU countries the effects of environmental taxes are significantly negative at 1% level towards life expectancy at birth to adults' years but insignificant towards infant mortality in both Tables 6.8 and 6.9. These results mean that, as environmental taxes become stricter or increases, adults' health decrease in these advanced economies. This may be due to decline in the production or supply of some health-related products or services for adults that are produced by environmental polluting companies driven away by strict environmental policy intervention (Tarlov, 1999; Salgado et al. 2020; Vostrykov and Jura, 2022). On the contrary, among the panel of 13 EU countries environmental taxes significantly promote life expectancy and reduces infant mortality rate at 1% in both Tables 6.8 and 6.9 (in line with; Tarlov, 1999; Salgado et al. 2020; Vostrykov and Jura, 2022). This shows that for the panel of 13 EU countries stricter environmental taxes are beneficial to the overall health of both adults and infants compared to the panel of 15 countries where it is found to be adverse towards adults' lives and insignificant towards infants' lives. Hypothesis 4 of this chapter which states that environmental policy directly promotes population health is completely supported by the results for the panel of 13 less developed EU countries and completely rejected by the results for the panel of 15 highly developed EU countries.

6.5.2.1.3. Effects of interacting Environmental taxes with GFDI and M&As on Population health.

Concerning the interaction between environmental taxes and GFDI, and between environmental taxes and M&As for the panel of 15 highly developed EU countries in Tables 6.8 and 6.9. The results indicate that the effects of both GFDI and M&As on both life expectancy at birth to adults' years (column 1) and infant mortality rate (column 2) is significantly contingent on the changes in environmental taxes. Specifically, the results in Table 6.8 show that a one-point increase in environmental taxes is responsible for significant decrease of 0.104 at 1% significance level in the positive effect of GFDI on life expectancy at birth to adults' years. Likewise, the results in Table 6.9 show that a one-point increase in environmental taxes is responsible for decrease of 0.018 at 1% significance level in the significant positive effect of M&As on life expectancy at birth to adults' years. Therefore, the significant marginal effect of GFDI on life expectancy is positive 0.122 years whereas the marginal effect of M&As on life expectancy is also positive 0.023 years. This means that despite the moderation effect of environmental policy, GFDI and M&As continue to promote life expectancy at birth to adults' years of the citizens of the 15 highly developed EU countries but at a smaller magnitude. These results support hypothesis 5 and 6 partially because it provides evidence that the effects of GFDI and M&As on the population health of the EU countries are significantly contingent on the environmental policy. Moreover, the moderation effect also shows that increase in the environmental policy lead to decrease in the positive effects of GFDI and M&As on infant health by 0.033 and 0.005 respectively. Therefore, the marginal moderated effect of GFDI on infant mortality becomes 0.054 instead of the initial 0.087. While the marginal moderated effect of M&As becomes 0.007 instead of the initial 0.012. These results completely support hypothesis 5 and 6 of this chapter. They also support studies like Davies and Mazumder (2003) and Landrigan and Goldman (2011) that argue that environmental pollution has significant impact on the lives of infants due to their low immune system, but government strict environmental policies play crucial role in improving infants' health. The results also agree with the proponents of the institutional based theory such as Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021).

Moreover, the interaction between environmental taxes with both GFDI and M&As for the panel of 13 less developed EU countries presented in Tables 6.8 and 6.9 also demonstrate that the effects of both GFDI and M&As on population health of the citizens are significantly contingent on the environmental policy (see columns 7 and 8). Furthermore, the moderation effect significantly reduces the negative effects of GFDI (Table 6.8) and M&As (Table 6.9) on life expectancy at birth to adults' years by 0.023 and 0.078 respectively. This sets the marginal moderated effect of GFDI on life expectancy at birth to adults' years to -0.026 instead of the initial -0.049. Similarly, the marginal moderated effect of M&As on life expectancy at birth to adults' years becomes -0.136 instead of the initial -0.214. This demonstrates that EU environmental policy minimises the adverse effects of both GFDI and M&As on life expectancy at birth to adults' years for the panel of 13 less developed EU countries. Furthermore, the evidence from the results also indicate that the moderation effect significantly reduces the increasing effects of both GFDI and M&As on infant mortality rate of the panel of 13 EU countries by -0.040 and -0.057 respectively. Therefore, the marginal moderated effect of GFDI on infant mortality rate becomes 0.089 instead of the initial 0.129, while the marginal moderated effect of M&As on infant mortality rate also becomes 0.134 instead of the initial 0.191. This also means that the moderation role of the environmental policy mitigates the adverse effects of both GFDI and M&As on infant mortality rate of the 13 less developed EU countries. These results completely support hypothesis 5 and 6 of this chapter that environmental policy is significant in moderating the adverse effects of direct investments on population health of developed countries. Also, it supports studies like Davies and Mazumder

(2003) and Landrigan and Goldman (2011) that argue that direct investments have significant impact on the lives of infants due to their low immune system, but government strict environmental policies play crucial role in improving infants' health. The results confirm the proponents of the institutional based theory such as Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021).

6.5.2.2. *Discussion of FGLS results for the effects on Employment*

6.5.2.2.1. Effects of GFDI and M&As on Employment.

In Tables 6.8 and 6.9, the results further reveal that both GFDI and M&As for the panel of 15 EU countries significantly reduces overall employment rate at 1% significant levels (columns 3). These results are consistent with the findings of studies like Schmerer (2014), Jude and Silaghi (2016) and Uddin and Chowdhury (2020) but contradicts the findings of Marelli et al. (2014) and Wang and Choi (2021). The results also support hypothesis 2 but reject hypothesis 3 of this chapter. The significant decrease in employment could be because of the substantial amount of FDI received by these countries that may have led to a rise in domestic wages causing most local firms to adjust to the wage increase by employing less labour in their production to be competitive in the market (Jude and Silaghi, 2016). In other instances, some intangible firm-specific distinctive capabilities, strategic assets or core competencies can promote productivity with very little labour and could be transferred to affiliates in these host countries by the parent MNCs and therefore lead to negative employment effects (Benacek et al. 2000; Conyon et al. 2002; Girma et al. 2002). However, in the case of the panel of 13 EU countries both GFDI and M&As significantly increase the overall employment rates in these countries and this reject hypothesis 2 but support hypothesis 3. This means that foreign investments in the panel of 13 countries creates and increases the overall employment levels compared to the panel of 15 countries which are highly developed. The result is consistent with findings from Marelli et al. (2014) and Wang and Choi (2021) and contradict studies like Schmerer (2014), Jude and Silaghi (2016) and Uddin and Chowdhury (2020).

Moreover, for both panel of countries GFDI and M&As affect employment in agriculture, in industries and in service differently (see columns 4, 5, 6 and 10, 11, 12 of the two results tables). Looking at the results for the panel of 15 EU countries in Table 6.8, it is noticed that GFDI lead to significant increase in employment rate in agriculture and in industry at 1% significant levels (columns 4 and 5 respectively). Nevertheless, it significantly decreases employment in service at 1% level (column 6). These results partially support hypothesis 3 of this chapter. However, in the panel of 13 EU countries, Table 6.8 shows that GFDI significantly increases employment in agriculture at 1% level and increases employment in services at 10% level but causes significant decrease in employment in industry at 1% level. This results partially rejects hypothesis 3. The common results for the two panels are that GFDI significantly promote employment in their agricultural sector. The difference is that while GFDI significantly promote employment in industry and rather reduce employment in services significantly in the panel of 15 EU countries. For the panel of 13 EU countries, GFDI significantly promote employment in service and significantly reduces employment in industry instead. Also, for the panel of 15 EU countries in Table 6.9, M&As significantly increases employment in agriculture at 1% level while causing significant decrease in employment in both industry and employment in service at 1% and 5% levels respectively. This results support hypothesis 2. Implying that, FDI in the form of either GFDI or M&As promote employment in agriculture for the panel 15 EU countries. But for the panel of 13 EU countries, M&As lead to insignificant change in employment in agriculture but significantly increase employment in industry at 1% level and a significant decrease in employment in service at 1% level. These results reject hypothesis 2 of this chapter.

6.5.2.2.2. Effects of Environmental taxes on Employment.

Furthermore, in Tables 6.8 and 6.9 environmental taxes significantly increase total employment rate at 1% levels for the panel of 15 EU countries (columns 3). This increase is significantly evident in the increase in employment in agriculture and in industry at 1% levels but there is also significant decrease in employment in service at 1% level. But, for the panel of 13 EU countries environmental taxes reduce the total employment rates significantly at 1% levels (column 9). Moreover, there is insignificant negative effects of environmental taxes on employment in agriculture and in industry and significant positive effects on employment in service at 5% level in Table 6.8.

6.5.2.2.3. Effects of interacting Environmental taxes with GFDI and M&As on Employment.

In Tables 6.8 and 6.9, the interaction effect of environmental taxes with GFDI and M&As on the four employment variables are reported for both the panel of highly developed 15 EU countries and the panel of less developed 13 EU countries. In Table 6.8, the results indicates that the effects of GFDI on total employment rate and employment in agriculture are significantly contingent on environmental policy at 1% significance level, but not significantly contingent on environmental policy considering the effects on employment in industry and service (see columns 3 to 6). Therefore, the moderation effect of the EU environmental policy significantly reduce the significant negative effects of GFDI on total employment rate by 0.671, whereas the moderation effect significantly increase the positive effect of GFDI on employment in agriculture by 0.064. The marginal moderated effects of GFDI on total employments becomes -0.769 instead of the initial -1.440. Also, the marginal moderated effects of GFDI on employment in agriculture becomes 0.196 instead of initial 0.132. These results partially support hypothesis 5 that the effects of GFDI on employment is contingent on the EU's environmental policy and also agrees with the proponents of the institutional based theory such as Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021). Nevertheless, it refutes hypothesis 5 of this chapter that the environmental policy of developed countries reduce the employment benefits of GFDI.

Moreover, the results in Table 6.9 columns 3 to 6 for the panel of 15 EU countries reveals that the effect of M&As on total employment rate, employment in agriculture and employment in industry are all significantly contingent on the environmental policy of the EU countries at 1% significance levels. This also supports the institutional based theory argued by Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021). In columns 3 and 5, the moderation effects of environmental policy significantly reduce the significant negative effects of M&As on total employment rate and employment in industry by 0.053 and 0.029 respectively. Therefore, the marginal moderated effects of M&As on total employment rate becomes -0.118 instead of initial -0.171, while the marginal moderated effects of M&As on employment in industry becomes -0.041 instead of initial -0.071. This indicates that environmental policy promotes the employment benefits of M&As and this is evident in the total employment rates and employment in industry. This provides complete support for hypothesis 6 that the environmental policies of EU countries encourage M&As to increase employment in developed countries. Contrary, the moderation effect of environmental policy significantly reduce the significant increase in employment in agriculture by -0.015. Therefore the marginal moderated effect of M&As on employment in agriculture is 0.025 from initial 0.040. This results for the panel of 15 EU countries contradicts the research hypothesis 6.

For the panel of 13 EU countries in Table 6.8 columns 9 to 12 the results indicate that the effects of GFDI is significantly contingent on the environmental policies of the countries at least at a significance of 10% level. This supports hypothesis 5 and the institutional based theory by Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021). However, the moderation effect of environmental policy reduces the positive direct effects of GFDI on the total employment rate, employment in agriculture and employment in service. Therefore, the marginal moderated effect of GFDI on employment rate is 0.092 from initial 0.122, on employment in agriculture is 0.096 from initial 0.157, and on employment in service is 0.048 from initial 0.09. This also support hypothesis 5 that developed countries environmental policy reduces the employment benefits from GFDI. Despite the moderation effect, GFDI still remained positive towards total employment rate, employment in agriculture and employment in service. However, the moderation effect of environmental policy reduces the negative effects of GFDI on the employment in industries for the 13 countries. Therefore, the marginal moderated effect of GFDI on is -0.102 from initial -0.193. Implying that the moderation effect promotes GFDI to increase employment in the industry and so resulting in the reduction in the negative effects. This results contradicts hypothesis 5 that environmental policy will moderate GFDI to reduce its employment benefits.

Also in Table 6.9 columns 9 to 12, the results indicates that the effects of M&As on total employment rate, employment in industry, and employment in service is significantly contingent on the environmental policy of the panel of 13 EU countries at 1% significant levels. This partly support hypothesis 6 of this chapter and also agree with studies like Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021) institutional based view. But the effects of M&As on employment in agriculture is not significantly contingent on the environmental policy and rejects hypothesis 6. The results further reveals that, the moderation effect of environmental policy significantly decreases the positive effects of M&As on total employment rates and employment in industries. While the moderation effect of environmental policy decreases the negative effects of M&As on employment in service of the 13 EU countries. Therefore, the marginal moderated effects of M&As on total employment rates is 0.144 from initial 0.265 and on employment in industry is 0.103 from initial 0.167. These results contradicts hypothesis 6 that environmental policy of the developed countries will encourage M&As to increase employment. Despite the negative moderation effect of environmental policy, M&As continue to demonstrate significant increases in total employment rates and employment in industries. Also, the marginal moderated effects of M&As on employment in service is -0.206 from initial -0.313. This results rather support hypothesis 6 that the moderated effects of environmental policy will encourage M&As to promote employment. In addition, M&As continue to significantly reduce employment in industries despite the positive moderation effect of environmental policy.

6.5.3. Estimated Long Run Results Using FMOLS Model.

In this subsection, the results for the FMOLS are discussed with emphasis on the effects of the interaction terms in the model results since it is the main variable of interest showing the moderating effects of environmental taxes on GFDI and M&As impact on population health and employment. The FMOLS results based on eqtn.6.1 and which include the interaction of environmental taxes and GFDI are presented in Tables 6.10 and the FMOLS results based on eqtn.6.2 which include interaction of environmental taxes and M&As are also presented in Table 6.11. While columns 1 to 6 are the results for the panel of 15 EU countries and columns 7 to 12 are the results for the panel of 13 EU countries. As usual the results based on the dependent variables are in this wise, life expectancy is for column 1 and 7, infant mortality rate is for columns 2 and 8, total employment rate is for columns 3 and 9, employment in agriculture is for columns 4 and 10, employment in industry is for columns 5 and 11, lastly the employment in service is also in columns 6 and 12.

Table 6.10.
FMOLS long run results for the impact of the interaction between GFDI and total environmental taxes on two population health variables and four employment variables.

	Panel of 15 EU countries joining latest by 1995.						13 EU countries joining from 2004 - 2013.					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Lex	IMR	ETot	EAgric	EIndus	Eserv	Lex	IMR	ETot	EAgric	EIndus	Eserv
GFDI	0.158***	0.057***	-2.226***	0.302***	-0.422***	0.129	-0.080***	0.257***	0.080	0.064	-0.250***	0.195*
	(0.021)	(0.017)	(0.539)	(0.073)	(0.109)	(0.273)	(0.021)	(0.036)	(0.082)	(0.062)	(0.047)	(0.103)
EnvTaxGDP	-0.356***	0.011	-0.446	0.231***	0.824***	-1.055***	0.473***	-0.367***	-0.457**	-0.103	-0.332***	0.387
	(0.012)	(0.010)	(0.302)	(0.041)	(0.061)	(0.153)	(0.054)	(0.093)	(0.214)	(0.161)	(0.122)	(0.266)
GFDI* EnvTaxGDP	-0.088***	-0.016**	0.989***	0.017	0.245***	-0.259**	0.035***	-0.083***	-0.017	-0.045**	0.114***	-0.071*
	(0.008)	(0.007)	(0.203)	(0.027)	(0.041)	(0.103)	(0.008)	(0.013)	(0.030)	(0.023)	(0.017)	(0.038)
lnGDPpccons	-1.136***	-1.279***	16.77***	-0.751***	8.227***	-7.522***	-0.605***	-6.850***	15.44***	-11.46***	11.08***	0.665
	(0.060)	(0.049)	(1.530)	(0.206)	(0.309)	(0.776)	(0.211)	(0.361)	(0.828)	(0.625)	(0.474)	(1.032)
lnTradeGDP	0.857***	0.571***	-5.391***	-1.005***	-5.678***	6.681***	-0.594***	0.245	-5.905***	-0.736	-2.067***	2.812***
	(0.046)	(0.038)	(1.180)	(0.159)	(0.238)	(0.598)	(0.206)	(0.352)	(0.807)	(0.609)	(0.462)	(1.006)
PopGrowth	-0.128***	0.142***	2.120***	-0.059***	1.552***	-1.466***	0.277***	0.552***	1.842***	1.686***	-1.627***	-0.083
	(0.007)	(0.005)	(0.168)	(0.023)	(0.034)	(0.085)	(0.034)	(0.058)	(0.133)	(0.100)	(0.076)	(0.166)
_cons	87.88***	15.34***	-98.54***	17.50***	-36.15***	119.2***	77.93***	69.69***	-56.94***	115.1***	-53.31***	35.68***
	(0.668)	(0.544)	(17.00)	(2.288)	(3.433)	(8.619)	(1.869)	(3.203)	(7.338)	(5.539)	(4.197)	(9.142)
Observations	254	254	254	254	254	254	220	220	220	220	220	220
R^2	0.946	0.814	0.853	0.916	0.946	0.935	0.961	0.762	0.783	0.921	0.910	0.943

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are all estimated using 1 lag.

Table 6.11.
FMOLS long run results for the impact of the interaction between M&As and total environmental taxes on two population health variables and four employment variables.

	Panel of 15 EU countries joining latest by 1995.						13 EU countries joining from 2004 - 2013.					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Lex	IMR	ETot	EAgric	EIndus	Eserv	Lex	IMR	ETot	EAgric	EIndus	Eserv
M&As	0.032***	0.0004	-0.198***	0.060***	-0.110***	0.051**	-0.232***	0.439***	0.915***	0.245**	0.015	-0.259**
	(0.007)	(0.005)	(0.034)	(0.0204)	(0.020)	(0.025)	(0.031)	(0.076)	(0.108)	(0.106)	(0.103)	(0.107)
EnvTaxGDP	-0.404***	0.010	0.373***	0.386***	0.990***	-1.373***	0.550***	-0.705***	-0.444***	-0.142	-0.003	0.162*
	(0.023)	(0.018)	(0.111)	(0.066)	(0.066)	(0.082)	(0.028)	(0.069)	(0.098)	(0.097)	(0.094)	(0.097)
M&As* EnvTaxGDP	-0.014***	-0.001	0.066***	-0.023***	0.044***	-0.021**	0.089***	-0.140***	-0.357***	-0.090**	-0.021	0.111***
	(0.003)	(0.002)	(0.013)	(0.008)	(0.008)	(0.010)	(0.011)	(0.027)	(0.038)	(0.037)	(0.036)	(0.038)
lnGDPpccons	-1.058***	-1.213***	16.89***	-0.624*	8.342***	-7.712***	-0.700***	-7.196***	14.81***	-10.56***	10.07***	0.521
	(0.129)	(0.100)	(0.633)	(0.378)	(0.378)	(0.468)	(0.126)	(0.312)	(0.443)	(0.437)	(0.425)	(0.440)
lnTradeGDP	0.917***	0.592***	-5.671***	-1.390***	-5.734***	7.130***	-0.459***	0.090	-5.607***	-0.906**	-1.341***	2.185***
	(0.100)	(0.078)	(0.490)	(0.293)	(0.293)	(0.363)	(0.123)	(0.306)	(0.436)	(0.430)	(0.418)	(0.432)
PopGrowth	-0.154***	0.142***	2.234***	-0.030	1.614***	-1.588***	0.295***	0.569***	1.841***	1.644***	-1.552***	-0.091
	(0.014)	(0.011)	(0.070)	(0.042)	(0.042)	(0.052)	(0.021)	(0.051)	(0.072)	(0.071)	(0.069)	(0.072)
_cons	86.85***	14.54***	-100.4***	17.72***	-37.42***	119.6***	78.09***	74.68***	-52.30***	107.5***	-47.77***	40.29***
	(1.439)	(1.115)	(7.048)	(4.206)	(4.211)	(5.211)	(1.103)	(2.738)	(3.895)	(3.841)	(3.732)	(3.864)
Observations	254	254	254	254	254	254	220	220	220	220	220	220
R^2	0.946	0.835	0.904	0.916	0.936	0.955	0.962	0.785	0.798	0.919	0.894	0.938

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These are all estimated using 1 lag.

6.5.3.1. *Discussion of long run FMOLS results for the effects on Population health.*

6.5.3.1.1. Effects of GFDI and M&As on Population health.

In Tables 6.10 and 6.11, the results reveal that GFDI and M&As of the panel of 15 EU countries both significantly increase life expectancy of adults' years in the long run (column 1) by 0.16 years and 0.03years respectively. These are in line with previous results generated from the FGLS model and support studies like Burns et al. (2017) which evidence increase in life expectancy due to FDI flows but rejects the studies of Herzer and Nunnenkamp (2012) and Nagel et al. (2015) which find declining effect. Moreover, in Table 6.10, GFDI increases infant mortality rate by 0.06% (column 2) at 1% significant levels. This result also confirm the previous FGLS results that agrees with the findings of Herzer and Nunnenkamp (2012) and Nagel et al. (2015) that advocates detrimental effects of FDI activities in the EU countries. But in Table 6.11, though the effect of M&As is positive on infant mortality rate as in the FGLS it fails to be significant in the long run. Therefore, it can be concluded that in the long run FDI either via GFDI or M&As promote life expectancy of adult years but only GFDI causes significant increase in infant mortality rate. Again, this reaffirms the summary of findings generated from the FGLS model that multinational activities in the EU countries partly support population health when considering adults' health, but population health deteriorates when considering infants' health of the panel of 15 EU countries who are highly developed.

Furthermore, the long run FMOLS results for the panel of 13 EU countries presented in Tables 6.10 and 6.11 can be interpreted as follows. In columns 7 of the two tables, both GFDI and M&As decreases life expectancy in adults' years by 0.08 years and 0.23 years respectively at significance levels of 1%. While in columns 8 of the two tables both GFDI and M&As increases infant mortality rate by 0.26% and 0.92% respectively at significance levels of 1%. These finds are also consistent with findings from Herzer and Nunnenkamp (2012) and Nagel et al. (2015) that indicate that FDI activities undermines population health in the panel of 13 EU countries.

Also, as in the summary of FGLS results, it is observed in FMOLS results that FDI activities are detrimental to both the adult's health and infants' health for the panel of 13 EU countries. While FDI activities is only detrimental to the health of infants but promote adults' health in the panel of 15 EU countries.

6.5.3.1.2. Effects of Environmental taxes on Population health.

Furthermore, the long run FMOLS results presented in Tables 6.10 and 6.11 for the panel of 15 EU countries are as follows. In columns 1 of the two tables both environmental taxes exert significant negative effects on life expectancy of adults' years by 0.36 years in Tables 6.10 and 0.40 years in Tables 6.11 at significance levels of 1%. However, in columns 2, environmental taxes exert insignificant positive effects on infant mortality rates. Likewise, these findings are consistent with the previous results produced by the FGLS model. Hence, the long run results of FMOLS provide additional confirmation to support the argument that strict environmental taxes do not foster adult health possibly because the policy mechanism could restrict multinationals production activities leading to reduction in production or supply of significant adults' health related products or services (Tarlov, 1999; Salgado et al. 2020; Vostrykov and Jura, 2022).

Moreover, for the panel of 13 EU countries the long run FMOLS results presented in Tables 6.10 and 6.11 evidence the following. In columns 7, environmental taxes increase life expectancy of adults' years by 0.47 years in Table 6.10, and 0.55 years in Table 6.11 at significance levels of 1%. On the other hand, in columns 8 of the two tables environmental taxes decline infant mortality rate by 0.37% in Tables 6.10 and 0.71% in Tables 6.11 at significance levels of 1%. These results are also in agreement with the previous results from the FGLS model. The results imply strict environmental taxes in the panel of EU countries is very essential for promoting population health of both adults and infants (Girma and Gorg, 2004; Girma, 2005; Seigel et al. 2009). The policy shows potential to successfully manage health endangering activities and ensure health for both adults and infants gets promoted in these countries.

In summary, while strict environmental taxes do not promote quality health for adults for the panel of 15 EU highly advanced countries in the long run, the strict environmental taxes promote quality population health for both adults and infants in the panel of 13 EU countries.

6.5.3.1.3. Effects of interacting Environmental taxes with GFDI and M&As on Population health.

Among the panel of 15 EU countries the long run results in Table 6.10 shows that, effects of GFDI on both life expectancy at birth to adults' years (column 1) and infant mortality rate (column 2) are significantly contingent on the changes in environmental taxes at 1% and 5% significance levels. This result is consistent with the results from the FGLS reported in Table 6.8, hypothesis 5 of this thesis and agrees with the proponents of the institutional based theory such as

Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021). Moreover, likewise the results in Table 6.8, the results in Table 6.10 confirms that the moderation effect of environmental policy of the 15 EU countries significantly decreases the magnitude of the positive effects of GFDI on life expectancy at birth to adults' years. While the moderation effects of environmental policy consistently reduce the magnitude of the negative effects of GFDI on infant mortality rate in the long run.

Furthermore, the results of Table 6.11 indicates that the effects of M&As on life expectancy at birth to adults' years is significantly contingent on the environmental policy of the EU at 1% significance level in the long run. This result is also consistent with the FGLS results in Table 6.9. Specifically, the results indicate that the moderation effect of environmental policy reduces the magnitude of the positive effects of M&As on life expectancy at birth to adults' years of the 15 EU countries. Contrary, in Table 6.11 the long run effect of M&As on infant mortality rate is not significantly contingent on environmental policy, which contradicts the results in Table 6.9.

Concerning the panel of 13 EU countries, the long run results in Tables 6.10 and 6.11 reveal that the effects of both GFDI and M&As on both life expectancy at birth to adults' years and infant mortality rate are significantly contingent on the environmental policy of the countries. These results are also consistent with the FGLS results in Tables 6.8 and 6.9. It also agrees with Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021) that suggest host country institutions play significant role in the effects of FDI. Moreover, Tables 6.10 and 6.11 indicate that the moderation effect of environmental policy significantly reduce the magnitude of the negative effects of both GFDI and M&As on life expectancy at birth to adults' years at 1% significance levels in the long run. While the moderation effect of environmental policy significantly reduce the magnitude of the positive effects of both GFDI and M&As on infant mortality rate at 1% significance levels in the long run. This results is also consistent with the results in the FGLS results in Tables 6.8 and 6.9.

6.5.3.2. *Discussion of long run FMOLS results for the effects on Employment*

6.5.3.2.1. Effects of GFDI and M&As on Employment.

The long run FMOLS results presented in Tables 6.10 and 6.11, show the effect of GFDI and M&As on total employment rate in column 3 for the panel of 15 EU countries respectively. It is observed from the results that a 1% increase in both GFDI and M&As significantly reduce total employment rate by 2.23% and 0.20% respectively, and at significance levels of 1%. This result is consistent with previous findings derived from the FGLS model estimations and the studies of Schmerer (2014), Jude and Silaghi (2016) and Uddin and Chowdhury (2020) which find FDI inflows as causing decline in employment rates of host countries. However, the results contradict the findings of Marelli et al. (2014) and Wang and Choi (2021) which suggest FDI leads to increase employment rates. As suggested earlier, the reason for this could possibly be due to the huge amount of FDIs to these advance 15 EU countries. This then cause a rise in domestic wages in the long run as supply for employment in the short run increases and therefore leading to domestic firms adjusting to the wage increase by reducing employment in the long run to remain competitive in the market (Jude and Silaghi, 2016). Or the transfer of advance technological skills and abilities of the multinationals to their satellite branches in these panel of 15 countries may have led to higher production efficiency that requires less workers or highly skilled workers and so leading to retrenchments or lay-off of unskilled workers (Benacek et al. 2000; Conyon et al. 2002; Girma et al. 2002).

Concerning the panel of 13 EU countries, the long run FMOLS results for the effects of GFDI and M&As on total employment in Tables 6.10 and 6.11 respectively and particularly in columns 9 evidence the following. The results shows that the effect of GFDI on employment is positive but insignificant and it contradicts the previous FGLS results only because it is insignificant. On the other hand, M&As significantly increase total employment by 0.92% at a significance level of 1%. This result is very consistent with the results from the previous FGLS model estimation results and supports results of studies like Marelli et al. (2014) and Wang and Choi (2021) which suggest FDI increases employment levels. However, it contradicts the results of Schmerer (2014), Jude and Silaghi (2016) and Uddin and Chowdhury (2020) which refute the positive effects of FDI on employment. Based on the results that have been analysed so far in this subsection, it can be established that the impact of FDI on employment rates among the EU countries is favourable to only the comparatively less developed 13 EU countries, but it is quite damaging to the comparatively highly developed panel of 15 EU countries.

Moreover, between the panel of 15 EU countries and 13 EU countries the impact of GFDI and M&As on the sectors are quite different in some sectors and similar in other sectors. For instance, in Table 6.10 columns 4 and 10, the effect of GFDI on employment in agriculture is positive, except that it is insignificant for the panel of 15 EU countries. Additionally, in columns 5 and 11 the effects of GFDI are significantly negative for both panels at 1% significance levels. However, in columns 6 and 12 the effect of GFDI on employment in service is positive but only significant and at 10% level for the panel of 13 EU countries. On the other hand, in Table 6.11 columns 4 and 10, M&As significantly increase employment in agriculture at 1% and 5% significance levels respectively. But while M&As significantly decreases employment in industry for the panel of 15 EU countries in column 5, the effect is positive and insignificant in column 11 for the panel of 13 EU countries. Also, while the effect of M&As significantly increase employment in the service sector at 5% level for the panel of 15 EU countries that are comparatively highly developed, the effect is significantly negative on the employment in service for the panel of comparatively less developed EU countries.

In summary, over the long term, the effect of GFDI on the panel of 15 EU nations results increased employment in agriculture, whereas for the panel of 13 EU countries, the growth is observed in the service sector. Nonetheless, over the long term, industrial employment uniformly decreases for countries in both panels. Furthermore, the long-term impacts of mergers and acquisitions indicate a substantial increase in employment within both the agriculture and service sectors for a panel of 15 relatively advanced EU countries. However, mergers and acquisitions (M&As) substantially enhance long-term employment in agriculture for the panel of 13 relatively underdeveloped EU nations, while severely diminishing employment in the service sector, with industry employment remaining statistically negligible.

6.5.3.2.2. Effects of Environmental taxes on Employment.

In Tables 6.10 and 6.11, the long run FMOLS results for the effects of environmental taxes on total employment rate respectively are reported in column 3 for panel of 15 comparatively highly developed EU countries and column 9 for 13 comparatively less developed EU countries. In Table 6.10, environmental taxes have insignificant negative effects on total employment rates for the panel of 15 EU countries. While environmental taxes significantly reduce total employment rates by 0.040% at significance level of 1% for the panel of 13 EU countries. However, in Table 6.11 column 3, the increase in environmental taxes significantly increase total employment rate by 0.37% and at a significance level of 1% for the panel of 15 EU countries. Yet in Table 6.11 column 9, consistently environmental taxes significantly reduce total employment rates by 0.44% at significance level of 1% for the panel of 13 EU countries that are comparatively less developed.

Concerning the diverse effects on employment in agriculture, industry and service sector the results are as follows. In Tables 6.10 and 6.11 both GFDI and M&As significantly increase employment in agriculture and industry but reduce employment in service for the panel of 15 EU countries and at 1% significance level in all cases. However, in Table 6.10 environmental taxes have significant effect on employment in industry and it is negative at 1% significance level for the panel of 13 EU countries. While in Table 6.11, environmental taxes have significant effects only on employment in service and it is positive and significance at 10% level for the panel of 13 EU countries.

6.5.3.2.3. Effects of interacting Environmental taxes with GFDI and M&As on Employment.

The results for the long run FMOLS presented in Table 6.10 shows that, among the panel of 15 EU countries the effects of GFDI on total employment rate is significantly contingent on the environmental policy of the countries at 1% significant level. This results partly support hypothesis 5 and agree with studies that assert that the effects of direct investments in host country is dependent on the institution of the host country such as Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021). The results further indicates that, in the long run the moderation effects of environmental policy significantly reduces the magnitude of the negative effects of GFDI on total employment rates in the countries. This results is also consistent with the results of FGLS in Table 6.8. However, the results in Table 6.10 further indicate that the effects of GFDI on employment in industry and service are significantly contingent on the environmental policy at 1% and 5% significance levels respectively. Such that, the moderation effect significantly reduces the magnitude of the negative effects of GFDI on employment in industry. These results support hypothesis 5 but contradict the results of FGLS in Table 6.8. Moreover in Table 6.11 columns 3 to 6, the results provide that the effects of M&As on total employment rates, employment in agriculture, in industry and in service are all significantly contingent on environmental policy for at most 5% significance level. These results are largely consistent with the results of FGLS in Table 6.9 and supports hypothesis 6 of this chapter. The results also reveal that the moderation effect of environmental policy significantly reduces the magnitude of the negative effects of M&As on total employment rates and employment in industry. While the moderation effect of environmental policy significantly reduces the magnitude of the positive effects of M&As on employment in industry.

Considering the panel of 13 EU countries, the results in Table 6.10 for columns 9 reveal that the effects of GFDI on total employment rates is not significantly contingent on environmental policy and this differs from the FGLS results in Table 6.8. But in columns 10 to 12, the effects of GFDI on employment in agriculture, industry and service are significantly contingent on environmental policy at least 10% significance level. These results support hypothesis 5 and are largely consistent with the result of FGLS in Table 6.8. Further insight from the results indicate that the moderation effect of environmental policy significantly reduce the magnitude of the negative effects of GFDI on employment in industry while significantly reducing the magnitude of positive effects of GFDI on employment in service. This results is also consistent with the reported FGLS results in Table 6.9. Finally, the long run results of FMOLS presented in Table 6.11 shows that the effects of M&As on employment is significantly contingent on the environmental policy of the countries This is also similar to the results of FGLS in Table 6.9 and supports hypothesis 6 of this chapter as well as Wilhelms and Witter (1998), Xiao and Park (2018) and Slesman et al. (2021) who argue that the institutions in the host country significantly regulate the effects of direct investments. Further insight into the results show that the moderation effect of environmental policy significantly reduce the positive effects of M&As on total employment rates and employment in agriculture but significantly reduce the negative effects of M&As on employment in service.

6.6. CONCLUSION

The relationship between foreign direct investment and population health has been the subject of extensive research. Existing literature suggests that FDI have negative effects on the population health of host countries. Therefore, the implementation of more stringent environmental policies can serve as an effective tool for mitigating the adverse externalities that arise as a result of multinational corporations' actions. This can lead to improved population health in the nations that are hosting the corporations, but it may also result in a loss of economic development benefits. This study therefore set out to explore the possible trade-off that arise as a result of enacting strict environmental policy to regulate activities of multinational corporations. To accomplish this, the 28 EU countries that existed before the year 2020 were categorised into two panels based on their year of accession. The panels were 15 countries that joined the EU latest by 1995 and 13 EU countries that joined the EU from 2004 to 2013. The available data used were for the period of 2003 to 2019.

The initial results demonstrated significant long run cointegration in the two panels. Also, the long run results from the FGLS and the FMOLS were mostly consistent. Generally, it was observed that the effects of both GFDI and M&As on both the population health and employment opportunities are significantly dependent on the moderation role of environmental policy in these countries. Specifically, environmental policy in the both the 15 EU countries and 13 EU countries played a significant role in reducing the negative effects of both GFDI and M&As on the population health of EU citizens. Environmental policy also played a moderation role to reduce the negative effects of GFDI and M&As on total employment in the 15 EU countries. Contrary, the environmental policy reduced the magnitude of the positive effects of the positive effects of GFDI and M&As on employment in the 13 EU countries.

This result is useful for EU environmental policy makers and local governments of member countries to develop investment and environmental protection policy that can help achieve the EU green deal objective of promoting sustainable development. From the results, the evidence indicates that policy makers can promote population health in the entire member countries by consciously regulating foreign investment actives with strict environmental standards. Particularly for the 15 countries that joined the union earlier, environmental policy is demonstrated as useful to promote employment by reducing the negative effect of direct investments in the long run. This means that policy maker in these 15 countries will in addition to improved health promote jobs creation by increasing the strictness of their environmental policy.

Chapter 7

Conclusion of Thesis

7.1. BACKGROUND

This Chapter intends to provide summary of the empirical activities, the major findings, contributions, policy recommendations, limitations and possible future research areas. The main aim of the thesis was to complement existing literature by examining the relationships between the environmental policy and FDI inflows. The thesis utilised macroeconomic secondary data for all 28 EU countries that existed before January 2020 when the United Kingdom left the union. The aggregate FDI inflows and the two FDI modes of entry which are Greenfields investments and Mergers & Acquisition sales are the key FDI variables in this study. The data for Greenfields investments were available for only the period from 2003 to 2019, and this restricted the entire research to rely on seventeen years data period. Apart from the total environmental taxes for the 28 EU countries adopted as main proxy for environmental policy, other proxies such as energy taxes, overall environmental stringency index, and three non-market based environmental policy indexes which include emissions limit value nitrogen oxide (NOx), emissions limit value sulphur oxide (SOx), and emissions limit value particulate matter (PM) have also been used for robustness checks. The main empirical model adopted for these studies include Two-way Fixed effects model, variance covariance robust standard error, Driscoll-Kraay robust standard errors, Bootstrap quantile regression, Panel vector autoregression model based on generalised method of moments estimation, impulse response functions, forecast errors decomposition, feasible generalised least squares method and fully modified ordinary least squares method. To generate broad understanding of the relationship between environmental policy and direct investments, the following research questions were stated and empirically answered.

1. What is the effect of EU strict environmental policy on direct investments into EU countries?
2. What direction of causality exist between EU's environmental policy and direct investments into EU countries?
3. What is the impulse response relationship between EU's environmental policy and direct investments into EU countries?

4. Does the EU's environmental policy play moderation role in the effects of direct investments inflows on population health and employment rates?

7.2. UNDERLINING THEORIES OF THE THESIS

The underlining theories of this thesis are based on the overview of existing literature on the linkages between FDI and environmental policy which are the pollution haven theory, pollution halo theory, the endogenous pollution haven theory and the institutional based theory of FDI. Three empirical analysis were conducted to provide answers to the research questions. These empirical analysis began in chapter 4, where the effect of EU environmental policy was examined on the aggregate FDI and the two FDI modes of entry. The theories that were underpinning this chapter were the pollution haven and pollution halo hypothesis. The results of this chapter facilitated in answering research question 1. Chapter 5 also provided empirical analysis for ascertaining the direction of causality and the forecasted impulse response relationship as well as the forecast errors variance decomposition between environmental policy and the FDI variables. The main investigated theories for this empirical analysis were the endogenous pollution haven theory, pollution haven hypothesis and the pollution halo hypothesis. This results from this chapter also provided answer to research question 2 and 3, while offering further justification for the answers to research question 1. Chapter 6 is the last empirical analysis of this thesis and dwelling on the institutional based theory of FDI it was hypothesised in this chapter that the spillover effects of the two FDI modes of entry on the population health and employment opportunities of EU countries is dependent on the moderation role of EU's environmental policy. This chapter provides the empirical results for answering research question 4.

7.3. MAIN CONTRIBUTION OF THE THESIS

This thesis distinguish itself from existing literature in three dynamic ways. First, this thesis examines the effects of environmental policy on direct investments into EU countries using various proxies such as environmental taxes, energy taxes, and emissions limit value nitrogen oxide (NOx), sulphur oxide (SOx), and emissions limit value particulate matter. In so doing, the research has attempted to address the argument that existing research yields inconclusive results due to biases in the selection of environmental policy measures and the use of varying environmental variables as proxies across different studies. Hence providing consistent results with different environmental policy measures and ensures robustness and confidence in the generated results.

Second, the research relies heavily on the two FDI modes of entry (GFDI and M&As) to address the inherent heterogeneous characteristics of the total capital flow. Previous research has relied on aggregate FDI or industrial data, but this study differs by utilising these modes of entry in addition to aggregate FDI. This provided policy makers clearer effects of environmental policy on the different forms of capital inflows and vice versa.

Lastly, the thesis distinguishes itself from by offering results that explains the moderating roles of environmental policy in ensuring improved public health and the associated economic consequences, specifically considering job creation. The study has been able to demonstrate potential trade off that may arise between public health and job creation when environmental policy is used to regulate the operational activities of foreign investors in the EU. Current literature has concentrated on the impact environmental policy have on FDI, hence to the best of the authors knowledge this is the only study that have empirically conducted this trade-off analysis.

7.4. SUMMARY OF RESEARCH RESULTS

The research results indicate that stringent environmental policies in the EU deter foreign direct investment through GFDI while encouraging foreign investments through M&As. The results indicate an endogenous relationship between the EU's environmental policy and the two modes of FDI entry. The increase in both GFDI and M&As initially leads to a decline in environmental policy, which subsequently becomes significantly stricter in later years. Conversely, when EU policymakers or local governments tighten environmental policies, the subsequent effect is a decline in GFDI over the following years before it stabilises, while M&As increase in the early years and decrease in the later years. The thesis results indicate that, broadly across EU countries, stringent environmental policies enhance children's health by regulating the operational activities of foreign firms. In less developed EU countries, strict environmental policies enhance adult health; in developed countries, such policies diminish the positive impacts of foreign investments on adult health. The marginal effects of environmental policy on public health are generally positive across all EU countries, while also promoting overall employment or inducing employment shifts among various sectors. The results indicate that EU countries should maintain stringent environmental policies to foster sustainable development and enhance public health.

7.5. POLICY RECOMMENDATIONS

The thesis aims to supplement existing literature by providing empirical findings to EU environmental policy institutions, international agencies, and local government policymakers. These findings can aid in the development of progressive investment and environmental policies, ultimately leading to sustainable development. The first policy recommendation from our results is that strict environmental policy can serve as an effective mechanism to deter the type of direct investments that come with its environmental polluting capabilities. The literature argues that the decline in GFDI, a form of FDI that is not environmentally friendly, is evidence of this. Instead, the strict environmental policy encourages more M&As, another form of capital flow that does not endanger the environment.

The second policy recommendation is that, while strict environmental policy is effective at driving out polluting industries, other options such as green technological incentives, promoting research and development, and offering easy access to cheap loans for acquiring advanced environmentally efficient technologies could be considered alongside environmentally related taxes. The goal is to encourage polluting industries to transition into a more efficient production process that can contribute to both economic development and environmental quality. This can eliminate the tendency of these polluting industries to relocate to countries with lax environmental policy, thereby reducing global environmental pressures.

The final policy recommendation suggests that these countries' environmental policies play a significant moderating role in the effects of direct investments on population health and employment. Policymakers can continue to act strictly on the multinational companies operating activities in the environment because the results support that such strictness contributes to both the health quality of the citizens and also promoting employment opportunities in the 15 countries that joined the EU latest by 1995. Though the magnitude of the increasing employment opportunities gets reduced in the 13 EU countries that joined the EU from 2004 to 2013.

7.5. LIMITATIONS AND POSSIBLE FUTURE RESEARCH AREAS

This thesis demonstrates its own limitations. The first limitation was very little data availability for GFDI which limited the entire analysis to seventeen years data. Another limitation is that apart from the total environmental taxes and energy taxes for the 28 EU countries adopted as proxies for environmental policy, other proxies such as, total environmental stringency index, and three non-market based environmental policy indexes which include emissions limit value NOx, emissions limit value SOx, and emissions limit value PM which were used for robustness checks had data available for only 19 EU countries who are OECD members. Lastly, the thesis did not classify the data for FDI into sectors which are primary, manufacturing and service sectors. We anticipate that the relationship between environmental policy and direct investments into these different sectors and further categorised according to their mode of entry can offer additional interesting results. However, good quality data to perform the empirical analysis were not available. Hence future research should focus on sectoral FDI while classifying them according to their modes of entry if sufficient and quality data become available.

REFERENCES

1. Abbasi, M.A., Nosheen, M. and Rahman, H.U., 2023. An approach to the pollution haven and pollution halo hypotheses in Asian countries. *Environmental Science and Pollution Research*, *30*(17), pp.49270-49289.
2. Abdel-Latif, H., 2019. FDI response to political shocks: What can the Arab Spring tell us?. *Journal of Behavioural and Experimental Finance*, *24*, p.100233.
3. Abdo, A.B., Li, B., Zhang, X., Lu, J. and Rasheed, A., 2020. Influence of FDI on environmental pollution in selected Arab countries: a spatial econometric analysis perspective. Environmental Science and Pollution Research, 27, pp.28222-28246.
4. Abdouli, M. and Hammami, S., 2017. Investigating the causality links between environmental quality, foreign direct investment and economic growth in MENA countries. *International Business Review*, *26*(2), pp.264-278.
5. Abid, M. and Sekrafi, H., 2021. Pollution haven or halo effect? A comparative analysis of developing and developed countries. *Energy Reports*, *7*, pp.4862-4871.
6. Abraham, K.G. and Kearney, M.S., 2020. Explaining the decline in the US employment-to-population ratio: A review of the evidence. *Journal of Economic Literature*, *58*(3), pp.585-643.
7. Abrigo, M.R. and Love, I., 2016. Estimation of panel vector autoregression in Stata. *The Stata Journal*, *16*(3), pp.778-804.
8. Abu Bakar, N.A., 2019. Greenfield, mergers and acquisitions, energy consumption, and environmental performance in selected SAARC and ASEAN countries. *International Journal of Energy Economics and Policy*, *9*(2), 216-224.
9. Acquah, A.M. and Ibrahim, M., 2020. Foreign direct investment, economic growth and financial sector development in Africa. *Journal of Sustainable Finance & Investment*, *10*(4), pp.315-334.
10. Adarov, A. and Stehrer, R., 2020. Capital dynamics, global value chains, competitiveness and barriers to FDI and capital accumulation in the EU. *Wiiw Research Report*, No. 446.
11. Adedoyin, F.F., Bekun, F.V., Driha, O.M. and Balsalobre-Lorente, D., 2020. The effects of air transportation, energy, ICT and FDI on economic growth in the industry 4.0 era: Evidence from the United States. *Technological Forecasting and Social Change*, *160*, p.120297.
12. Adeel-Farooq, R.M., Abu Bakar, N.A. and Olajide Raji, J., 2018. Green field investment and environmental performance: A case of selected nine developing countries of Asia. *Environmental Progress & Sustainable Energy*, *37*(3), pp.1085-1092.

13. Adeel-Farooq, R.M., Riaz, M.F. and Ali, T., 2021. Improving the environment begins at home: Revisiting the links between FDI and environment. *Energy*, *215*, p.119150.
14. Adeel-Farooq, R.M., Riaz, M.F. and Ali, T., 2021. Improving the environment begins at home: Revisiting the links between FDI and environment. *Energy*, *215*, p.119150.
15. Adeleye, B.N., Akam, D., Inuwa, N., James, H.T. and Basila, D., 2023. Does globalization and energy usage influence carbon emissions in South Asia? An empirical revisit of the debate. *Environmental Science and Pollution Research*, *30*(13), pp.36190-36207.
16. Agras, J. and Chapman, D., 1999. A dynamic approach to the Environmental Kuznets Curve hypothesis. *Ecological Economics*, *28*(2), pp.267-277.
17. Ahn, J. and Park, J.H., 2022. Identifying FDI types: Watch what they do, not what they say or look like. *Economics Letters*, *213*, p.110346.
18. Ahn, J. and Park, J.H., 2023. Contracting with Enemies? Vertical FDI with outsourcing contracts. *International Economic Journal*, pp.1-28.
19. Aizenman, J. and Marion, N., 2004. The merits of horizontal versus vertical FDI in the presence of uncertainty. *Journal of International Economics*, *62*(1), pp.125-148.
20. Akaike, H., 1969. Fitting autoregressive models for prediction. *Annals of the Institute of Statistical Mathematics*, *21*(1), pp.243-247.
21. Akram, R., Chen, F., Khalid, F., Huang, G. and Irfan, M., 2021. Heterogeneous effects of energy efficiency and renewable energy on economic growth of BRICS countries: a fixed effect panel quantile regression analysis. *Energy*, *215*, p.119019.
22. Alam, M.S., Raza, S.A., Shahbaz, M. and Abbas, Q., 2016. Accounting for contribution of trade openness and foreign direct investment in life expectancy: The long-run and short-run analysis in Pakistan. *Social Indicators Research*, *129*, pp.1155-1170.
23. Alfaro, L., Chanda, A., Kalemli-Ozcan, S. and Sayek, S., 2004. FDI and economic growth: the role of local financial markets. *Journal of International Economics*, *64*(1), pp.89-112.
24. Alola, A.A., Yalçiner, K., Alola, U.V. and Saint Akadiri, S., 2019. The role of renewable energy, immigration and real income in environmental sustainability target. Evidence from Europe largest states. *Science of The Total Environment*, *674*, pp.307-315.
25. Alon, I., Elia, S. and Li, S., 2020. Greenfield or M&A? An institutional and learning perspective on the establishment mode choice of Chinese outward investments. *Journal of International Management*, *26*(3), p.100758.
26. Altenburg, T., 2000. Linkages and spillovers between transnational corporations and small and medium-sized enterprises in developing countries: Opportunities and policies. *German Development Institute, Berlin*. ISBN: 3-88985-217-3.

27. Amoroso, S. and Moncada-Paternò-Castello, P., 2018. Inward greenfield FDI and patterns of job polarization. *Sustainability*, *10*(4), p.1219.
28. Andersen, M.S. and Liefferink, D. eds., 1997. *European environmental policy: The pioneers*. Manchester University Press. pp.xi, 330
29. Andrews, D.W. and Lu, B., 2001. Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *Journal of Econometrics*, *101*(1), pp.123-164.
30. Antonakis, J., Bendahan, S., Jacquart, P. and Lalive, R., 2010. On making causal claims: A review and recommendations. *The Leadership Quarterly*, *21*(6), pp.1086-1120.
31. Antonietti, R. and Franco, C., 2021. From FDI to economic complexity: a panel Granger causality analysis. *Structural Change and Economic Dynamics*, *56*, pp.225-239.
32. Antweiler, W., Copeland, B. R., and Taylor, M. S., 2001. "Is Free Trade Good for the Environment?" *American Economic Review, 91*, pp.877-908.
33. Apergis, N. and Ozturk, I., 2015. Testing environmental Kuznets curve hypothesis in Asian countries. *Ecological Indicators*, *52*, pp.16-22.
34. Aragón, F.M., Rud, J.P. and Toews, G., 2018. Resource shocks, employment, and gender: evidence from the collapse of the UK coal industry. *Labour Economics*, *52*, pp.54-67.
35. Arellano, M. and Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), pp.277-297.
36. Armstrong, C.E. and Shimizu, K., 2007. A review of approaches to empirical research on the resource-based view of the firm. *Journal of Management*, *33*(6), pp.959-986.
37. Ashraf, A., Doytch, N. and Uctum, M., 2021. Foreign direct investment and the environment: disentangling the impact of greenfield investment and merger and acquisition sales. *Sustainability Accounting, Management and Policy Journal*, *12*(1), pp.51-73.
38. Ashraf, A., Herzer, D. and Nunnenkamp, P., 2016. The effects of Greenfield FDI and cross-border M&As on total factor productivity. *The World Economy*, *39*(11), pp.1728-1755.
39. Asiedu, E., 2002. On the determinants of foreign direct investment to developing countries: is Africa different? *World Development*, *30*(1), pp.107-119.
40. Asiedu, E., 2003. Foreign direct investment to Africa: The role of government policy, governance and political instability. *Department of Economics, University of Kansas*.
41. Asiedu, E., 2006. Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. *World economy*, 29(1), pp.63-77.

42. Aslan, A., Ocal, O., Ozsolak, B. and Ozturk, I., 2022. Renewable energy and economic growth relationship under the oil reserve ownership: Evidence from panel VAR approach. *Renewable Energy*, *188*, pp.402-410.
43. Assamah, D. and Yuan, S., 2024. Greenfield investment and job creation in Ghana: a sectorial analysis and geopolitical implications of Chinese investments. *Humanities and Social Sciences Communications*, *11*(1), pp.1-11.
44. Asteriou, D., and Hall, S.G., 2016. Applied Econometrics. *3rd ed*. London: Bloomsbury Publishing Plc. Pp.442-518.
45. Aydin, M. and Degirmenci, T., 2024. The role of greenfield investment and investment freedom on environmental quality: testing the EKC hypothesis for EU countries. *International Journal of Sustainable Development & World Ecology*, pp.1-11.
46. Ayyagari, M. and Kosová, R., 2010. Does FDI facilitate domestic entry? Evidence from the Czech Republic. *Review of International Economics*, *18*(1), pp.14-29.
47. Aziz, T., Raza, A. and Tarakai, M., 2023. Impact of the greenfield-foreign direct investment on the economic growth of Afghanistan. *Liberal Arts and Social Sciences International Journal (LASSIJ)*, *7*(1), pp.187-201.
48. Azman-Saini, W.N.W. and Law, S.H., 2010. FDI and economic growth: New evidence on the role of financial markets. *Economics Letters*, *107*(2), pp.211-213.
49. Bai, J., Choi, S.H. and Liao, Y., 2021. Feasible generalized least squares for panel data with cross-sectional and serial correlations. *Empirical Economics*, *60*, pp.309-326.
50. Bai, L., Shin, S., Burnett, R.T., Kwong, J.C., Hystad, P., van Donkelaar, A., Goldberg, M.S., Lavigne, E., Weichenthal, S., Martin, R.V. and Copes, R., 2020. Exposure to ambient air pollution and the incidence of lung cancer and breast cancer in the Ontario Population Health and Environment Cohort. *International Journal of Cancer*, *146*(9), pp.2450-2459.
51. Bai, Y., Qian, Q., Jiao, J., Li, L., Li, F. and Yang, R., 2020. Can environmental innovation benefit from outward foreign direct investment to developed countries? Evidence from Chinese manufacturing enterprises. *Environmental Science and Pollution Research*, *27*, pp.13790-13808.
52. Bajrami, H. and Zeqiri, N., 2019. Theories of foreign direct investment (FDI) and the significance of human capital. *International Journal of Business & Management*, *7*(1), pp.11-24.
53. Balsalobre-Lorente, D., Gokmenoglu, K.K., Taspinar, N. and Cantos-Cantos, J.M., 2019. An approach to the pollution haven and pollution halo hypotheses in MINT countries. *Environmental Science and Pollution Research*, *26*, pp.23010-23026.

54. Bandick, R. and Karpaty, P., 2011. Employment effects of foreign acquisition. *International Review of Economics & Finance*, *20*(2), pp.211-224.
55. Baranwal, G., 2019. Links between foreign direct investment and human capital formation: Evidence from the manufacturing sector in India. *The Journal of International Trade & Economic Development*, *28*(2), pp.137-160.
56. Baranzini, A., Goldemberg, J. and Speck, S., 2000. A future for carbon taxes. *Ecological Economics*, *32*(3), pp.395-412.
57. Barman, N. and Talukdar, D., 2014. Socio-demographic factors affecting infant mortality rate in Assam. *International Journal of Science, Environment and Technology*, *3*(5), pp.1893-1900.
58. Barnard, C., 2022. The substantive law of the EU: the four freedoms. 7th *ed.* New York: Oxford university press.
59. Barnes, P.M. and Barnes, I.G., 2000. Environmental policy in the European Union.
60. Barney, J., 1991. Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), pp.99-120.
61. Barney, J., Wright, M. and Ketchen Jr, D.J., 2001. The resource-based view of the firm: Ten years after 1991. *Journal of Management*, *27*(6), pp.625-641.
62. Bashir, T., Mansha, A., Zulfiqar, R. and Riaz, R., 2014. Impact of FDI on economy growth: a comparison of South Asian States & China. *European Scientific Journal*, *10*(1).
63. Bator, F.M., 1957. The simple analytics of welfare maximization. *The American Economic Review*, *47*(1), pp.22-59.
64. Baumol WJ, Oates WE, eds. 1988. The Theory of Environmental Policy. Cambridge, UK: *Cambridge Univ. Press*. 2nd ed.
65. Baun, M.J., 2018. An imperfect Union: The Maastricht Treaty and the new politics of European integration. *1st ed*. New York: Routledge.
66. Bayar, Y., 2017. Greenfield and brownfield investments and economic growth: evidence from central and Eastern European Union countries. *Our Economy*, *63*(3), pp.19-26.
67. Bayar, Y., Dan Gavriletea, M., Estes, J. and Oana Pintea, M., 2023. Impact of banking sector development and environment on population health: evidence from EU transition countries. *Economic Research*, *36*(1).
68. Bayraktar-Sağlam, B. and Sayek Böke, S., 2017. Labor costs and foreign direct investment: A panel VAR approach. *Economies*, *5*(4), p.36.
69. Becker, R. and Henderson, V., 2000. Effects of air quality regulations on polluting industries. *Journal of Political Economy*, *108*(2), pp.379-421.

70. Bekun, F.V., Alola, A.A., Gyamfi, B.A. and Yaw, S.S., 2021. The relevance of EKC hypothesis in energy intensity real-output trade-off for sustainable environment in EU-27. *Environmental Science and Pollution Research*, *28*, pp.1-12.
71. Bellak, C. and Leibrecht, M., 2009. Do low corporate income tax rates attract FDI?–Evidence from Central-and East European countries. *Applied Economics*, *41*(21), pp.2691-2703.
72. Bellemare, M.F., Masaki, T. and Pepinsky, T.B., 2017. Lagged explanatory variables and the estimation of causal effect. *The Journal of Politics*, *79*(3), pp.949-963.
73. Belloumi, M. and Alshehry, A., 2020. The impact of international trade on sustainable development in Saudi Arabia. *Sustainability*, *12*(13), p.5421.
74. Benacek, V., Gronicki, M., Holland, D. and Sass, M., 2000. The Determinants and Impact of Foreign Direct Investment in Central and Eastern Europe: A comparison of survey and econometric evidence. *Transnational Corporations*, *9*(3), pp.163-212.
75. Bergek, A., Berggren, C. and KITE Research Group, 2014. The impact of environmental policy instruments on innovation: A review of energy and automotive industry studies. *Ecological Economics*, *106*, pp.112-123.
76. Bergquist, A.K., Söderholm, K., Kinneryd, H., Lindmark, M. and Söderholm, P., 2013. Command-and-control revisited: Environmental compliance and technological change in Swedish industry 1970–1990. *Ecological Economics*, *85*, pp.6-19.
77. Bermejo Carbonell, J. and Werner, R.A., 2018. Does foreign direct investment generate economic growth? A new empirical approach applied to Spain. *Economic Geography*, *94*(4), pp.425-456.
78. Beugelsdijk, S., Smeets, R. and Zwinkels, R., 2008. The impact of horizontal and vertical FDI on host's country economic growth. *International Business Review*, *17*(4), pp.452-472.
79. Bevan, A.A. and Estrin, S., 2000. The determinants of foreign direct investment in transition economies. *Available at SSRN 258070*.
80. Bevan, A.A. and Estrin, S., 2004. The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics*, *32*(4), pp.775-787.
81. Bhagat, S., Shleifer, A., Vishny, R.W., Jarrel, G. and Summers, L., 1990. Hostile takeovers in the 1980s: The return to corporate specialization. *Brookings Papers on Economic Activity. Microeconomics*, *1990*(1990), pp.1-84.
82. Bialek, S. and Weichenrieder, A.J., 2021. Do stringent environmental policies deter FDI? M&A versus Greenfield. *Environmental and Resource Economics*, *80*(3), pp.603-636.

83. Bialek, S. and Weichenrieder, A.J., 2021. Do stringent environmental policies deter FDI? M&A versus Greenfield. *Environmental and Resource Economics*, *80*, pp.603-636.
84. Bickenbach, F. and Liu, W.H., 2018. Chinese direct investment in Europe–Challenges for EU FDI policy. München: ifo Institut–Leibniz-Institut für Wirtschaftsforschung an der Universität München. In CESifo Forum *19*(4), pp. 15-22.
85. Blanco, L., Gonzalez, F. and Ruiz, I., 2013. The impact of FDI on CO2 emissions in Latin America. *Oxford Development Studies*, *41*(1), pp.104-121.
86. Blauberger, M. and Van Hüllen, V., 2021. Conditionality of EU funds: an instrument to enforce EU fundamental values?. *Journal of European Integration*, *43*(1), pp.1-16.
87. Blomström, M., Kokko, A. and Zejan, M., 1994. Host country competition, labor skills, and technology transfer by multinationals. *Review of World Economics*, *130*, pp.521-533.
88. Bloom, N., Bunn, P., Chen, S., Mizen, P., Smietanka, P. and Thwaites, G., 2019. The impact of Brexit on UK firms. *National Bureau of Economic Research*. No. 26218.
89. Blundell, R. and Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), pp.115-143.
90. Boddewyn, J.J. 1983, "Foreign direct divestment theory: is it the reverse of FDI theory?". *Review of World Economics*, *119*(2). pp. 345-355.
91. Boddewyn, J.J., 1985. Theories of foreign direct investment and divestment: A classificatory note. *Management International Review*, pp.57-65.
92. Bond, S.R., 2002. Dynamic panel data models: a guide to micro data methods and practice. *Portuguese Economic Journal*, *1*, pp.141-162.
93. Borensztein, E., De Gregorio, J. and Lee, J.W., 1998. How does foreign direct investment affect economic growth?. *Journal of International Economics*, *45*(1), pp.115-135.
94. Borgen, N.T., 2016. Fixed effects in unconditional quantile regression. *The Stata Journal*, *16*(2), pp.403-415.
95. Bosworth, B.P., Collins, S.M. and Reinhart, C.M., 1999. Capital flows to developing economies: implications for saving and investment. *Brookings papers on economic activity*, *1999*(1), pp.143-180.
96. Botta, E. and Koźluk, T., 2014. Measuring environmental policy stringency in OECD countries: A composite index approach. No. 1177. Pp. 1- 47.
97. Bradford, A., 2020. The Brussels effect: How the European Union rules the world. New York: Oxford University Press.

98. Brahmasrene, T., Huang, J.C. and Sissoko, Y., 2014. Crude oil prices and exchange rates: Causality, variance decomposition and impulse response. *Energy Economics*, *44*, pp.407-412.

99. Breitung, J. and Das, S., 2005. Panel unit root tests under cross-sectional dependence. *Statistica Neerlandica*, *59*(4), pp.414-433.

100. Breitung, J., 2001. The local power of some unit root tests for panel data. In *Nonstationary panels, panel cointegration, and dynamic panels. Emerald Group Publishing Limited*, *15*, pp.161-177.

101. Breusch, T.S. and Pagan, A.R., 1979. A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the Econometric Society*, pp.1287-1294.

102. Brincikova, Z. and Darmo, L., 2014. The impact of FDI inflow on employment in V4 countries. *European Scientific Journal, 1,* pp.245-252.

103. Brockhoff, K., 1967. A test for the product life cycle. *Econometrica, Journal of the Econometric Society*, pp.472-484.

104. Brown, C. and Medoff, J.L., 1988. The impact of firm acquisitions on labour. In *Corporate takeovers: Causes and consequences.* University of Chicago Press, pp. 9-32.

105. Brunnermeier, S.B. and Levinson, A., 2004. Examining the evidence on environmental regulations and industry location. *The Journal of Environment & Development*, *13*(1), pp.6-41.

106. Bruno C., Maria B., Konstantin M. W. (2023). Measuring Multinational Production with Foreign Direct Investment Statistics: Recent Trends, Challenges, and Developments [Online]. *International Monetary Fund Statistics Department Working Paper No.23/113*. Retrieved from: wpiea2023113-print-pdf.pdf. Date accessed: 1st August 2023.

107. Buchanan, J.M. and Stubblebine, W.C., 1962. Externality. In *Classic papers in natural resource economics*. London: Palgrave Macmillan. pp. 138-154

108. Buckley, P.J. and Casson, M.C., 2015. The internalisation theory of the multinational enterprise: A review of the progress of a research agenda after 30 years. *International Business Strategy*, pp.85-107.

109. Buckley, P.J., 2018. Internalisation theory and outward direct investment by emerging market multinationals. *Management International Review*, *58*(2), pp.195-224.

110. Bui, Q., Wang, Z., Zhang, B., Le, H.P. and Vu, K.D., 2021. Revisiting the biomass energy-economic growth linkage of BRICS countries: A panel quantile regression with fixed effects approach. *Journal of Cleaner Production*, *316*, p.128382.

111. Burns, C. and Tobin, P., 2016. The impact of the economic crisis on European Union environmental policy. *JCMS: Journal of Common Market Studies*, *54*(6), pp.1485-1494.
112. Burns, C., Eckersley, P. and Tobin, P., 2020. EU environmental policy in times of crisis. *Journal of European Public Policy*, *27*(1), pp.1-19.
113. Burns, C., Eckersley, P. and Tobin, P., 2020. EU environmental policy in times of crisis. *Journal of European Public Policy*, *27*(1), pp.1-19.
114. Burns, D.K., Jones, A.P., Goryakin, Y. and Suhrcke, M., 2017. Is foreign direct investment good for health in low- and middle-income countries? An instrumental variable approach. *Social Science & Medicine*, *181*, pp.74-82.
115. Burrell, K. and Hopkins, P., 2019. Introduction: Brexit, race and migration. In: ed. *Environment and Planning C: Politics and Space*, *37*(1), pp.4-7.
116. Buse, K., Mays, N., Colombini, M., Fraser, A., Khan, M. and Walls, H., 2023. Making Health Policy, 3e. McGraw Hill.
117. Byaro, M., Nkonoki, J. and Mayaya, H., 2021. The contribution of trade openness to health outcomes in sub-Saharan African countries: A dynamic panel analysis. *Research in Globalization*, *3*, p.100067.
118. Caetano, J. and Galego, A., 2009. FDI in the European Union and MENA countries: Institutional and Economic Determinants. *CEFAGE-UE Working Paper*, *9*, pp.1-21.
119. Camarero, M., Moliner, S. and Tamarit, C., 2021. Japan's FDI drivers in a time of financial uncertainty. New evidence based on Bayesian Model Averaging. *Japan and the World Economy*, *57*, p.101058.
120. Cameron, A.C. and Trivedi, P.K., 2005. Microeconometrics: methods and applications. *1st ed*. Cambridge university press. pp.702.
121. Cameron, S. 2005. Econometrics. *1st ed*. London: McGraw-Hill Education.
122. Campos, N.F., Coricelli, F. and Franceschi, E., 2022. Institutional integration and productivity growth: Evidence from the 1995 enlargement of the European Union. *European Economic Review, 142*, p.104014.
123. Cao, B. and Sun, Y., 2011. Asymptotic distributions of impulse response functions in short panel vector autoregressions. *Journal of Econometrics, 163*(2), pp.127-143.
124. Cao, H. and Folan, P., 2012. Product life cycle: the evolution of a paradigm and literature review from 1950–2009. *Production Planning & Control*, *23*(8), pp.641-662.

125. Carkovic, M. and Levine, R., 2005. Does foreign direct investment accelerate economic growth. In: ed. *Does foreign direct investment promote development*. Washinton DC: Automated Graphic Systems, Inc, 2005. *195*, p.220.
126. Casella, B. and Formenti, L., 2019. FDI in the digital economy: a shift to asset-light international footprints. *Transnational Corporations*, *25*(1), pp.101-130.
127. Caves, R.E., 1974. Multinational firms, competition, and productivity in host-country markets. *Economica*, *41*(162), pp.176-193.
128. Chakraborty, C. and Nunnenkamp, P., 2008. Economic reforms, FDI, and economic growth in India: a sector level analysis. *World Development*, *36*(7), pp.1192-1212.
129. Chang, S.J. and Xu, D., 2008. Spillovers and competition among foreign and local firms in China. *Strategic Management Journal*, *29*(5), pp.495-518.
130. Chaudhury, S., Nanda, N. and Tyagi, B., 2020. Impact of FDI on economic growth in South Asia: does nature of FDI matters?. *Review of Market Integration*, *12*(1-2), pp.51-69.
131. Chen, B. and Kan, H., 2008. Air pollution and population health: a global challenge. *Environmental Health and Preventive Medicine*, *13*, pp.94-101.
132. Cherchye, L., Lovell, C.K., Moesen, W. and Van Puyenbroeck, T., 2007. One market, one number? A composite indicator assessment of EU internal market dynamics. *European Economic Review*, *51*(3), pp.749-779.
133. Chiappini, R., Coupaud, M. and Viaud, F., 2022. Does attracting FDI affect population health? New evidence from a multi-dimensional measure of health. *Social Science & Medicine*, *301*, p.114878.
134. Chichilnisky G. 1994. North-south trade and the global environment. *American Economic Review, 84*(4), pp.851–74.
135. Chien, F., Sadiq, M., Nawaz, M.A., Hussain, M.S., Tran, T.D. and Le Thanh, T., 2021. A step toward reducing air pollution in top Asian economies: The role of green energy, eco-innovation, and environmental taxes. *Journal of Environmental Management*, *297*, p.113420.
136. Child, J., 1997. Strategic choice in the analysis of action, structure, organizations and environment: Retrospect and prospect. *Organization Studies*, *18*(1), pp.43-76.
137. Choi, I., 2001. Unit root tests for panel data. *Journal of International Money and Finance*, *20*(2), pp.249-272.
138. Chopin, T. and Lequesne, C., 2021. Disintegration reversed: Brexit and the cohesiveness of the EU27. Journal of Contemporary European Studies, 29(3), pp.419-431.

139. Cieślik, A. and Ghodsi, M., 2021. Economic sentiment indicators and foreign direct investment: Empirical evidence from European Union countries. *International Economics*, *168*, pp.56-75.
140. Ciobanu, A.M., 2021. The impact of FDI on economic growth in case of Romania. *International Journal of Economics and Finance*, *12*(12), pp.1-81.
141. Coase, R.H., 2013. The problem of social cost. *The Journal of Law and Economics*, *56*(4), pp.837-877.
142. Cole, M.A. and Elliott, R.J., 2005. FDI and the capital intensity of "dirty" sectors: a missing piece of the pollution haven puzzle. *Review of Development Economics*, *9*(4), pp.530-548.
143. Cole, M.A., 2004. Trade, the pollution haven hypothesis and the environmental Kuznets curve: examining the linkages. *Ecological Economics*, *48*(1), pp.71-81.
144. Cole, M.A., Elliott, R.J. and Fredriksson, P.G., 2006. Endogenous pollution havens: Does FDI influence environmental regulations?. *Scandinavian Journal of Economics*, *108*(1), pp.157-178.
145. Cole, M.A., Elliott, R.J. and Zhang, J., 2011. Growth, foreign direct investment, and the environment: evidence from Chinese cities. *Journal of Regional Science*, *51*(1), pp.121-138.
146. Contractor, F.J., Dangol, R., Nuruzzaman, N. and Raghunath, S., 2020. How do country regulations and business environment impact foreign direct investment (FDI) inflows?. *International Business Review*, *29*(2), p.101640.
147. Conyon, M.J., Girma, S., Thompson, S. and Wright, P.W., 2001. Do hostile mergers destroy jobs?. *Journal of Economic Behaviour & Organization*, *45*(4), pp.427-440.
148. Conyon, M.J., Girma, S., Thompson, S. and Wright, P.W., 2002. The impact of mergers and acquisitions on company employment in the United Kingdom. *European Economic Review*, *46*(1), pp.31-49.
149. Conyon, M.J., Girma, S., Thompson, S. and Wright, P.W., 2002. The impact of mergers and acquisitions on company employment in the United Kingdom. *European Economic Review*, *46*(1), pp.31-49.
150. Cook, R.D. and Weisberg, S., 1983. Diagnostics for heteroscedasticity in regression. *Biometrika*, *70*(1), pp.1-10.
151. Copeland, B.R. and Taylor, M.S., 1993 and 2017. North-South trade and the environment. In *International trade and the environment*. *Routledge.* pp. 205-238.

152. Cortes-Ramirez, J., Wilches-Vega, J.D., Paris-Pineda, O.M., Rod, J.E., Ayurzana, L. and Sly, P.D., 2021. Environmental risk factors associated with respiratory diseases in children with socioeconomic disadvantage. Heliyon, 7(4).
153. Costa, O., 2019. The politicization of EU external relations. *Journal of European Public Policy*, *26*(5), pp.790-802.
154. Crescenzi, R., Di Cataldo, M. and Giua, M., 2021. FDI inflows in Europe: Does investment promotion work?. *Journal of International Economics*, *132*, pp.103497.
155. Cui, L. and Jiang, F., 2012. State ownership effect on firms' FDI ownership decisions under institutional pressure: A study of Chinese outward-investing firms. *Journal of International Business Studies*, *43*, pp.264-284.
156. Damette, O. and Delacote, P., 2012. On the economic factors of deforestation: what can we learn from quantile analysis?. *Economic Modelling*, *29*(6), pp.2427-2434.
157. Daoud, J.I., 2017, December. Multicollinearity and regression analysis. In: ed. *Journal of Physics: Conference Series*. IOP Publishing, *949*(1), p. 012009.
158. Darvas, Z., Mazza, J. and Midoes, C., 2019. In: ed. *How to improve European Union cohesion policy for the next decade*. Bruegel Policy Contribution, No. 2019/8.
159. Davies, J.M. and Mazumder, A., 2003. Health and environmental policy issues in Canada: the role of watershed management in sustaining clean drinking water quality at surface sources. *Journal of environmental management*, *68*(3), pp.273-286.
160. Davis, G.F. and DeWitt, T., 2021. Organization theory and the resource-based view of the firm: The great divide. *Journal of Management*, *47*(7), pp.1684-1697.
161. Dean, J.M., Lovely, M.E. and Wang, H., 2009. Are foreign investors attracted to weak environmental regulations? Evaluating the evidence from China. *Journal of development economics*, *90*(1), pp.1-13.
162. Dedman, M., 2006. The origins and development of the European Union 1945-1995: a history of European integration. *1st ed*. London: Routledge, pp. 1-160.
163. Delevic, U. and Heim, I., 2017. Institutions in transition: is the EU integration process relevant for inward FDI in transition European economies?. *Eurasian Journal of Economics and Finance*, *5*(1), pp.16-32.
164. Demena, B. and Afesorgbor, S.K., 2019. The effect of FDI on environmental emissions: Evidence from a meta-analysis. *ISS Working Paper Series/General Series*, *650*(650), pp.1-41.

165. Demena, B.A. and Afesorgbor, S.K., 2020. The effect of FDI on environmental emissions: Evidence from a meta-analysis. *Energy Policy*, *138*, p.111192.

166. Demirsel, M.T., Adem, Ö. and Mucuk, M., 2014. The effect of foreign direct investment on economic growth: The case of Turkey. In *Proceedings of International Academic Conferences*. International Institute of Social and Economic Sciences. No. 0702081

167. Den Hertog, L. and Stroß, S., 2013. Coherence in EU external relations: Concepts and legal rooting of an ambiguous term. *European Foreign Affairs Review*, *18*(3).

168. Deng, P., 2013. Chinese outward direct investment research: theoretical integration and recommendations. *Management and Organisation Review*. 9 (3), 513–539.

169. Denisia, V., 2010. Foreign direct investment theories: An overview of the main FDI theories. *European journal of interdisciplinary studies*, (3).

170. Dikova, D. and Van Witteloostuijn, A., 2007. Foreign direct investment mode choice: entry and establishment modes in transition economies. *Journal of international business studies*, *38*, pp.1013-1033.

171. Dinan, D., 2004. Europe recast: a history of European Union. *2nd ed*. Basingstoke: Palgrave Macmillan, *373*.

172. Dinda, S., 2004. Environmental Kuznets curve hypothesis: a survey. *Ecological Economics*, *49*(4), pp.431-455.

173. Dinh, T.T.H., Vo, D.H., The Vo, A. and Nguyen, T.C., 2019. Foreign direct investment and economic growth in the short run and long run: Empirical evidence from developing countries. *Journal of Risk and Financial Management*, *12*(4), p.176.

174. Dollar, D. and Kraay, A., 2003. Institutions, trade, and growth. *Journal of Monetary Economics*, *50*(1), pp.133-162.

175. Dong, Y., Jin, G. and Deng, X., 2020. Dynamic interactive effects of urban land-use efficiency, industrial transformation, and carbon emissions. *Journal of Cleaner Production*, *270*, p.122547.

176. Dorakh, A., 2020a. FDI determinants in the European Union: Empirical application. *Scientific Annals of Economics and Business*, *67*(2), pp.219-232.

177. Dorakh, A., 2020b. A gravity model analysis of FDI across EU member states. *Journal of Economic Integration*, *35*(3), pp.426-456.

178. Dornean, A., Chiriac, I. and Rusu, V.D., 2021. Linking FDI and Sustainable Environment in EU countries. *Sustainability*, *14*(1), p.196.

179. Doytch, N. and Ashraf, A., 2022. The ecological footprints of greenfield FDI and cross border M&A Sales. *Environmental Modelling & Assessment, 27*(6), pp.935-951.

180. Doytch, N. and Uctum, M., 2016. Globalization and the environmental impact of sectoral FDI. *Economic Systems*, *40*(4), pp.582-594.
181. Driscoll, J.C. and Kraay, A.C., 1998. Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics*, *80*(4), pp.549-560.
182. Duce, M. and España, B.D., 2003. Definitions of Foreign Direct Investment (FDI): a methodological note. *Banco de Espana*, *6*(2), pp.43-49.
183. Duffy-Deno, K.T., 1992. Pollution abatement expenditures and regional manufacturing activity. *Journal of Regional Science*, *32*(4), pp.419-436.
184. Dumciuviene, D. and Paleviciene, A., 2017. Finding the determinants of FDI inflows to EU member states. In: ed. *Country Experiences in Economic Development, Management and Entrepreneurship.* Springer, Cham, pp. 139-149.
185. Dunning, J.H., 1973. The determinants of international production. *Oxford Economic Papers*, *25*(3), pp.289-336.
186. Dunning, J.H., 1997. The European internal market programme and inbound foreign direct investment. *J. Common Mkt. Stud.*, *35*, p.189.
187. Dursun-Özkanca, O., 2022. An examination of the underlying dynamics of Turkey-European Union relations through the lenses of international relations theory. *Turkish Studies*, *23*(5), pp.743-764.
188. Dutta, N. and Osei-Yeboah, K., 2013. A new dimension to the relationship between foreign direct investment and human capital: The role of political and civil rights. *Journal of International Development*, *25*(2), pp.160-179.
189. Economou, F., 2019. Economic freedom and asymmetric crisis effects on FDI inflows: The case of four South European economies. *Research in International Business and Finance*, *49*, pp.114-126.
190. Ekins, P., 1999. European environmental taxes and charges: recent experience, issues and trends. *Ecological Economics*, *31*(1), pp.39-62.
191. Elliott RJR, Zhou Y. 2013. Environmental regulation induced foreign direct investment. *Environmental Resource Economics, 55*(1), pp.141–58.
192. Elsa G., and Radoslav I., 2011. Economy and finance [Online]. Eurostat Statistics in focus 25/2011. Retrieved from: https://ec.europa.eu/eurostat/documents/3433488/5578916/KS-SF-11-025-EN.PDF.pdf/e9f982a0-fff2-417e-94a7-a9b296dec11f?t=1414693394000. Date accessed: 3rd August 2023.

193. Emako, E., Nuru, S. and Menza, M., 2023. The effect of foreign direct investment on capital accumulation in developing countries. *Development Studies Research*, *10*(1), p.2220580.

194. Erel, I., Liao, R.C. and Weisbach, M.S., 2012. Determinants of cross-border mergers and acquisitions. *The Journal of Finance*, *67*(3), pp.1045-1082.

195. Eskeland, G.S. and Harrison, A.E., 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. *Journal of development economics*, *70*(1), pp.1-23.

196. EU environmental legislation, 2024. Environment and climate change [Online]. EUR-Lex: Access to European Union law. Accessed from: Environment and climate change - EUR-Lex (europa.eu). Date accessed: 12th September 2024.

197. EU-Central Asia water, environment, and climate change cooperation (WECOOP), 2022. EU Environmental policy [online]. Retrieved from: https://wecoop.eu/regional-knowledge-centre/eu-policies-regulations/. Date accessed: 14th February 2022.

198. Eurobarometer Survey 89.2 of the EU Parliament (2018). A Public Opinion Monitoring Study [online]. Retrieved from: https://www.europarl.europa.eu/at-your-service/files/be-heard/eurobarometer/2018/delivering_on_europe_citizens_views_on_current_and_future_eu_action/report.pdf . Date accessed: 17th February 2022.

199. European Commission, 2022a. EU Accession Process Step by Step [Online]. Retrieved from: EU_accession_process_clusters (oct 2022).pdf (europa.eu). Date accessed: 25th April 2023.

200. European Commission, 2022b. Second Annual Report on the screening of foreign direct investments into the Union [Online]. Report from the Commission to the European Parliament and the Council. Brussels COM (2022) 433 final. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3a52022DC0433. Date accessed: 3rd August 2023.

201. European Commission, CAP Financing (2023). Agriculture and rural development [Online]. Retrieved from: CAP at a glance (europa.eu). Date accessed: 25th July 2023.

202. European Environmental Agency, 2019. European environment – state and outlook 2020. *Luxembourg: Publication Office of the European Union*. Retrieved from: the european environment-TH0419541ENN.pdf. Date accessed: 26th February 2025.

203. European Environmental Agency, 2025. Air pollution in the EU: facts and figures. Retrieved from: Air pollution in the EU: facts and figures - Consilium. Date accessed: 30th January 2025.

204. European Parliament, 2019. EU Environmental policy [online]. Retrieved from: https://what-europe-does-for-me.eu/data/pdf/focus/focus07_en.pdf. Date accessed: 14th February 2022.
205. European Parliament, 2020. EU Competitiveness and global growth [Online]. Retrieved from: EU competitiveness and global growth (europa.eu). Date accessed: 3rd May, 2023.
206. European Parliament, 2022. The Internal Market [Online]. Retrieved from: Freedom of establishment and freedom to provide services | Fact Sheets on the European Union | European Parliament (europa.eu). Date accessed: 3rd May 2023.
207. European Parliament, 2023. The EU's external relations [Online]. Retrieved from: The EU's external relations | Fact Sheets on the European Union | European Parliament (europa.eu). Date accessed: 28th July 2023.
208. European Union, 2023. Joining the EU [Online]. Retrieved from: EU membership, how to join, candidates| European Union (europa.eu). Date Accessed: 3rd May 2023.
209. Eurostat, 2020. Environmental tax revenues and energy tax revenues as percentage of GDP data. Retrieved from: Statistics | Eurostat. Date Accessed: 28th July 2020.
210. Evan, T. and Bolotov, I., 2022. Can Investment Incentives Cause Unemployment? An Empirical Analysis of The Relationship Between FDI and Employment Based on The OLI Framework. *Central European Business Review*, 11(3), p.1.
211. Ezeoha, A.E. and Cattaneo, N., 2012. FDI flows to sub-Saharan Africa: The impact of finance, institutions, and natural resource endowment. *Comparative Economic Studies*, *54*, pp.597-632.
212. Fabella, C., 2008. Population growth and infant mortality. *UPSE Discussion Paper*. No. 2008, 10.
213. Fahad, S., Bai, D., Liu, L. and Baloch, Z.A., 2022. Heterogeneous impacts of environmental regulation on foreign direct investment: do environmental regulation affect FDI decisions?. *Environmental Science and Pollution Research*, *29*(4), pp.5092-5104.
214. Fang, J., Collins, A. and Yao, S., 2021. On the global COVID-19 pandemic and China's FDI. *Journal of Asian Economics*, *74*, p.101300.
215. Ferrara, I., Missios, P. and Yildiz, H.M., 2015. Pollution havens, endogenous environmental policy, and foreign direct investment. *Southern Economic Journal*, *82*(1), pp.257-284.
216. Flores, C.A., Flores-Lagunes, A. and Kapetanakis, D., 2014. Lessons from quantile panel estimation of the environmental Kuznets curve. *Econometric Reviews*, *33*(8), pp.815-853.
217. Fredriksson PG. 1997. The political economy of pollution taxes in a small open economy. *Journal of Environmental Economics Management, 33*(1), pp.44–58.

218. Fredriksson, P.G. and Svensson, J., 2003. Political instability, corruption and policy formation: the case of environmental policy. *Journal of Public Economics*, *87*(7-8), pp.1383-1405.
219. Fredriksson, P.G., 1999. The political economy of trade liberalization and environmental policy. *Southern Economic Journal*, *65*(3), pp.513-525.
220. Fredriksson, P.G., List, J.A. and Millimet, D.L., 2003. Bureaucratic corruption, environmental policy and inbound US FDI: theory and evidence. *Journal of Public Economics*, *87*(7-8), pp.1407-1430.
221. Fukao, K. and Wei, Y., 2008. How do the location determinants of vertical FDI and horizontal FDI differ?. *Institute of Economic Research, Hitotsubashi University*, pp. d07-233)
222. Gao, L., Pei, T., Zhang, J. and Tian, Y., 2022. The "Pollution Halo" effect of fdi: evidence from the Chinese Sichuan–Chongqing urban agglomeration. *International Journal of Environmental Research and Public Health*, *19*(19), p.11903.
223. Gardiner, B., Martin, R. and Tyler, P., 2012. Competitiveness, productivity and economic growth across the European regions. In *Regional Competitiveness* (pp. 55-77). Routledge.
224. Gastanaga, V.M., Nugent, J.B. and Pashamova, B., 1998. Host country reforms and FDI inflows: How much difference do they make?. *World Development*, *26*(7), pp.1299-1314.
225. Ge, Y., Hu, Y. and Ren, S., 2020. Environmental regulation and foreign direct investment: evidence from China's eleventh and twelfth five-year plans. *Sustainability*, *12*(6), p.2528.
226. Gerhart, B. and Feng, J., 2021. The resource-based view of the firm, human resources, and human capital: Progress and prospects. *Journal of Management*, *47*(7), pp.1796-1819.
227. Ghazi, M., 2021. The determinant of foreign direct investment in Indonesia. *Jurnal Bisnis dan Akuntansi*, *23*(2), pp.297-306.
228. Ghoshal, S., 1987. Global strategy: An organizing framework. *Strategic Management Journal*, *8*(5), pp.425-440.
229. Giammanco, M.D. and Gitto, L., 2019. Health expenditure and FDI in Europe. *Economic Analysis and Policy*, *62*, pp.255-267.
230. Girma, S., 2005. Safeguarding jobs? Acquisition FDI and employment dynamics in UK manufacturing. *Review of World Economics*, *141*, pp.165-178.
231. Girma, S., Gorg, H., 2004. Blessing or curse? Domestic plants' employment and survival prospects after foreign acquisition. Applied Economics Quarterly 50, 89–110.
232. Girma, S., Thompson, S. and Wright, P.W., 2002. Why are productivity and wages higher in foreign firms?. *Economic and Social Review*, *33*(1), pp.93-100.

233. Gittens, D. and Pilgrim, S., 2013. Foreign Direct Investment and Human Capital: A Dynamic Paradox for Developing Countries. *Journal of Finance, Accounting & Management*, *4*(2).
234. Globerman, S. and Shapiro, D., 2002. Global foreign direct investment flows: The role of governance infrastructure. *World Development*, *30*(11), pp.1899-1919.
235. Golkhandan, A., 2017. The impact of foreign direct investment on health in developing countries. *Health Research Journal*, *2*(4), pp.235-243.
236. Gopalan, S., Ouyang, A. and Rajan, R.S., 2018. Impact of Greenfield FDI versus M&A on growth and domestic investment in developing Asia. *Economia Politica*, *35*, pp.41-70.
237. Görg, H., 2000. Analysing foreign market entry–the choice between greenfield investment and acquisitions. *Journal of Economic Studies*.
238. Granger, C.W., 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, pp.424-438.
239. Grant, W., Matthews, D. and Newell, P., 2000. *The effectiveness of European Union environmental policy*. Palgrave Macmillan Limited, pp.1-248. Retrieved from: ProQuest Ebook Central - Book Details. Date accessed: 5th March 2025.
240. Grant, W., Perl, A. and Knoepfel, P., 1999. The politics of improving urban air quality. United Kingdom: Cheltenham, Edward Elgar. Pp.145
241. Greene, W., 2019. Econometric Analysis [online]. 8th wd. India: Pearson Education Ltd. Pp.765-1020. Retrieved from: ProQuest Ebook Central - Reader. Date accessed: 1st June 2022.
242. Greenstone, M., 2002. The impacts of environmental regulations on industrial activity: Evidence from the 1970 and 1977 clean air act amendments and the census of manufactures. *Journal of Political Economy*, *110*(6), pp.1175-1219.
243. Gregory, A.W. and Hansen, B.E., 1996. Residual-based tests for cointegration in models with regime shifts. *Journal of Econometrics*, *70*(1), pp.99-126.
244. Grosse, R., 1985. An imperfect competition theory of the MNE. *Journal of International Business Studies*, *16*, pp.57-80.
245. Grossman, G. M., & Krueger, A. B. (1993). "Environmental Impacts of a North American Free Trade Agreement." *NBER Working Paper. No.3914.*
246. Guzzetti, L., 1995. A brief history of European Union research policy. Luxembourg: Office for Official Publications of the European Communities, p.172. Retrieved from: A Brief History of European Union Research Policy : OCTOBER 1995 (netaffair.org). Date accessed: 1st June 2022.

247. Gyamfi, B.A., Bein, M.A., Udemba, E.N. and Bekun, F.V., 2021. Investigating the pollution haven hypothesis in oil and non-oil sub-Saharan Africa countries: Evidence from quantile regression technique. *Resources Policy*, *73*, p.102119.
248. Hadri, K., 2000. Testing for stationarity in heterogeneous panel data. *The Econometrics Journal*, *3*(2), pp.148-161.
249. Haigh, N., 2015. *EU environmental policy: its journey to centre stage*. Routledge.
250. Hail, L. and Leuz, C., 2006. International differences in the cost of equity capital: Do legal institutions and securities regulation matter?. *Journal of Accounting Research*, *44*(3), pp.485-531.
251. Hale, G. and Xu, M., 2016. FDI effects on the labour market of host countries. *Federal Reserve Bank. RP 2016, 25.*
252. Halunga, A.G., Orme, C.D. and Yamagata, T., 2017. A heteroskedasticity robust Breusch–Pagan test for Contemporaneous correlation in dynamic panel data models. *Journal of Econometrics*, *198*(2), pp.209-230.
253. Hamilton, B.H. and Nickerson, J.A., 2003. Correcting for endogeneity in strategic management research. *Strategic Organization*, 1(1), pp.51-78.
254. Hamilton, J.D., 2010. Regime switching models. In *Macroeconometrics and time series analysis*. London: Palgrave Macmillan, pp. 202-209.
255. Handoyo, R.D., 2020. Impact of Covid 19 on trade, FDI, real exchange rate and era of digitalization: Brief review global economy during pandemic. *Journal of Developing Economies*, *5*(2), pp.86-90.
256. Hanna, R., 2010. US environmental regulation and FDI: evidence from a panel of US-based multinational firms. *American Economic Journal: Applied Economics*, *2*(3), pp.158-89.
257. Hannan, E.J. and Quinn, B.G., 1979. The determination of the order of an autoregression. *Journal of the Royal Statistical Society: Series B (Methodological)*, *41*(2), pp.190-195.
258. Hansen, H. and Rand, J., 2006. On the causal links between FDI and growth in developing countries. *World Economy*, *29*(1), pp.21-41.
259. Hansen, L.P., 1982. Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the Econometric Society*, pp.1029-1054.
260. Hansson, Å. and Olofsdotter, K., 2014. Labor Taxation and FDI decisions in the European Union. *Open Economies Review*, *25*(2), pp.263-287.

261. Hao, Y., Deng, Y., Lu, Z.N. and Chen, H., 2018. Is environmental regulation effective in China? Evidence from city-level panel data. *Journal of Cleaner Production*, *188*, pp.966-976.

262. Har, W.M., Teo, K.L. and Yee, K.M., 2008. FDI and economic growth relationship: An empirical study on Malaysia. *International Business Research*, *1*(2), pp.11-18.

263. Hargreaves, C., 1994. A review of methods of estimating cointegrating relationships. Nonstationary time series analysis and cointegration. *Oxford University Press: Oxford.* pp.87-131.

264. Harms, P. and Méon, P.G., 2018. Good and useless FDI: The growth effects of greenfield investment and mergers and acquisitions. *Review of International Economics*, *26*(1), pp.37-59.

265. Harris, R.D. and Tzavalis, E., 1999. Inference for unit roots in dynamic panels where the time dimension is fixed. *Journal of Econometrics*, *91*(2), pp.201-226.

266. Harzing, A.W., 2002. Acquisitions versus greenfield investments: International strategy and management of entry modes. *Strategic Management Journal*, *23*(3), pp.211-227.

267. Hassaballa, H., 2014. Testing for Granger causality between energy use and foreign direct investment inflows in developing countries. *Renewable and Sustainable Energy Reviews*, *31*, pp.417-426.

268. Hasudungan, A. and Pulungan, A.H., 2021. An Analysis of the monetary transmission mechanism of M&A, Greenfield FDI, Domestic Investment, and GDP per capita growth: The structural vector correction model in Indonesia. *International Journal of Business and Economic Sciences Applied Research*, *14*, pp.29-42.

269. Hausman, J. and Kuersteiner, G., 2008. Difference in difference meets generalized least squares: Higher order properties of hypotheses tests. *Journal of Econometrics*, *144*(2), pp.371-391.

270. Hawkins, J., 2020. One Hundred Years Ago. The Book That Inspired the Carbon Price: Pigou's The Economics of Welfare. *History of Economics Review*, *77*(1), pp.61-74.

271. Hayat, A., 2018. FDI and economic growth: the role of natural resources?. *Journal of Economic Studies*, *45*(2), pp.283-295.

272. Head, A., Lloyd-Ellis, H. and Sun, H., 2014. Search, liquidity, and the dynamics of house prices and construction. *American Economic Review*, *104*(4), pp.1172-1210.

273. Hemmelskamp, J., 1997. Environmental policy instruments and their effects on innovation. *European Planning Studies*, *5*(2), pp.177-194.

274. Hennart, J.F. and Park, Y.R., 1993. Greenfield vs. acquisition: The strategy of Japanese investors in the United States. *Management Science*, *39*(9), pp.1054-1070.
275. Hermes, N. and Lensink, R., 2003. Foreign direct investment, financial development and economic growth. *The Journal of Development Studies*, *40*(1), pp.142-163.
276. Herzer, D. and Nunnenkamp, P., 2012. *FDI and health in developed economies: A panel cointegration analysis*. Kiel *Working Paper*, No. 1756.
277. Herzer, D., 2010. Outward FDI and economic growth. *Journal of Economic Studies*, *37*(5), pp.476-494.
278. Hey, C., 2005. EU Environmental Policies: A short history of the policy strategies. *EU Environmental Policy Handbook*, Pp *14*.
279. Hillion, C., 2014. The Copenhagen criteria and their progeny. In: ed. *EU enlargement (Oxford, Hart Publishing, 2004)*, pp.1-22.
280. Hillman AL, Ursprung HW. 1992. The influence of environmental concerns on the political determination of trade policy. In The Greening of World Trade Issues, ed. K Anderson, R Blackhurst. *Ann Arbor, MI: Univ. Michigan Press*. pp. 195–20.
281. Hillman AL, Ursprung HW. 1993. Multinational firms, political competition, and international trade policy. *Int. Economic Review*, *34*(2), pp347–63.
282. Hoechle, D., 2007. Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal*, *7*(3), pp.281-312.
283. Hoffmann, R., Lee, C.G., Ramasamy, B. and Yeung, M., 2005. FDI and pollution: a Granger causality test using panel data. *Journal of International Development: The Journal of the Development Studies Association*, *17*(3), pp.311-317.
284. Holland, D. and Pain, N., 1998. The diffusion of innovations in Central and Eastern Europe: A study of the determinants and impact of foreign direct investment. London: National Institute of Economic and Social Research.
285. Holtz-Eakin, D., Newey, W. and Rosen, H.S., 1988. Estimating vector autoregressions with panel data. *Econometrica: Journal of the Econometric Society*, pp.1371-1395.
286. Hymer, S.H., 1976. The international operations of national firms: A study of foreign direct investment. MIT press Cambridge, MA.
287. Ibrahim, M.F., Hod, R., Tajudin, M.A.B.A., Mahiyuddin, W.R.W., Nawi, A.M. and Sahani, M., 2022. Children's exposure to air pollution in a natural gas industrial area and their risk of hospital admission for respiratory diseases. Environmental Research, 210, p.112966.

288. Im, K.S., Pesaran, M.H. and Shin, Y., 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, *115*(1), pp.53-74.
289. Immurana, M., 2021. Does population health influence FDI inflows into Ghana?. *International Journal of Social Economics*, *48*(2), pp.334-347.
290. Immurana, M., 2022. An empirical analysis of the effect of foreign direct investment on population health in Ghana. *International Social Science Journal*, *72*(245), pp.787-798.
291. Immurana, M., Iddrisu, A.A., Mohammed, A., Boachie, M.K., Owusu, S., KK, T.J.M. and Halidu, B.O., 2023. The effect of population health on the inflows of foreign direct investment in Africa. *Research in Globalization*, *6*, p.100114.
292. Imtiaz, S. and Bashir, M.F., 2017. Economic freedom and foreign direct investment in South Asian countries. *Theoretical & Applied Economics*, *24*(2).
293. Iršová, Z. and Havránek, T., 2013. Determinants of horizontal spillovers from FDI: Evidence from a large meta-analysis. *World Development*, *42*, pp.1-15.
294. Islam, M.A., Khan, M.A., Popp, J., Sroka, W. and Oláh, J., 2020. Financial development and foreign direct investment—The moderating role of quality institutions. *Sustainability*, *12*(9), p.3556.
295. Islam, M.A., Liu, H., Khan, M.A., Islam, M.T. and Sultanuzzaman, M.R., 2021. Does foreign direct investment deepen the financial system in Southeast Asian economies?. *Journal of Multinational Financial Management*, *61*, p.100682.
296. Jaffe, A.B., Peterson, S.R., Portney, P.R. and Stavins, R.N., 1995. Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us?. *Journal of Economic Literature*, *33*(1), pp.132-163.
297. Jan Mišun, V.T., 2002. Does foreign direct investment crowd in or crowd out domestic investment?. *Eastern European Economics*, *40*(2), pp.38-56.
298. Janicki, H.P. and Wunnava, P.V., 2004. Determinants of foreign direct investment: empirical evidence from EU accession candidates. *Applied Economics*, *36*(5), pp.505-509.
299. Jaul, E. and Barron, J., 2017. Age-related diseases and clinical and public health implications for the 85 years old and over population. *Frontiers in Public Health*, *5*, p.316964.
300. Javorcik, B.S. and Wei, S.J., 2003. Pollution havens and foreign direct investment: dirty secret or popular myth?. *Contributions in Economic Analysis & Policy*, *3*(2).
301. Jaworek, M., Karaszewski, W. and Szałucka, M., 2018. Greenfield or Acquisition Entry? An Impact of Foreign Direct Investment on the Competitiveness of Polish Investors. *Entrepreneurial Business & Economics Review*, *6*(2).

302. Jenkins, R., 2006. Globalization, FDI and employment in Viet Nam. *Transnational Corporations*, *15*(1), p.115.
303. Jentsch, C. and Lunsford, K.G., 2016. Proxy SVARS: Asymptotic theory, bootstrap inference, and the effects of income tax changes in the United States. *University of Mannheim and Federal Reserve Bank of Cleveland, Working Paper Series No*. 16-19.
304. Jentsch, C. and Lunsford, K.G., 2019. The dynamic effects of personal and corporate income tax changes in the United States: Comment. *American Economic Review*, *109*(7), pp.2655-2678.
305. Jeppesen, T., List, J.A. and Folmer, H., 2002. Environmental regulations and new plant location decisions: Evidence from a meta-analysis. *Journal of regional science*, *42*(1), pp.19-49.
306. Jones, C. and Temouri, Y., 2016. The determinants of tax haven FDI. *Journal of World Business*, *51*(2), pp.237-250.
307. Jordan, A. ed., 2012. *Environmental policy in the European Union: actors, institutions, and processes*. Earthscan.
308. Jorgenson, A.K., 2009. Political-economic integration, industrial pollution and human health: a panel study of less-developed countries, 1980—2000. *International Sociology*, *24*(1), pp.115-143.
309. Jorgenson, A.K., 2009. Political-economic integration, industrial pollution and human health: a panel study of less-developed countries, 1980—2000. International sociology, 24(1), pp.115-143.
310. Jorgenson, A.K., 2009a. Foreign direct investment and the environment, the mitigating influence of institutional and civil society factors, and relationships between industrial pollution and human health: A panel study of less-developed countries. *Organization & Environment*, *22*(2), pp.135-157.
311. Jude, C. and Silaghi, M.I.P., 2016. Employment effects of foreign direct investment: New evidence from Central and Eastern European countries. *International Economics*, *145*, pp.32-49.
312. Jude, C. and Silaghi, M.I.P., 2016. Employment effects of foreign direct investment: New evidence from Central and Eastern European countries. *International Economics*, *145*, pp.32-49.

313. Jugurnath, B., Roucheet, B. and Teeroovengadum, V., 2017. Moving to greener pastures: Untangling the evidence about FDI and environmental regulation in EU countries. *The Journal of Developing Areas*, *51*(2), pp.405-415.
314. Julio, B. and Yook, Y., 2016. Policy uncertainty, irreversibility, and cross border flows of capital. *Journal of International Economics*, *103*, pp.13-26.
315. Kahouli, B. and Maktouf, S., 2015. The determinants of FDI and the impact of the economic crisis on the implementation of RTAs: A static and dynamic gravity model. *International Business Review*, *24*(3), pp.518-529.
316. Karlsson, M., Nilsson, T., Lyttkens, C.H. and Leeson, G., 2010. Income inequality and health: Importance of a cross-country perspective. *Social Science & Medicine*, *70*(6), pp.875-885.
317. Kathuria, V., 2018. Does environmental governance matter for foreign direct investment? Testing the pollution haven hypothesis for Indian States. *Asian Development Review*, *35*(1), pp.81-107.
318. Kaur, S., Kumar, P. and Ansari, M.A., 2024. An analysis of Indian FDI inflows through an augmented gravity model: exploring new insights. *International Economics and Economic Policy*, *21*(2), pp.435-455.
319. Kelemen, R.D., 2010. Globalizing European union environmental policy. *Journal of European Public Policy*, *17*(3), pp.335-349.
320. Kersan-Skabic, I. and Orlic, E., 2007. Determinants of FDI inflows in CEE1 and Western Balkan countries (Is accession to the EU important for attracting FDI?). *Economic and Business Review for Central and South-Eastern Europe*, *9*(4), p.333.
321. Ketokivi, M. and McIntosh, C.N., 2017. Addressing the endogeneity dilemma in operations management research: Theoretical, empirical, and pragmatic considerations. *Journal of Operations Management, 52*, pp.1-14.
322. Khan, A.G., Hossain, M.A. and Chen, S., 2021. Do financial development, trade openness, economic development, and energy consumption affect carbon emissions for an emerging country?. *Environmental Science and Pollution Research*, *28*, pp.42150-42160.
323. Khan, E., 2023. The Post-Brexit Paradigm: Investigating the Effects of Foreign Direct Investment on Economic Growth in the United Kingdom. *Archives of the Social Sciences: A Journal of Collaborative Memory*, *2*(1), pp.94-110.
324. Khan, I., Xue, J., Zaman, S. and Mehmood, Z., 2023. Nexus between FDI, economic growth, industrialization, and employment opportunities: empirical evidence from Pakistan. *Journal of the Knowledge Economy*, *14*(3), pp.3153-3175.

325. Khan, M.A. and Ozturk, I., 2020. Examining foreign direct investment and environmental pollution linkage in Asia. *Environmental Science and Pollution Research*, *27*(7), pp.7244-7255.

326. Kim, Y. and Rhee, D.E., 2019. Do stringent environmental regulations attract foreign direct investment in developing countries? Evidence on the "Race to the Top" from cross-country panel data. *Emerging Markets Finance and Trade*, *55*(12), pp.2796-2808.

327. Kinda, T., 2013. Beyond natural resources: Horizontal and vertical FDI diversification in Sub-Saharan Africa. *Applied Economics*, *45*(25), pp.3587-3598.

328. Kindleberger, C.P., 1969. American business abroad. *The International Executive*, *11*(2), pp.11-12.

329. Kirkpatrick, C. and Shimamoto, K., 2008. The effect of environmental regulation on the locational choice of Japanese foreign direct investment. *Applied Economics*, *40*(11), pp.1399-1409.

330. Knickerbocker, F.T., 1973. Oligopolistic reaction and multinational enterprise. *The International Executive*, *15*(2), pp.7-9.

331. Knodt, M. and Princen, S. eds., 2003. *Understanding the European Union's external relations*. Routledge, *28*.

332. Koczan, Z., Paetzold, P. and Vujic, N., 2021. Those Were the Days? Greenfield FDI, Jobs and Inclusion in Emerging Markets. *EBRD Working Paper,* No. 262.

333. Kohpaiboon, A., 2012. Vertical and horizontal FDI technology spillovers: evidence from Thai manufacturing. In: 1st ed. *Economic Consequences of Globalization*. Routledge, pp. 148-168.

334. Koop, G., Pesaran, M.H. and Potter, S.M., 1996. Impulse response analysis in nonlinear multivariate models. *Journal of Econometrics, 74*(1), pp.119-147.

335. Kottaridi, C. and Stengos, T., 2010. Foreign direct investment, human capital and non-linearities in economic growth. *Journal of Macroeconomics*, *32*(3), pp.858-871.

336. Kox, H.L. and Rojas-Romagosa, H., 2020. How trade and investment agreements affect bilateral foreign direct investment: Results from a structural gravity model. *The World Economy*, *43*(12).

337. Krautheim, S., 2013. Export-supporting FDI. *Canadian Journal of Economics*, *46*(4), pp.1571-1605.

338. Kruse, T., Dechezleprêtre, A., Saffar, R. and Robert, L., 2022. Measuring environmental policy stringency in OECD countries: An update of the OECD composite EPS indicator. Retrieved from: https://doi.org/10.1787/90ab82e8-en. Date accessed: 22nd January 2024.

339. Kuznets, S., 1955. Economic growth and income inequality. *The American Economic Review*, *45*(1), pp.1-28.
340. Kwilinski, A., Lyulyov, O. and Pimonenko, T., 2023. Greenfield Investment as a Catalyst of Green Economic Growth. *Energies*, *16*(5), p.2372.
341. Landrigan, P.J. and Goldman, L.R., 2011. Children's vulnerability to toxic chemicals: a challenge and opportunity to strengthen health and environmental policy. *Health Affairs*, *30*(5), pp.842-850.
342. Lazzini, S., Occhipinti, Z., Parenti, A. and Verona, R., 2021. Disentangling economic crisis effects from environmental regulation effects: Implications for sustainable development. *Business Strategy and the Environment*, *30*(5), pp.2332-2353.
343. Lean, H.H. and Smyth, R., 2010. CO2 emissions, electricity consumption and output in ASEAN. *Applied Energy*, *87*(6), pp.1858-1864.
344. Lee, H.H. and Park, D., 2020. Effects of inward and outward greenfield FDI on employment by domestic firms: The Korean experience. *Korea and the World Economy*, *21*(1), pp.1-33.
345. Lehto, E. and Böckerman, P., 2008. Analysing the employment effects of mergers and acquisitions. *Journal of Economic Behaviour & Organization*, *68*(1), pp.112-124.
346. Levin, A., Lin, C.F. and Chu, C.S.J., 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics*, *108*(1), pp.1-24.
347. Levine, D.I. and Rothman, D., 2006. Does trade affect child health?. *Journal of health Economics*, *25*(3), pp.538-554.
348. Levinson, A. and Taylor, M.S., 2008. Unmasking the pollution haven effect. *International Economic Review*, *49*(1), pp.223-254.
349. Levinson, A., 2009. Technology, international trade, and pollution from US manufacturing. *American economic review*, *99*(5), pp.2177-2192.
350. Li, C. and Whalley, J., 2021. Trade protectionism and US manufacturing employment. *Economic Modelling*, *96*, pp.353-361.
351. Li, P., Lin, Z., Du, H., Feng, T. and Zuo, J., 2021. Do environmental taxes reduce air pollution? Evidence from fossil-fuel power plants in China. *Journal of Environmental Management*, *295*, p.113112.
352. Liao, Z., 2018. Environmental policy instruments, environmental innovation and the reputation of enterprises. *Journal of Cleaner Production*, *171*, pp.1111-1117.
353. Lichtenberg, F.R. and Siegel, D., 1990. The effect of ownership changes on the employment and wages of central office and other personnel. *The Journal of Law and Economics*, *33*(2), pp.383-408.

354. Lin, Y., Qin, Y. and Xie, Z., 2021. Does foreign technology transfer spur domestic innovation? Evidence from the high-speed rail sector in China. *Journal of Comparative Economics*, *49*(1), pp.212-229.
355. Lindeneg, K., 1992. Instruments in environmental policy—Different approaches. *Waste Management & Research*, *10*(3), pp.281-287.
356. List, J.A., Millimet, D.L., Fredriksson, P.G. and McHone, W.W., 2003. Effects of environmental regulations on manufacturing plant births: evidence from a propensity score matching estimator. *Review of Economics and Statistics*, *85*(4), pp.944-952.
357. Liu, S.J. and Xu, X.L., 2021. The pollution halo effect of technology spillover and pollution haven effect of economic growth in agricultural foreign trade: two sides of the same coin?. *Environmental Science and Pollution Research*, *28*, pp.20157-20173.
358. Loayza, N., Calderón, C.A. and Servén, L., 2004. Greenfield foreign direct investment and mergers and acquisitions: feedback and macroeconomic effects. *Available at SSRN 636612*.
359. Loayza, N., Calderón, C.A. and Servén, L., 2004. Greenfield foreign direct investment and mergers and acquisitions: feedback and macroeconomic effects. *Available at SSRN 636612*.
360. Lockett, A., Thompson, S. and Morgenstern, U., 2009. The development of the resource-based view of the firm: A critical appraisal. *International Journal of Management reviews*, *11*(1), pp.9-28.
361. Lomachynska, I., Yakubovskiy, S. and Plets, I., 2018. Dynamics of Austrian foreign direct investment and their influence on the national economy. *Baltic Journal of Economic Studies*, 4(5), pp.167-174.
362. Lopez, A.D., Mathers, C.D., Ezzati, M., Jamison, D.T. and Murray, C.J., 2006. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *The Lancet*, *367*(9524), pp.1747-1757.
363. Love, I. and Zicchino, L., 2006. Financial development and dynamic investment behavior: Evidence from panel VAR. *The Quarterly Review of Economics and Finance*, *46*(2), pp.190-210.
364. Luckstead, J., Devadoss, S. and Zhao, X., 2024. Gravity trade model with firm heterogeneity and horizontal foreign direct investment. *American Journal of Agricultural Economics*, *106*(1), pp.206-225.
365. Lütkepohl, H., 2005. New introduction to multiple time series analysis. *Springer Science & Business Media.*
366. Ma, Y., Hu, M. and Zafar, Q., 2022. Analysis of the impact of external debt on health in an emerging Asian economy: Does FDI matter?. *Frontiers in Public Health*, *10*, p.824073.

367. Maestas, N., Mullen, K.J. and Powell, D., 2023. The effect of population aging on economic growth, the labor force, and productivity. *American Economic Journal: Macroeconomics*, *15*(2), pp.306-332.
368. Mahmood, H., Alkhateeb, T.T.Y. and Furqan, M., 2020. Exports, imports, foreign direct investment and CO2 emissions in North Africa: Spatial analysis. *Energy Reports*, *6*, pp.2403-2409.
369. Mahmood, H., Furqan, M., Alkhateeb, T.T.Y. and Fawaz, M.M., 2019. Testing the environmental Kuznets curve in Egypt: Role of foreign investment and trade. *International Journal of Energy Economics and Policy*, *9*(2), p.225.
370. Mahmood, H., Maalel, N. and Zarrad, O., 2019. Trade openness and CO2 emissions: Evidence from Tunisia. *Sustainability*, *11*(12), p.3295.
371. Makhavikova, H., 2018. Determinants of FDI in Central and Eastern Europe [Online]. Germany: Springer International publishing AG. Pp.133-219. Retrieved from: ProQuest Ebook Central - Reader. Date accessed: 20th March 2022.
372. Makoni, P.L., 2015. An extensive exploration of theories of foreign direct investment. *Risk governance & control: Financial markets and institutions*, *5*(2), pp.77-83.
373. Marandu, E.E., Mburu, P.T. and Amanze, D., 2019. An analysis of trends in foreign direct investment inflows to Africa. *International Journal of Business Administration*, *10*(1), pp.20-32.
374. Marelli, E., Resmini, L. and Signorelli, M., 2014. The Effects of Inward FDI on Regional Employment in Europe. *Romanian Journal of Regional Science*, *8*(1).
375. Margolis, D.N., 2006. Should employment authorities worry about mergers and acquisitions?. *Portuguese economic journal*, *5*, pp.167-194.
376. Marinescu, N., 2016. Greenfields and acquisitions: a comparative analysis. *Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences*, pp.295-300.
377. Markusen JR, Morey ER, Olewiler N. 1995. Competition in regional environmental policies when plant locations are endogenous. *Journal of Public Economy*, *56*(1), pp.55–77.
378. McConnell, V.D. and Schwab, R.M., 1990. The impact of environmental regulation on industry location decisions: The motor vehicle industry. *Land Economics*, *66*(1), pp.67-81.
379. McCulloch, J.H., 1985. Miscellanea on Heteroskedasticity. *Econometrica (pre-1986)*, *53*(2), p.483.

380. McDermott, C.L. and Sotirov, M., 2018. A political economy of the European Union's timber regulation: Which member states would, should or could support and implement EU rules on the import of illegal wood?. *Forest Policy and Economics*, *90*, pp.180-190.
381. McMichael, A.J. and Butler, C.D., 2011. Promoting global population health while constraining the environmental footprint. *Annual Review of Public Health*, *32*, pp.179-197.
382. Medve-Bálint, G., 2014. The Role of the EU in Shaping FDI Flows to East Central E urope. JCMS: *Journal of Common Market Studies*, 52(1), pp.35-51.
383. Melidis, M. and Russel, D.J., 2020. Environmental policy implementation during the economic crisis: an analysis of European member state 'leader-laggard'dynamics. *Journal of Environmental Policy & Planning*, *22*(2), pp.198-210.
384. Méon, P.G. and Sekkat, K., 2015. The formal and informal institutional framework of capital accumulation. *Journal of Comparative Economics*, *43*(3), pp.754-771.
385. Mickwitz, P., 2003. A framework for evaluating environmental policy instruments: context and key concepts. *Evaluation*, *9*(4), pp.415-436.
386. Miller, S. and Startz, R., 2019. Feasible generalized least squares using support vector regression. *Economics Letters*, *175*, pp.28-31.
387. Millimet, D.L. and Roy, J., 2016. Empirical tests of the pollution haven hypothesis when environmental regulation is endogenous. *Journal of Applied Econometrics*, *31*(4), pp.652-677.
388. Milliou, C. and Sandonis, J., 2020. Vertical foreign direct investment: Make, buy, and sell. *Review of International Economics*, *28*(3), pp.884-912.
389. Milward, A., 2005. Politics and Economics in the History of the European Union. Routledge.
390. Milward, A.S., 2003. The reconstruction of western Europe, 1945-51. Routledge.
391. Mishra, B.R. and Jena, P.K., 2019. Bilateral FDI flows in four major Asian economies: a gravity model analysis. *Journal of Economic Studies*, *46*(1), pp.71-89.
392. Mishra, R. and Palit, S., 2020. Role of FDI on employment scenario in India. *International Journal of Recent Technology and Engineering*, *8*(6), pp.1481-1489.
393. Mkombe, D., Tufa, A.H., Alene, A.D., Manda, J., Feleke, S., Abdoulaye, T. and Manyong, V., 2021. The effects of foreign direct investment on youth unemployment in the Southern African Development Community. *Development Southern Africa*, *38*(6), pp.863-878.
394. Moffitt, R.A., Davis, S.J. and Mas, A., 2012. The reversal of the employment-population ratio in the 2000s: Facts and explanations [with comments and disscussion]. *Brookings Papers on Economic Activity*, pp.201-264.

395. Mohanty, S. and Sethi, N., 2019. Outward FDI, human capital and economic growth in BRICS countries: an empirical insight. *Transnational Corporations Review*, *11*(3), pp.235-249.
396. Mohr, R.D., 2002. Technical change, external economies, and the Porter hypothesis. *Journal of Environmental Economics and Management*, *43*(1), pp.158-168.
397. Morley, B., 2012. Empirical evidence on the effectiveness of environmental taxes. *Applied Economics Letters*, *19*(18), pp.1817-1820.
398. Morrissey, O. and Udomkerdmongkol, M., 2012. Governance, private investment and foreign direct investment in developing countries. *World development*, *40*(3), pp.437-445.
399. Motta M, Thisse JF. 1994. Does environmental dumping lead to delocation? *European Economic Review, 38*(3), pp.563–76.
400. Mulatu, A., 2017. The structure of UK outbound FDI and environmental regulation. *Environmental and Resource Economics*, *68*(1), pp.65-96.
401. Mumuni, S. and Mwimba, T., 2023. Modeling the impact of green energy consumption and natural resources rents on economic growth in Africa: An analysis of dynamic panel ARDL and the feasible generalized least squares estimators. *Cogent Economics & Finance*, *11*(1), p.2161774.
402. Mundell, R.A., 1957. International trade and factor mobility. *The American Economic Review*, pp.321-335.
403. Musonera, E., Nyamulinda, I.B. and Karuranga, G.E., 2010. FDI fitness in Sub-Saharan Africa-the case of Eastern African community (EAC). *Journal of International Business Research and Practice*, *4*, p.1.
404. Nagel, K., Herzer, D. and Nunnenkamp, P., 2015. How does FDI affect health?. *International Economic Journal*, *29*(4), pp.655-679.
405. Nair-Reichert, U. and Weinhold, D., 2001. Causality tests for cross-country panels: a New look at FDI and economic growth in developing countries. *Oxford Bulletin of Economics and Statistics*, *63*(2), pp.153-171.
406. Nanda, N., 2009. Growth effects of FDI: is greenfield greener?. *Perspectives on Global Development and Technology*, *8*(1), pp.26-47.
407. Neal, T., 2014. Panel cointegration analysis with xtpedroni. *The Stata Journal*, *14*(3), pp.684-692.
408. Neequaye, N.A. and Oladi, R., 2015. Environment, growth, and FDI revisited. *International Review of Economics & Finance*, *39*, pp.47-56.

409. Nemlioglu, I. and Mallick, S., 2020. Does multilateral lending aid capital accumulation? Role of intellectual capital and institutional quality. *Journal of International Money and Finance*, *108*, p.102155.
410. Neto, P., Brandão, A. and Cerqueira, A., 2010. The macroeconomic determinants of cross border mergers and acquisitions and greenfield investments. *IUP Journal of Business Strategy*, *7*(1/2), p.21.
411. Newfarmer, R. and Sztajerowska, M., 2012. Trade and employment in a fast-changing world. *Policy priorities for international trade and jobs*, *7*.
412. Newman, C., Page, J., Rand, J., Shimeles, A., Söderbom, M. and Tarp, F., 2020. Linked-in by FDI: The role of firm-level relationships for knowledge transfers in Africa and Asia. *The Journal of Development Studies*, *56*(3), pp.451-468.
413. Nguegang, F., 2023. Effect of foreign direct investment on population health in Africa: Is there any threshold role of governance?. *Economics Bulletin*, *43*(2), pp.1172-1184.
414. Nguyen, H.T., Luu, H.N. and Do, N.H., 2021. The dynamic relationship between greenfield investments, cross border M&As, domestic investment and economic growth in Vietnam. *Economic Change and Restructuring*, *54*(4), pp.1065-1089.
415. Nguyen, N.M., 2023. The effect of FDI on domestic entrepreneurship: the case of greenfield investment and cross border M&A activities. *Journal of Economics and Development*, *25*(1), pp.62-78.
416. Nguyen-Thanh, N., Chin, K.H. and Nguyen, V., 2022. Does the pollution halo hypothesis exist in this “better” world? The evidence from STIRPAT model. *Environmental Science and Pollution Research*, *29*(58), pp.87082-87096.
417. Nicolini, M. and Resmini, L., 2010. FDI spillovers in new EU member states. Economics of Transition, 18(3), pp.487-511.
418. Nistor, P., 2015. FDI implications on BRICS economy growth. *Procedia Economics and Finance*, *32*, pp.981-985.
419. Niţoiu, C., 2014. The narrative construction of the European Union in external relations. In *Europe, Discourse, and Institutions*. Routledge, pp. 76-91.
420. Nocke, V. and Yeaple, S., 2007. Cross border mergers and acquisitions vs. greenfield foreign direct investment: The role of firm heterogeneity. *Journal of International Economics*, *72*(2), pp.336-365.
421. Novignon, J., Atakorah, Y.B. and Djossou, G.N., 2018. How does the health sector benefit from trade openness? Evidence from Sub-Saharan Africa. *African Development Review*, *30*(2), pp.135-148.

422. Nyen Wong, K. and Cheong Tang, T., 2011. Foreign direct investment and employment in manufacturing and services sectors: Fresh empirical evidence from Singapore. *Journal of Economic Studies*, *38*(3), pp.313-330.
423. Oates WE, Schwab RM. 1988. Economic competition among jurisdictions: efficiency enhancing or distortion inducing? *Journal of Public Economy*, *35*(3*)*, pp.333–54.
424. Odidi, M.V. and Jagong'o, A., 2020. The moderating effect of inflation on the relationship between foreign direct investment, financial market development, and economic growth in Kenya. *International Academic Journal of Economics and Finance*, *3*(6), pp.168-180.
425. Oldford, E. and Otchere, I., 2016. Are cross border acquisitions enemy of labor? An examination of employment and productivity effects. *Pacific-Basin Finance Journal*, *40*, pp.438-455.
426. Olsen, J., 2020. The European Union: politics and policies. Routledge.
427. Osei, M.J. and Kim, J., 2020. Foreign direct investment and economic growth: Is more financial development better?. *Economic Modelling*, *93*, pp.154-161.
428. Osnago, A., Rocha, N. and Ruta, M., 2019. Deep trade agreements and vertical FDI: The devil is in the details. *Canadian Journal of Economics, 52*(4), pp.1558-1599.
429. Owen, A.L. and Wu, S., 2007. Is trade good for your health?. *Review of International Economics*, *15*(4), pp.660-682.
430. Özkan-Günay, E.N., 2011. Determinants of FDI inflows and policy implications: A comparative study for the enlarged EU and candidate countries. *Emerging Markets Finance and Trade*, *47*(sup4), pp.71-85.
431. Pao, H.T. and Tsai, C.M., 2011. Multivariate Granger causality between CO2 emissions, energy consumption, FDI and GDP: evidence from a panel of BRIC countries. *Energy*, *36*(1), pp.685-693.
432. Patton, G.C., Coffey, C., Sawyer, S.M., Viner, R.M., Haller, D.M., Bose, K., Vos, T., Ferguson, J. and Mathers, C.D., 2009. Global patterns of mortality in young people: a systematic analysis of population health data. *The Lancet*, *374*(9693), pp.881-892.
433. Paul, J. and Feliciano-Cestero, M.M., 2021. Five decades of research on foreign direct investment by MNEs: An overview and research agenda. *Journal of Business Research*, *124*, pp.800-812.
434. Pečarić, M., Kusanović, T. and Jakovac, P., 2021. The determinants of FDI sectoral structure in the Central and East European EU Countries. *Economies*, *9*(2), p.66.
435. Pedroni, P., 1997. Cross sectional dependence in cointegration tests of purchasing power parity in panels. *Working Paper, Department of Economics, Indiana University*.

436. Pedroni, P., 1999. Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, *61*(S1), pp.653-670.

437. Pedroni, P., 2001. Fully modified OLS for heterogeneous cointegrated panels. In Nonstationary panels, panel cointegration, and dynamic panels. *Emerald Group Publishing Limited. pp.* 93-130

438. Pedroni, P., 2004. Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, *20*(3), pp.597-625.

439. Pedroni, P., 2019. Panel cointegration techniques and open challenges. In *Panel data econometrics. Academic Press*., *1*, pp. 251-287.

440. Pegkas, P., 2015. The impact of FDI on economic growth in Eurozone countries. *The Journal of Economic Asymmetries*, *12*(2), pp.124-132.

441. Pegkas, P., 2015. The impact of FDI on economic growth in Eurozone countries. *The Journal of Economic Asymmetries*, *12*(2), pp.124-132.

442. Peng, H., Tan, X., Li, Y. and Hu, L., 2016. Economic growth, foreign direct investment and CO2 emissions in China: A panel Granger causality analysis. *Sustainability*, *8*(3), p.233.

443. Penker, M., Scaramuzzi, S., Edelmann, H., Belletti, G., Marescotti, A., Casabianca, F. and Quiñones-Ruiz, X.F., 2022. Polycentric structures nurturing adaptive food quality governance-Lessons learned from geographical indications in the European Union. *Journal of Rural Studies, 89*, pp.208-221.

444. Pesaran, M. H. 2004. General diagnostic tests for cross section dependence in panels. *University of Cambridge, Faculty of Economics, Cambridge Working Papers in Economics,* No. 0435.

445. Petroni, G., Bigliardi, B. and Galati, F., 2019. Rethinking the porter hypothesis: The underappreciated importance of value appropriation and pollution intensity. *Review of Policy Research*, *36*(1), pp.121-140.

446. Phillips, P.C. and Hansen, B.E., 1990. Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, *57*(1), pp.99-125.

447. Phillips, P.C., 1995. Fully modified least squares and vector autoregression. *Econometrica: Journal of the Econometric Society*, pp.1023-1078.

448. Pigou, A.C. and Aslanbeigui, N., 2017. *The economics of welfare*. Routledge.

449. Pigou, A.C.,1920. *The economics of welfare*. Routledge.

450. Piscitello, L. and Rabbiosi, L., 2005. The impact of inward FDI on local companies' labour productivity: evidence from the Italian case. *International Journal of the Economics of Business*, *12*(1), pp.35-51.
451. Popeanga, V., 2013. Environmental Action Programmes in The European Union-Evolution and Specific. *Annals Constantin Brancusi U. Targu Jiu, Letters & Soc. Sci. Series*, p.24.
452. Popescu, G.H., 2014. FDI and economic growth in Central and Eastern Europe. *Sustainability*, *6*(11), pp.8149-8163.
453. Popoola, O.T., 2018. Population growth and life expectancy in Nigeria: Issues and further considerations. *Humanities and Social Science Research*, *1*(1), pp.p30-p30.
454. Popovici, O.C. and Călin, A.C., 2014. FDI theories. A location-based approach. *Romanian Economic Journal*, *17*(53).
455. Porter, M.E. and Van der Linde, C., 1995. Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, *9*(4), pp.97-118.
456. Pradhan, R.P., 2011. Determinants of foreign direct investment in SAARC countries: an investigation using panel VAR model. *Information Management and Business Review*, *3*(2), pp.117-126.
457. Pradhan, R.P., Arvin, M.B., Norman, N.R. and Bele, S.K., 2014. Economic growth and the development of telecommunications infrastructure in the G-20 countries: A panel-VAR approach. *Telecommunications Policy*, *38*(7), pp.634-649.
458. Pritchett, L., 1997. Divergence, big time. *Journal of Economic perspectives*, *11*(3), pp.3-17.
459. Rahman, Z.U., Cai, H. and Ahmad, M., 2023. A new look at the remittances-FDI-energy-environment nexus in the case of selected Asian nations. *The Singapore Economic Review*, *68*(01), pp.157-175.
460. Ramirez, M.D., 2007. A panel unit root and panel cointegration test of the complementarity hypothesis in the Mexican case: 1960–2001. *Atlantic Economic Journal*, *35*, pp.343-356.
461. Rao, D.T., Sethi, N., Dash, D.P. and Bhujabal, P., 2023. Foreign aid, FDI and economic growth in South-East Asia and South Asia. *Global Business Review*, *24*(1), pp.31-47.
462. Rauscher M. 1995. Environmental regulation and the location of polluting industries. *International Tax Public Finance, 2*(2), pp.229–44.
463. Raza, A., Akbar, S.H.A.H.I.D. and Sadiqa, B.A., 2021. Relationship among economic growth, health, education, economic development and green-field investment as mode of FDI: evidence from MENA countries. *Int. Rev. Soc. Sci*, *9*(5), pp.271-280.

464. Raza, A., Azam, M. and Tariq, M., 2020b. The impact of greenfield-FDI on socio-economic development of Pakistan. Экономический журнал Высшей школы экономики, 24(3), pp.415-433.

465. Raza, A., Azam, M.K. and Tariq, M.U.H.A.M.M.A.D., 2020a. A panel data investigation of greenfield investment on the welfare of African developing countries. *International Review of Social Sciences*, *8*(8), pp.41-57.

466. Raza, S.A., Shah, N. and Arif, I., 2021. Relationship between FDI and economic growth in the presence of good governance system: Evidence from OECD Countries. *Global Business Review*, *22*(6), pp.1471-1489.

467. Requate, T., 2005. Dynamic incentives by environmental policy instruments—a survey. *Ecological economics*, *54*(2-3), pp.175-195.

468. Rezler, P., 2010. The Copenhagen criteria: are they helping or hurting the European Union. Touro Int'l L. Rev., 14, p.390.

469. Ricardo, D., 1817. *The works and correspondence of David Ricardo, Vol. 1: Principles of political economy and taxation*. Online Library of Liberty.

470. Rink, D.R. and Swan, J.E., 1979. Product life cycle research: A literature review. *Journal of Business Research*, *7*(3), pp.219-242.

471. Rissanen, J., 1978. Modelling by shortest data description. *Automatica*, *14*(5), pp.465-471.

472. Rodríguez-Pose, A. and Zademach, H.M., 2003. Rising metropoli: The geography of mergers and acquisitions in Germany. *Urban Studies*, *40*(10), pp.1895-1923.

473. Roodman, D., 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), pp.86-136.

474. Rossi, S. and Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, *74*(2), pp.277-304.

475. Rozen-Bakher, Z., 2017. Impact of inward and outward FDI on employment: the role of strategic asset-seeking FDI. *Transnational Corporations Review*, *9*(1), pp.16-30.

476. Rudolph, A. and Figge, L., 2017. Determinants of ecological footprints: what is the role of globalization?. *Ecological Indicators*, *81*, pp.348-361.

477. Rugman, A.M. 1980, "Internalization as a general theory of foreign direct investment: A re-appraisal of the literature". *Review of World Economics*, *116*(2), pp. 365-379.

478. Sabir, S., Qayyum, U. and Majeed, T., 2020. FDI and environmental degradation: the role of political institutions in South Asian countries. *Environmental Science and Pollution Research*, *27*, pp.32544-32553.

479. Sahu, J.P. and Dash, S.K., 2021. What Explains FDI Inflows to ASEAN Countries? Evidence from Quantile Regressions. *Journal of Asian Economic Integration*, *3*(1), pp.25-37.
480. Saini, N. and Singhania, M., 2018. Determinants of FDI in developed and developing countries: A quantitative analysis using GMM. *Journal of Economic Studies*, 45(2), pp.348-382.
481. Salehnia, N., Alavijeh, N.K. and Salehnia, N., 2020. Testing Porter and pollution haven hypothesis via economic variables and CO 2 emissions: a cross-country review with panel quantile regression method. *Environmental Science and Pollution Research*, *27*(25), pp.31527-31542.
482. Salgado, M., Madureira, J., Mendes, A.S., Torres, A., Teixeira, J.P. and Oliveira, M.D., 2020. Environmental determinants of population health in urban settings. A systematic review. *BMC Public Health*, *20*, pp.1-11.
483. Sanna-Randaccio, F., and Sestini, R., 2012. The impact of unilateral climate policy with endogenous plant location and market size asymmetry. *Review of International Economics*, *20*(3), pp.580-599.
484. Sarkodie, S.A. and Ozturk, I., 2020. Investigating the environmental Kuznets curve hypothesis in Kenya: a multivariate analysis. *Renewable and Sustainable Energy Reviews*, *117*, p.109481.
485. Sarkodie, S.A., 2021. Failure to control economic sectoral inefficiencies through policy stringency disrupts environmental performance. *Science of The Total Environment*, *772*, p.145603.
486. Saucedo, E., Ozuna Jr, T. and Zamora, H., 2020. The effect of FDI on low and high-skilled employment and wages in Mexico: a study for the manufacture and service sectors. *Journal for Labour Market Research*, *54*(1), p.9.
487. Schmerer, H.J., 2014. Foreign direct investment and search unemployment: Theory and evidence. *International Review of Economics & Finance*, *30*, pp.41-56.
488. Schmitz, A. and Bieri, J., 1972. EEC tariffs and US direct investment. *European Economic Review*, *3*(3), pp.259-270.
489. Schwarz, G., 1978. Estimating the dimension of a model. *The annals of statistics*, pp.461-464.
490. Seker, F., Ertugrul, H.M. and Cetin, M., 2015. The impact of foreign direct investment on environmental quality: a bounds testing and causality analysis for Turkey. *Renewable and Sustainable Energy Reviews*, *52*, pp.347-356.

491. Serwicka, I. and Tamberi, N., 2018. Not backing Britain: FDI inflows since the Brexit referendum. *UK Trade Policy Observatory Briefing Paper*, *23*.
492. Sethi, D., Guisinger, S.E., Phelan, S.E. and Berg, D.M., 2003. Trends in foreign direct investment flows: A theoretical and empirical analysis. *Journal of International Business Studies*, *34*, pp.315-326.
493. Shah, S.N., 2021. Impact of industrial pollution on our society. Pakistan Journal of Science, 73(1).
494. Shahzad, U., 2020. Environmental taxes, energy consumption, and environmental quality: Theoretical survey with policy implications. *Environmental Science and Pollution Research*, *27*(20), pp.24848-24862.
495. Shi, J., 2019. Vertical FDI and exchange rates over the business cycle: The welfare implications of openness to FDI. *Journal of Development Economics*, *138*, pp.274-293.
496. Siddique, H.M.A. and Kiani, A.K., 2020. Industrial pollution and human health: evidence from middle-income countries. Environmental Science and Pollution Research, 27(11), pp.12439-12448.
497. Siddique, H.M.A., Ansar, R., Naeem, M.M. and Yaqoob, S., 2017. Impact of FDI on economic growth: Evidence from Pakistan. *Bulletin of Business and Economics (BBE)*, *6*(3), pp.111-116.
498. Siegel, D.S., Simons, K.L. and Lindstrom, T., 2009. Ownership change, productivity, and human capital: New evidence from matched employer-employee data. In: ed. *Producer dynamics: new evidence from micro data*. University of Chicago Press, pp. 397-442.
499. Sims, C.A. and Zha, T., 1999. Error bands for impulse responses. *Econometrica*, *67*(5), pp.1113-1155.
500. Singhania, M. and Saini, N., 2021. Demystifying pollution haven hypothesis: Role of FDI. *Journal of Business Research*, *123*, pp.516-528.
501. Slangen, A.H. and Hennart, J.F., 2008. Do foreign greenfields outperform foreign acquisitions or vice versa? An institutional perspective. *Journal of Management Studies*, *45*(7), pp.1301-1328.
502. Slesman, L., Abubakar, Y.A. and Mitra, J., 2021. Foreign direct investment and entrepreneurship: does the role of institutions matter?. *International Business Review*, *30*(4), p.101774.

503. Smith, A., 1776. An inquiry into the nature and causes of the wealth of nations: Vol One. London: printed for W. Strahan; and T. Cadell, 1776..

504. Smith, A., 1937. The wealth of nations (1776). In: ed. *An enquiry into the nature and causes of the wealth of nations.* London: J. M. Dent, *11937*, pp. 12-5, 400-401, 436-437.

505. Smith, R.D., Lee, K. and Drager, N., 2009. Trade and health: an agenda for action. *The Lancet*, *373*(9665), pp.768-773.

506. Solarin, S.A., Al-Mulali, U., Musah, I. and Ozturk, I., 2017. Investigating the pollution haven hypothesis in Ghana: an empirical investigation. *Energy*, *124*, pp.706-719.

507. Sooreea-Bheemul, B., Rasool, U.S. and Sooreea, R., 2020. Does economic freedom matter to foreign direct investment in Sub-Saharan Africa. *International Journal of Economics and Financial Issues*, *10*(3).

508. Srinivasan, S. and Jayaraman, V., 2021. Orchestrating Sustainable Stakeholder Value Creation: A Product Life Cycle Extension Perspective. *Pursuing Sustainability: OR/MS Applications in Sustainable Design, Manufacturing, Logistics, and Resource Management*, pp.239-254.

509. Stavins, R.N., 2003. Experience with market-based environmental policy instruments. In *Handbook of Environmental Economics* (Vol. 1, pp. 355-435). Elsevier.

510. Stevens, P., Urbach, J. and Wills, G., 2013. Healthy trade: the relationship between open trade and health. *Foreign Trade Review*, *48*(1), pp.125-135.

511. Strat, V.A., Davidescu, A. and Paul, A.M., 2015. FDI and the unemployment-a causality analysis for the latest EU members. *Procedia Economics and Finance*, *23*, pp.635-643.

512. Stypka, O., Wagner, M., Grabarczyk, P. and Kawka, R., 2024. Cointegrating polynomial regressions: Robustness of fully modified OLS. *Econometric Theory*, pp.1-21.

513. Su, C.W., Meng, X.L., Tao, R. and Umar, M., 2022. Policy turmoil in China: a barrier for FDI flows?. *International Journal of Emerging Markets*, *17*(7), pp.1617-1634.

514. Su, Y. and Li, D., 2023. Interaction effects of government subsidies, R&D input and innovation performance of Chinese energy industry: a panel vector autoregressive (PVAR) analysis. *Technology Analysis & Strategic Management, 35*(5), pp.493-507.

515. Tarlov, A.R., 1999. Public policy frameworks for improving population health. *Annals of the New York Academy of Sciences*, *896*(1), pp.281-293.

516. Tews, K., Busch, P.O. and Jörgens, H., 2003. The diffusion of new environmental policy instruments 1. *European Journal of Political Research*, *42*(4), pp.569-600.

517. The Heritage Foundation (2023), 2023 Index of Economic Freedom, The Heritage Foundation, Washington, DC. Accessed from: https://www.heritage.org/index/explore. Date accessed: 4th January 2024.
518. Thompson, P. and Zang, W., 2022. A matter of life and death? Knowledge intensity of FDI activities and domestic enterprise. *Papers in Regional Science*, *101*(5), pp.1157-1179.
519. Tran, H.M., Tsai, F.J., Lee, Y.L., Chang, J.H., Chang, L.T., Chang, T.Y., Chung, K.F., Kuo, H.P., Lee, K.Y., Chuang, K.J. and Chuang, H.C., 2023. The impact of air pollution on respiratory diseases in an era of climate change: A review of the current evidence. Science of the Total Environment, 898, p.166340.
520. Tsai, P.L., 1994. Determinants of foreign direct investment and its impact on economic growth. *Journal of Economic Development*, *19*(1), pp.137-163.
521. Tsai, P.L., 1994. Determinants of foreign direct investment and its impact on economic growth. *Journal of Economic Development*, *19*(1), pp.137-163.
522. Tsaurai, K., 2018. FDI led financial development hypothesis in emerging markets: The role of human capital development. *International Journal of Education Economics and Development*, *9*(2), pp.109-123.
523. Turkson, F.E., Gyeke-Dako, A. and Amissah, E.B. (2015) Foreign Direct Investment Spillovers and the Ghanaian Local Financial Environment. Modern Economy, 6, 1078-1089.
524. Turvey, R., 1963. On divergences between social cost and private cost. *Economica*, *30*(119), pp.309-313.
525. Uctum, M., Doytch, N. and Ashraf, A., 2022. Capital outflows and the environment: fresh evidence from M&A purchases and greenfield FDI. *Environmental Science and Pollution Research*, pp.1-11.
526. Uddin, K.M.K. and Chowdhury, M.A., 2020. Impact of FDI on Employment Level in Bangladesh: A VECM Approach. *International Journal of Applied Economics, Finance and Accounting*, *8*(1), pp.30-37.
527. Ullah, A., Zhao, X., Abdul Kamal, M. and Zheng, J., 2022. Environmental regulations and inward FDI in China: Fresh evidence from the asymmetric autoregressive distributed lag approach. *International Journal of Finance & Economics*, *27*(1), pp.1340-1356.
528. Ullah, S., Akhtar, P. and Zaefarian, G., 2018. Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, *71*, pp.69-78.

529. UNCTAD Handbook of Statistics (2019). Fact sheet #9: Foreign direct investment [Online]. Retrieved from: UNCTAD Handbook of Statistics 2019 - Fact sheet #9: Foreign direct investment. Date accessed: 1st August 2023.
530. UNCTAD W.I.R. (2023). FDI Inflows, by Region and Economy from 1990 -2022 [Online]. Retrieved from: https://unctad.org/topic/investment/world-investment-report. Date accessed: 1st August 2023.
531. UNCTAD, 2009. Global FDI inflows continue to slide in 2009: significant recovery expected only in 2011 [Online]. UNCTAD/Press/Press Release/2009/042. Retrieved from: https://unctad.org/press-material/global-fdi-inflows-continue-slide-2009-significant-recovery-expected-only-2011. Date accessed: 3rd August 2023.
532. Van den Brink, M.J., 2012. EU citizenship and EU fundamental rights: taking EU citizenship rights seriously?. *Legal Issues of Economic Integration*, 39(2).
533. Van, D.T.B. and Bao, H.H.G., 2018. The role of globalization on CO2 emission in Vietnam incorporating industrialization, urbanization, GDP per capita and energy use. *International Journal of Energy Economics and Policy*, *8*(6), p.275.
534. Vernon, R., 1992. International investment and international trade in the product cycle. In: ed. *International economic policies and their theoretical foundations*. Academic Press, pp. 415-435.
535. Vijayakumar, N., Sridharan, P. and Rao, K.C.S., 2010. Determinants of FDI in BRICS Countries: A panel analysis. *International Journal of Business Science & Applied Management (IJBSAM)*, *5*(3), pp.1-13.
536. Vostrykov, P.M. and Jura, A., 2022. Environmental taxes impact for the population health protection: Cross-country analysis.
537. Vytenis A., 2019. State of Health in the EU: Companion Report 2019. European Commission, Luxembourg. Assessed from: state of health in the EU-EW0119848ENN.pdf. Date accessed: 12th February 2024.
538. Wagner, M. and Hong, S.H., 2016. Cointegrating polynomial regressions: fully modified OLS estimation and inference. *Econometric Theory*, *32*(5), pp.1289-1315.
539. Wallace, H., Pollack, M.A., Roederer-Rynning, C. and Young, A.R., 2020. *Policy-making in the European Union*. 7th eds. Oxford university press.
540. Walter, I. and Ugelow, J.L., 1979. Environmental policies in developing countries. *Ambio*, pp.102-109.

541. Wang, H., Dong, C. and Liu, Y., 2019. Beijing direct investment to its neighbours: A pollution haven or pollution halo effect?. *Journal of Cleaner Production*, *239*, p.118062.
542. Wang, M. and Choi, B., 2021. Does FDI Affect Domestic Employment in OECD Countries?. *The Journal of Asian Finance, Economics and Business*, *8*(12), pp.283-293.
543. Wang, M. and Sunny Wong, M.C., 2009. What drives economic growth? The case of cross-border M&A and greenfield FDI activities. *Kyklos*, *62*(2), pp.316-330.
544. Wang, M., 2009. Manufacturing FDI and economic growth: evidence from Asian economies. *Applied Economics*, *41*(8), pp.991-1002.
545. Wang, Q., Hubacek, K., Feng, K., Wei, Y.M. and Liang, Q.M., 2016. Distributional effects of carbon taxation. *Applied Energy*, *184*, pp.1123-1131.
546. Wang, X., Zhang, C. and Zhang, Z., 2019. Pollution haven or porter? The impact of environmental regulation on location choices of pollution-intensive firms in China. *Journal of Environmental Management*, *248*, p.109248.
547. Warren, M., Seetanah, B. and Sookia, N., 2023. An investigation of exchange rate, exchange rate volatility and FDI nexus in a gravity model approach. *International Review of Applied Economics*, *37*(4), pp.482-502.
548. Warsame, A.A., 2022. The impact of urbanization on energy demand: an empirical evidence from Somalia. *International Journal of Energy Economics and Policy*, *12*(1), pp.383-389.
549. Wernerfelt, B., 1984. A resource-based view of the firm. *Strategic Management Journal*, *5*(2), pp.171-180.
550. Wernerfelt, B., 1995. The resource-based view of the firm: Ten years after. *Strategic Management Journal*, *16*(3), pp.171-174.
551. Wessel, R.A., 2021. Normative transformations in EU external relations: the phenomenon of 'soft'international agreements. *West European Politics*, *44*(1), pp.72-92.
552. Westerlund, J., 2007. Testing for error correction in panel data. *Oxford Bulleting of Economics and Statistics, 69*(6), pp.709-748.
553. Wijaya, S. and Dewi, A.K., 2022. Determinants of foreign direct investment and its implications on tax revenue in Indonesia. *JPPI (Jurnal Penelitian Pendidikan Indonesia)*, *8*(3), pp.719-733.
554. Wilhelms, S.K. and Witter, M.S.D., 1998. Foreign direct investment and its determinants in emerging economies. Washington DC: *United States Agency for International Development, Bureau for Africa, Office of Sustainable Development*. 20523-4600.

555. Wintoki, M.B., Linck, J.S. and Netter, J.M., 2012. Endogeneity and the dynamics of internal corporate governance. Journal of Financial Economics, 105(3), pp.581-606.
556. Woodgate, R., 2023. Offshoring via vertical FDI in a long-run Kaleckian Model. *Journal of Post Keynesian Economics*, *46*(1), pp.32-64.
557. Wooldridge, J. M. 2010. Econometric analysis of cross section and panel data [Online]. United States: MIT Press. Pp.51-394. Retrieved from: ProQuest Ebook Central - Reader. Date accessed: 1st June 2022.
558. Wooldridge, J. M. 2015. Introductory Econometric: a modern approach. 5Th ed. Canada: Cengage Learning International. Pp.377-381.
559. Wooldridge, J.M., 2012. Introductory econometrics: a modern approach (upper-level economics titles). Southwestern College Publishing, Nashville, T ATN, 41, pp.673-690.
560. World Development Indicators, 2023. Gross domestic product (constant US$) [Online]. Retrieved from: GDP (constant 2015 US$) - China, World, United States, European Union Data (worldbank.org). Date accessed: 28th July 2023.
561. World Health Organization, 1995. Constitution of the world health organization. Accessed from: May 19, 2002.PDF (who.int). Date accessed: 12th December 2024.
562. Wu, C., Maurer, C., Wang, Y., Xue, S. and Davis, D.L., 1999. Water pollution and human health in China. Environmental Health Perspectives, 107(4), pp.251-256.
563. Wurzel, R.K., Zito, A.R. and Jordan, A.J., 2013. Environmental governance in Europe: A comparative analysis of the use of new environmental policy instruments. Edward Elgar Publishing.
564. Xia, X., Zhang, A., Liang, S., Qi, Q., Jiang, L. and Ye, Y., 2017. The association between air pollution and population health risk for respiratory infection: a case study of Shenzhen, China. *International journal of environmental research and public health*, *14*(9), p.950.
565. Xiao, S.S. and Park, B.I., 2018. Bring institutions into FDI spillover research: Exploring the impact of ownership restructuring and institutional development in emerging economies. *International Business Review*, *27*(1), pp.289-308.
566. Xing, Y. and Kolstad, C.D., 2002. Do lax environmental regulations attract foreign investment? *Environmental and Resource Economics*, *21*(1), pp.1-22.
567. Xu, B. and Wang, J., 2000. Trade, FDI, and international technology diffusion. *Journal of Economic Integration*, pp.585-601.

568. Yaduma, N., Kortelainen, M. and Wossink, A., 2015. The environmental Kuznets curve at different levels of economic development: a counterfactual quantile regression analysis for CO2 emissions. *Journal of Environmental Economics and Policy*, *4*(3), pp.278-303.
569. Yang, J., Guo, H., Liu, B., Shi, R., Zhang, B. and Ye, W., 2018. Environmental regulation and the pollution haven hypothesis: do environmental regulation measures matter? Journal of Cleaner Production, 202, pp.993-1000.
570. Yildirim, D.Ç., Yildirim, S., Erdogan, S. and Kantarci, T., 2022. Innovation—Unemployment nexus: The case of EU countries. *International Journal of Finance & Economics*, *27*(1), pp.1208-1219.
571. Yimer, A., 2023. The effects of FDI on economic growth in Africa. *The Journal of International Trade & Economic Development*, *32*(1), pp.2-36.
572. Yoon, H. and Heshmati, A., 2021. Do environmental regulations affect FDI decisions? The pollution haven hypothesis revisited. *Science and Public Policy*, *48*(1), pp.122-131.
573. Yu, W. and Jin, X., 2022. Does environmental information disclosure promote the awakening of public environmental awareness? Insights from Baidu keyword analysis. Journal of Cleaner Production, 375, p.134072.
574. Yuan, B. and Zhang, Y., 2020. Flexible environmental policy, technological innovation and sustainable development of China's industry: The moderating effect of environment regulatory enforcement. *Journal of Cleaner Production*, *243*, p.118543.
575. Zang W and Baimbridge M (2014) Foreign Direct Investment and economic growth in OECD countries. In: Accosi C (Ed.) Economic growth in the 21st century: perspectives, role of governmental policies, potential and constraints. New York: Nova Science Publishers: 29-55.
576. Zeraibi, A., Jahanger, A., Adebayo, T.S., Ramzan, M. and Yu, Y., 2023. Greenfield investments, economic complexity, and financial inclusion-environmental quality nexus in BRICS Countries: Does renewable energy transition matter?. *Gondwana Research*, *117*, pp.139-154.
577. Zhang, J. and Fu, X., 2008. FDI and environmental regulations in China. *Journal of the Asia Pacific Economy*, *13*(3), pp.332-353.
578. Zhang, J., Qu, Y., Zhang, Y., Li, X. and Miao, X., 2019. Effects of FDI on the efficiency of government expenditure on environmental protection under fiscal decentralization: A spatial econometric analysis for China. *International Journal of Environmental Research and Public Health*, *16*(14), p.2496.

579. Zhang, T., Kato, K. and Ruppert, D., 2023. Bootstrap inference for quantile-based modal regression. *Journal of the American Statistical Association*, *118*(541), pp.122-134.
580. Zhang, X. and Zhang, Z., 2022. Interaction effects of R&D investment, Industrial structure rationalization, and Economic growth in China based on the PVAR Model. *Sustainability, 15*(1), p.545.
581. Zhang, Z., Nuță, F.M., Dimen, L., Ullah, I., Xuanye, S., Junchen, Y., Yihan, Z. and Yi, C., 2023. Relationship between FDI inflow, CO2 emissions, renewable energy consumption, and population health quality in China. *Frontiers in Environmental Science*, *11*, p.1120970.
582. Zheng, J. and Sheng, P., 2017. The impact of foreign direct investment (FDI) on the environment: market perspectives and evidence from China. *Economies*, *5*(1), p.8.
583. Zhou, K., Kumar, S., Yu, L. and Jiang, X., 2021. The economic policy uncertainty and the choice of entry mode of outward foreign direct investment: Cross border M&A or Greenfield Investment. *Journal of Asian Economics*, *74*, p.101306.
584. Zhu, H., Duan, L., Guo, Y. and Yu, K., 2016. The effects of FDI, economic growth and energy consumption on carbon emissions in ASEAN-5: evidence from panel quantile regression. *Economic Modelling*, *58*, pp.237-248.
585. Zoltán, G. and Gábor, L., 2022. FDI-based regional development in Central and Eastern Europe: A review and an agenda. *Tér és Társadalom*, *36*(3), pp.68-98.

APPENDIX A. Results showing the effects of environmental policy variables on aggregate FDI for the subsample of 19 EU countries.

The results presented in Tables A1, A2 and A3 below were generated because in chapter 4 subsection 4.6.2 all the results from the three models demonstrated insignificant effects of all independent variables on the aggregate FDI for the subsample of 19 EU countries. Hence in Tables A1, A2 and A3, the results provided are Pooled OLS results, variance covariance robust standard errors results, and Driscoll Kraay robust standard errors estimated without fixed effects. The results from Tables A1, A2 and A3 suggest that the reason for the insignificant effects of all independent variables is likely due to the fixed effects in the models. Because when the fixed effects were removed some variables in the model became significant. For instance, the effect of energy taxes and the overall environmental stringency index on aggregate FDI inflows of 19 EU countries became significantly negative and implied evidence of pollution haven hypothesis. However, the effect of energy taxes, emissions limit value for NOx, SOx and PM remains insignificant even after dropping the fixed effects. Among the controlled variable trade and financial freedom index also had significant increase on aggregate FDI.

Table A1.

The effects of environmental tax and energy tax on aggregate FDI for 19 EU countries using data from 2003 to 2019.

	Pooled OLS		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
EnvTax % GDP (-1)	0.491 (1.831)		0.491 (1.604)		0.166 (0.608)	
EnerTax % GDP (-1)		-3.619 (2.379)		-3.619** (1.455)		-4.063*** (0.888)
lnGDPpc (-1)	-2.212 (4.252)	-2.701 (4.126)	-2.212 (4.591)	-2.701 (4.394)	1.117 (3.138)	0.387 (3.148)
lnTrade % GDP (-1)	6.351* (3.403)	7.888** (3.285)	6.351 (4.275)	7.888* (4.247)	8.901*** (2.686)	9.637*** (2.847)
Unemployment rate (-1)	0.178 (0.208)	0.277 (0.210)	0.178 (0.201)	0.277 (0.198)	0.233 (0.173)	0.229 (0.174)
Financial Freedom (-1)	-0.131 (0.294)	-0.278 (0.291)	-0.131 (0.213)	-0.278 (0.200)	0.187* (0.0898)	0.00972 (0.0937)
Government Integrity (-1)	0.150 (0.123)	0.184 (0.118)	0.150 (0.127)	0.184 (0.123)	0.0284 (0.0445)	0.0599 (0.0506)
Constant	-4.044 (42.65)	9.252 (42.29)	-4.044 (51.35)	9.252 (48.53)	-63.57 (37.36)	-40.90 (37.15)
Observations	304	304	304	304	304	304
R^2	0.285	0.345	0.285	0.345	0.109	0.125

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag. These results compare with the results in Table 5.8 estimated with two-way Fixed effects.

Table A2.
The effects of the overall stringency index and emission limit of NOx on aggregate FDI for 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
Overall Stringent index (-1)	-3.119**		-3.119***		-2.815***	
	(1.336)		(1.038)		(0.664)	
NOx Limit (-1)		-0.388		-0.388		-0.191
		(0.702)		(0.278)		(0.400)
lnGDPpc (-1)	0.754	-1.837	0.754	-1.837	2.281	1.129
	(4.407)	(4.259)	(5.194)	(4.707)	(3.011)	(3.105)
lnTrade % GDP (-1)	7.844**	7.056**	7.844*	7.056*	8.792***	9.008***
	(3.351)	(3.400)	(4.240)	(4.228)	(2.794)	(2.648)
Unemployment rate (-1)	0.282	0.197	0.282	0.197	0.216	0.229
	(0.206)	(0.204)	(0.198)	(0.194)	(0.152)	(0.174)
Financial freedom (-1)	-0.118	-0.157	-0.118	-0.157	0.163*	0.180*
	(0.280)	(0.280)	(0.191)	(0.189)	(0.0840)	(0.0882)
Government Integrity (-1)	0.130	0.159	0.130	0.159	0.0402	0.0340
	(0.119)	(0.119)	(0.130)	(0.128)	(0.0467)	(0.0525)
Constant	-31.86	-7.043	-31.86	-7.043	-65.61*	-62.73
	(43.76)	(42.35)	(58.44)	(53.38)	(36.40)	(38.17)
Observations	304	304	304	304	304	304
R^2	0.346	0.292	0.346	0.292	0.126	0.109

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag. These results compare with the results in Table 5.9 estimated with two-way Fixed effects.

Table A3.
The effects of emissions limit of SOx and PM on aggregate FDI for 19 EU countries using data from 2003 to 2019.

19 EU Countries	Two -Way Fixed Effects		VCE Robust Std. Errors		Driscoll-Kraay Std. Errors	
	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
SOx Limit (-1)	-0.086		-0.086		-0.086	
	(1.056)		(1.056)		(0.811)	
PM Limit (-1)		-0.049		-0.049		-0.049
		(0.447)		(0.447)		(0.622)
lnGDPpc (-1)	1.157	1.189	1.157	1.189	1.157	1.189
	(2.524)	(2.561)	(2.524)	(2.561)	(3.084)	(2.732)
lnTrade % GDP (-1)	8.960***	9.001***	8.960***	9.001***	8.960***	9.001***
	(1.926)	(1.946)	(1.926)	(1.946)	(2.695)	(2.481)
Unemployment rate (-1)	0.232	0.233	0.232	0.233	0.232	0.233
	(0.176)	(0.176)	(0.176)	(0.176)	(0.174)	(0.175)
Financial freedom (-1)	0.179	0.179	0.179	0.179	0.179*	0.179*
	(0.182)	(0.182)	(0.182)	(0.182)	(0.089)	(0.089)
Government Integrity (-1)	0.031	0.030	0.031	0.030	0.031	0.030
	(0.077)	(0.077)	(0.077)	(0.077)	(0.050)	(0.046)
Constant	-63.03**	-63.68**	-63.03**	-63.68**	-63.03	-63.68*
	(25.40)	(25.76)	(25.40)	(25.76)	(38.48)	(35.23)
Observations	304	304	304	304	304	304
R^2	0.109	0.109	0.109	0.109	0.109	0.109

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, (-1) indicates that all variables are estimated using 1 lag. These results compare with the results in Table 5.10 estimated with two-way Fixed effects.

APPENDIX B**.** Bootstrap Quantile regression results showing the effects of environmental policy variables on aggregate FDI for the subsample of 19 EU countries.

Summary of the results indicate evidence of pollution haven hypothesis in the relationship between environmental policy variables and aggregate FDI. These environmental policy variables include energy taxes, overall stringency index, emission limits NOx, and emissions limit PM.

Table B1.
Bootstrap Quantile regression without fixed effects showing the effects of environmental taxes on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
EnvTax % GDP (-1)	-0.100 (0.850)	-0.309 (0.573)	0.012 (0.969)	-0.192 (0.391)	-0.350 (0.276)	-0.363 (0.240)	-0.264 (0.629)	-0.317 (0.678)	0.144 (0.947)	0.247 (0.944)	5.860 (0.576)
lnGDPpc (-1)	-4.152 (0.373)	-3.870*** (0.005)	-2.986*** (0.001)	-2.105*** (0.005)	-1.484** (0.036)	-1.226* (0.073)	-0.445 (0.739)	1.413 (0.388)	0.959 (0.815)	-7.839 (0.394)	12.70 (0.263)
lnTrade % GDP (-1)	-6.196*** (0.003)	-4.775*** (0.001)	-0.964 (0.388)	0.112 (0.906)	1.858** (0.020)	2.289*** (0.003)	3.762** (0.028)	8.595*** (0.000)	21.85*** (0.000)	30.94*** (0.000)	45.82*** (0.000)
Unemployment rate (-1)	0.114 (0.283)	0.067 (0.111)	0.020 (0.317)	0.012 (0.616)	0.052 (0.169)	0.072* (0.054)	0.101* (0.070)	0.054 (0.651)	-0.261 (0.272)	-0.585** (0.030)	0.283 (0.685)
Financial Freedom (-1)	0.060 (0.256)	0.055 (0.256)	0.035 (0.110)	0.021 (0.294)	0.013 (0.445)	0.015 (0.406)	0.022 (0.352)	-0.002 (0.969)	-0.031 (0.799)	-0.017 (0.937)	-0.224 (0.385)
Government Integrity (-1)	-0.017 (0.885)	-0.047 (0.646)	0.060 (0.362)	0.044 (0.378)	0.085** (0.049)	0.080 (0.112)	0.162** (0.047)	0.225* (0.066)	0.238 (0.220)	0.365 (0.223)	0.638 (0.353)
Constant	64.43 (0.124)	59.62*** (0.000)	29.86*** (0.009)	19.04* (0.073)	3.528 (0.719)	-0.748 (0.933)	-20.60 (0.226)	-60.86*** (0.006)	-104.4** (0.014)	-53.09 (0.612)	-349.2** (0.022)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.145	0.089	0.018	0.020	0.035	0.043	0.057	0.127	0.282	0.324	0.416

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B2.
Bootstrap Quantile regression without fixed effects showing the effects of energy taxes on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
EnerTax % GDP (-1)	0.016	0.538	0.111	-0.524	-1.141**	-1.146*	-2.033**	-2.749**	-2.482	-4.596	-1.864
	(0.983)	(0.439)	(0.795)	(0.311)	(0.043)	(0.084)	(0.032)	(0.014)	(0.293)	(0.175)	(0.698)
lnGDPpc (-1)	-4.143	-3.878***	-2.938***	-2.352***	-1.337**	-1.347*	-0.407	2.737	2.043	-2.273	10.75
	(0.227)	(0.004)	(0.001)	(0.002)	(0.046)	(0.052)	(0.768)	(0.113)	(0.669)	(0.805)	(0.258)
lnTrade % GDP (-1)	-6.366***	-5.029***	-0.949	0.112	2.538**	2.685**	4.637**	8.044***	21.88***	33.81***	47.12***
	(0.000)	(0.000)	(0.380)	(0.910)	(0.030)	(0.022)	(0.011)	(0.001)	(0.000)	(0.000)	(0.000)
Unemployment rate (-1)	0.112	0.041	0.012	0.026	0.064	0.071	0.124*	0.188*	-0.162	-0.436	-0.259
	(0.221)	(0.415)	(0.561)	(0.372)	(0.102)	(0.108)	(0.099)	(0.095)	(0.534)	(0.202)	(0.511)
Financial Freedom (-1)	0.018	-0.019	0.055	0.041	0.044	0.059	0.067	0.213*	0.252	0.503	0.823
	(0.900)	(0.860)	(0.376)	(0.344)	(0.328)	(0.272)	(0.479)	(0.080)	(0.320)	(0.132)	(0.363)
Government Integrity (-1)	0.048	0.065	0.035	0.025	0.008	0.010	0.007	-0.037	-0.065	-0.226	-0.272
	(0.422)	(0.204)	(0.112)	(0.302)	(0.715)	(0.664)	(0.858)	(0.397)	(0.677)	(0.347)	(0.575)
Constant	63.25*	56.87***	29.56***	21.92**	3.413	1.798	-14.65	-65.93***	-109.9**	-110.3	-322.2**
	(0.055)	(0.001)	(0.005)	(0.026)	(0.723)	(0.848)	(0.436)	(0.003)	(0.032)	(0.335)	(0.021)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.144	0.090	0.019	0.020	0.039	0.048	0.067	0.141	0.285	0.327	0.416

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B3.
Bootstrap Quantile regression without fixed effects showing the effects of overall environmental stringency index on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
Overall Stringent index (-1)	-0.255	-0.145	-0.379	-0.323	-0.844**	-0.891*	-1.112**	-1.633**	-2.114	-0.634	-1.480
	(0.770)	(0.810)	(0.233)	(0.303)	(0.043)	(0.058)	(0.024)	(0.024)	(0.169)	(0.706)	(0.797)
lnGDPpc (-1)	-4.344	-3.891***	-2.354**	-2.155**	-0.730	-0.528	0.617	2.879	2.431	-5.798	10.85
	(0.277)	(0.004)	(0.034)	(0.047)	(0.465)	(0.620)	(0.696)	(0.143)	(0.661)	(0.498)	(0.440)
lnTrade % GDP (-1)	-6.157***	-4.766***	-0.578	-0.050	1.977**	1.976**	4.058*	8.222***	23.15***	32.02***	46.35***
	(0.000)	(0.001)	(0.532)	(0.951)	(0.032)	(0.038)	(0.051)	(0.001)	(0.000)	(0.000)	(0.000)
Unemployment rate (-1)	0.125	0.078*	0.014	0.012	0.062	0.060*	0.065	0.066	-0.211	-0.597**	-0.297
	(0.182)	(0.085)	(0.563)	(0.662)	(0.135)	(0.097)	(0.354)	(0.603)	(0.328)	(0.026)	(0.549)
Financial freedom (-1)	0.004	-0.015	0.046	0.089*	0.111*	0.121**	0.085	0.180*	0.158	0.428	0.993
	(0.977)	(0.894)	(0.442)	(0.084)	(0.075)	(0.018)	(0.304)	(0.086)	(0.423)	(0.133)	(0.154)
Government Integrity (-1)	0.063	0.062	0.030	0.015	0.004	0.003	0.025	-0.004	-0.007	-0.077	-0.293
	(0.198)	(0.238)	(0.284)	(0.555)	(0.854)	(0.898)	(0.320)	(0.914)	(0.945)	(0.667)	(0.306)
Constant	64.96*	56.72***	24.13*	17.96	-4.453	-6.689	-25.26	-67.57**	-115.9**	-76.54	-328.7*
	(0.069)	(0.001)	(0.082)	(0.196)	(0.739)	(0.622)	(0.238)	(0.011)	(0.027)	(0.448)	(0.065)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.146	0.088	0.020	0.021	0.037	0.047	0.066	0.143	0.292	0.324	0.415

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B4.

Bootstrap Quantile regression without fixed effects showing the effects of emissions limit of NOx on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
NOx Limit (-1)	0.234	0.248	0.057	0.080	-0.029	-0.022	-0.164	-0.328*	-0.316	-0.076	-0.310
	(0.260)	(0.173)	(0.580)	(0.487)	(0.748)	(0.808)	(0.291)	(0.062)	(0.442)	(0.875)	(0.752)
lnGDPpc (-1)	-3.803	-3.373***	-2.815***	-2.373***	-1.614**	-1.506**	-0.264	1.314	-0.267	-6.878	10.21
	(0.327)	(0.004)	(0.002)	(0.001)	(0.022)	(0.040)	(0.847)	(0.302)	(0.950)	(0.395)	(0.260)
lnTrade % GDP (-1)	-6.324***	-5.057***	-0.826	-0.361	1.608**	1.857***	4.042**	8.386***	22.28***	31.57***	46.37***
	(0.000)	(0.000)	(0.363)	(0.646)	(0.049)	(0.004)	(0.032)	(0.001)	(0.000)	(0.000)	(0.000)
Unemployment rate (-1)	0.108	0.061	0.020	0.012	0.053*	0.065*	0.068	0.062	-0.233	-0.590**	-0.263
	(0.299)	(0.163)	(0.416)	(0.604)	(0.086)	(0.074)	(0.201)	(0.516)	(0.198)	(0.026)	(0.467)
Financial freedom (-1)	-0.017	0.008	0.055	0.044	0.097**	0.127***	0.135*	0.238*	0.173	0.400	0.985*
	(0.877)	(0.923)	(0.343)	(0.335)	(0.014)	(0.002)	(0.060)	(0.069)	(0.323)	(0.172)	(0.074)
Government Integrity (-1)	0.044	0.023	0.030	0.026	0.012	0.012	0.026	0.005	0.036	-0.051	-0.257
	(0.313)	(0.618)	(0.202)	(0.212)	(0.406)	(0.389)	(0.229)	(0.908)	(0.720)	(0.796)	(0.425)
Constant	61.18*	52.17***	28.01**	22.55**	4.368	0.315	-21.85	-59.71***	-92.03**	-64.91	-326.9**
	(0.078)	(0.000)	(0.020)	(0.029)	(0.656)	(0.975)	(0.272)	(0.005)	(0.035)	(0.520)	(0.015)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.146	0.089	0.019	0.019	0.033	0.042	0.057	0.130	0.283	0.324	0.414

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B5.
Bootstrap Quantile regression without fixed effects showing the effects of emissions limit of SOx on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
SOx Limit (-1)	-0.192	-0.238	-0.027	-0.109	-0.072	-0.108	-0.268	-0.657	-0.172	-0.022	-0.620
	(0.627)	(0.446)	(0.886)	(0.526)	(0.615)	(0.520)	(0.325)	(0.137)	(0.841)	(0.983)	(0.663)
lnGDPpc (-1)	-4.295	-3.588***	-2.944***	-2.299***	-1.548**	-1.405**	-0.242	1.262	0.620	-7.451	10.21
	(0.130)	(0.008)	(0.000)	(0.004)	(0.049)	(0.027)	(0.839)	(0.419)	(0.892)	(0.428)	(0.259)
lnTrade % GDP (-1)	-6.032***	-4.816***	-0.956	-0.095	1.612**	1.905***	3.923**	8.356***	21.94***	31.20***	46.37***
	(0.005)	(0.001)	(0.177)	(0.911)	(0.024)	(0.002)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate (-1)	0.128*	0.074	0.015	0.016	0.058*	0.064*	0.063	0.041	-0.250	-0.569**	-0.263
	(0.072)	(0.130)	(0.504)	(0.477)	(0.089)	(0.060)	(0.133)	(0.636)	(0.178)	(0.033)	(0.547)
Financial freedom (-1)	0.002	-0.018	0.050	0.055	0.107***	0.125***	0.138*	0.242*	0.213	0.390	0.985
	(0.989)	(0.880)	(0.349)	(0.251)	(0.007)	(0.008)	(0.077)	(0.064)	(0.329)	(0.271)	(0.208)
Government Integrity (-1)	0.061	0.061	0.036	0.024	0.010	0.012	0.023	-0.003	-0.010	-0.030	-0.257
	(0.274)	(0.279)	(0.117)	(0.283)	(0.564)	(0.472)	(0.324)	(0.942)	(0.931)	(0.890)	(0.563)
Constant	64.37**	55.00***	30.26***	20.93*	3.317	-0.328	-21.02	-56.85***	-99.94**	-58.41	-325.4**
	(0.020)	(0.002)	(0.001)	(0.059)	(0.755)	(0.968)	(0.231)	(0.009)	(0.025)	(0.615)	(0.013)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.145	0.089	0.018	0.019	0.034	0.042	0.057	0.130	0.282	0.324	0.414

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B6.

Bootstrap Quantile regression without fixed effects showing the effects of emissions limit of PM on aggregate FDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 FDI	q.10 FDI	q.25 FDI	q.30 FDI	q.45 FDI	q.50 FDI	q.60 FDI	q.75 FDI	q.90 FDI	q.95 FDI	q.99 FDI
PM Limit (-1)	-0.121	0.013	0.037	0.074	-0.089	-0.121	-0.327**	-0.440	-0.049	-0.014	-0.398
	(0.705)	(0.964)	(0.717)	(0.507)	(0.365)	(0.317)	(0.030)	(0.126)	(0.932)	(0.982)	(0.796)
lnGDPpc (-1)	-4.237	-4.075***	-2.873***	-2.504***	-1.409*	-1.281	-0.068	1.563	0.964	-7.422	10.91
	(0.211)	(0.001)	(0.002)	(0.001)	(0.072)	(0.148)	(0.949)	(0.279)	(0.855)	(0.434)	(0.329)
lnTrade % GDP (-1)	-5.890***	-5.003***	-0.717	-0.380	1.805**	2.136**	3.952**	8.923***	22.04***	31.22***	46.96***
	(0.000)	(0.000)	(0.409)	(0.652)	(0.015)	(0.025)	(0.015)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate (-1)	0.128	0.070	0.020	0.005	0.068*	0.069*	0.102**	0.082	-0.248	-0.569**	-0.222
	(0.129)	(0.152)	(0.439)	(0.828)	(0.090)	(0.084)	(0.042)	(0.352)	(0.196)	(0.039)	(0.603)
Financial freedom (-1)	0.005	-0.028	0.043	0.031	0.106**	0.114**	0.140*	0.211*	0.227	0.390	0.964
	(0.960)	(0.778)	(0.423)	(0.543)	(0.015)	(0.017)	(0.056)	(0.094)	(0.357)	(0.196)	(0.413)
Government Integrity (-1)	0.057	0.068	0.035	0.035*	0.009	0.016	0.018	0.002	-0.024	-0.030	-0.267
	(0.192)	(0.137)	(0.147)	(0.084)	(0.642)	(0.384)	(0.332)	(0.949)	(0.855)	(0.879)	(0.640)
Constant	62.68**	59.86***	28.65**	24.39**	1.184	-2.212	-22.98	-62.41***	-104.6*	-58.86	-335.0**
	(0.040)	(0.000)	(0.017)	(0.014)	(0.918)	(0.863)	(0.162)	(0.003)	(0.055)	(0.625)	(0.044)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.427	0.266	0.171	0.171	0.236	0.269	0.336	0.447	0.630	0.690	0.812

Note: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX C. Bootstrap Quantile regression results with two-way fixed effects showing the effects of environmental policy variables on GFDI and M&A for the subsample of 19 EU countries.

Summary of the results indicate evidence of pollution haven hypothesis in the relationship between environmental policy variables and GFDI. The environmental policy variables include energy taxes, emission limits NOx, and emissions limit PM. The rest are insignificant.

Table C1.

Bootstrap Quantile regression with two-way fixed effects showing the effects of environmental taxes on GFDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
EnvTax % GDP (-1)	-0.225	-0.241	-0.255	-0.300	-0.266	-0.255	-0.276	-0.303	-0.339	-0.288	-0.288
	(0.193)	(0.166)	(0.174)	(0.109)	(0.172)	(0.199)	(0.171)	(0.230)	(0.371)	(0.540)	(0.450)
lnGDPpc (-1)	-4.669***	-3.789***	-3.601*	-4.256*	-3.572	-3.785*	-3.841	-3.546*	-2.584	-3.545	-3.545
	(0.007)	(0.008)	(0.087)	(0.077)	(0.103)	(0.062)	(0.102)	(0.053)	(0.204)	(0.230)	(0.165)
lnTrade % GDP (-1)	-0.192	-0.277	-1.152	-0.232	-0.281	-0.553	-0.349	-1.273	-1.938	-0.787	-0.787
	(0.800)	(0.711)	(0.119)	(0.758)	(0.728)	(0.544)	(0.720)	(0.254)	(0.204)	(0.686)	(0.663)
Unemployment rate (-1)	-0.055***	-0.057***	-0.047**	-0.0521*	-0.049**	-0.048*	-0.051	-0.026	0.003	-0.020	-0.020
	(0.005)	(0.003)	(0.033)	(0.052)	(0.024)	(0.051)	(0.105)	(0.445)	(0.953)	(0.689)	(0.718)
Financial Freedom (-1)	-0.042*	-0.032	-0.047*	-0.043	-0.049	-0.051	-0.040	-0.049	-0.057	-0.059	-0.060
	(0.062)	(0.251)	(0.077)	(0.165)	(0.182)	(0.140)	(0.251)	(0.135)	(0.229)	(0.217)	(0.181)
Government Integrity (-1)	-0.006	-0.004	-0.004	-0.004	-0.013	-0.007	-0.024*	-0.002	-0.016	-0.007	-0.006
	(0.502)	(0.668)	(0.741)	(0.726)	(0.309)	(0.594)	(0.099)	(0.911)	(0.423)	(0.806)	(0.790)
Constant	55.30***	45.43***	48.66**	51.33*	45.59*	48.76**	49.22**	49.56**	46.16**	50.81*	50.81**
	(0.005)	(0.004)	(0.040)	(0.056)	(0.061)	(0.034)	(0.046)	(0.013)	(0.034)	(0.093)	(0.039)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.439	0.423	0.429	0.436	0.472	0.486	0.525	0.585	0.676	0.749	0.861

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2.

Bootstrap Quantile regression with two-way fixed effects showing the effects of energy taxes on GFDI for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
EnerTax % GDP (-1)	-0.388**	-0.309	-0.213	-0.318	-0.269	-0.321	-0.224	-0.232	-0.343	0.505	0.505
	(0.022)	(0.148)	(0.419)	(0.256)	(0.293)	(0.282)	(0.481)	(0.487)	(0.368)	(0.400)	(0.374)
lnGDPpc (-1)	-5.024***	-3.864**	-3.209	-4.156	-3.605	-4.194	-3.491	-3.549	-1.951	-0.867	-0.867
	(0.008)	(0.042)	(0.172)	(0.128)	(0.146)	(0.121)	(0.106)	(0.143)	(0.445)	(0.800)	(0.731)
lnTrade % GDP (-1)	-0.318	-0.346	-1.069	-0.444	-0.270	-0.297	-0.602	-1.355	-1.971	-3.222*	-3.222
	(0.648)	(0.655)	(0.137)	(0.498)	(0.745)	(0.780)	(0.574)	(0.187)	(0.249)	(0.077)	(0.104)
Unemployment rate (-1)	-0.059**	-0.050**	-0.041**	-0.046*	-0.048*	-0.051*	-0.044*	-0.037	0.018	-0.031	-0.031
	(0.011)	(0.016)	(0.024)	(0.058)	(0.069)	(0.071)	(0.087)	(0.243)	(0.723)	(0.585)	(0.538)
Financial Freedom (-1)	-0.047*	-0.035	-0.039	-0.046	-0.050	-0.054	-0.030	-0.052	-0.057	-0.022	-0.022
	(0.051)	(0.133)	(0.123)	(0.108)	(0.179)	(0.151)	(0.435)	(0.220)	(0.183)	(0.652)	(0.661)
Government Integrity (-1)	-0.003	-0.003	-0.004	0.001	-0.006	-0.007	-0.022	-0.004	-0.010	-0.032	-0.032
	(0.775)	(0.796)	(0.696)	(0.929)	(0.677)	(0.631)	(0.117)	(0.799)	(0.622)	(0.259)	(0.235)
Constant	59.83***	46.56**	43.24*	50.78*	45.20*	52.01*	45.34**	49.87**	38.82	31.01	31.01
	(0.004)	(0.032)	(0.097)	(0.091)	(0.098)	(0.068)	(0.046)	(0.039)	(0.107)	(0.372)	(0.235)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.442	0.423	0.428	0.434	0.471	0.485	0.523	0.583	0.675	0.749	0.861

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C3.

The effects of the overall stringency index on GFDI for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
Overall Stringent index (-1)	-0.031	-0.007	-0.033	-0.058	-0.060	-0.166	-0.087	-0.226	-0.328	-0.214	-0.214
	(0.809)	(0.959)	(0.813)	(0.720)	(0.757)	(0.440)	(0.667)	(0.384)	(0.333)	(0.579)	(0.617)
lnGDPpc (-1)	-3.263*	-2.764*	-2.546	-2.555	-2.790*	-3.546*	-2.982	-3.182	-2.032	-1.778	-1.778
	(0.067)	(0.075)	(0.138)	(0.173)	(0.093)	(0.091)	(0.179)	(0.123)	(0.295)	(0.462)	(0.517)
lnTrade % GDP (-1)	-0.564	-0.565	-1.043	-0.613	-0.307	-0.700	-0.831	-1.614*	-2.870*	-1.610	-1.610
	(0.519)	(0.452)	(0.202)	(0.436)	(0.740)	(0.487)	(0.346)	(0.082)	(0.063)	(0.388)	(0.402)
Unemployment rate (-1)	-0.033	-0.041*	-0.044*	-0.043*	-0.046*	-0.059**	-0.051*	-0.038	-0.025	0.001	0.001
	(0.213)	(0.090)	(0.061)	(0.063)	(0.070)	(0.018)	(0.087)	(0.239)	(0.531)	(0.991)	(0.993)
Financial Freedom (-1)	-0.044*	-0.033	-0.034	-0.026	-0.035	-0.024	-0.027	-0.034	-0.045	-0.028	-0.028
	(0.065)	(0.155)	(0.145)	(0.323)	(0.215)	(0.492)	(0.442)	(0.359)	(0.259)	(0.545)	(0.543)
Government Integrity (-1)	-0.003	-0.005	-0.005	-0.007	-0.007	-0.020	-0.023	-0.007	-0.014	-0.012	-0.012
	(0.726)	(0.652)	(0.651)	(0.545)	(0.585)	(0.141)	(0.158)	(0.703)	(0.463)	(0.622)	(0.626)
Constant	41.28**	35.28**	35.43*	33.26	35.36*	45.72*	40.62*	46.20**	43.14**	33.48	33.48
	(0.046)	(0.043)	(0.085)	(0.123)	(0.078)	(0.061)	(0.092)	(0.046)	(0.049)	(0.213)	(0.257)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.432	0.416	0.425	0.432	0.468	0.483	0.522	0.584	0.677	0.749	0.861

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C4.

The effects of emissions limit of NOx on GFDI for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
NOx Limit (-1)	-0.023	-0.069	-0.103	-0.112	-0.148*	-0.179	-0.144	-0.236	-0.401*	-0.224	-0.224
	(0.685)	(0.160)	(0.115)	(0.142)	(0.065)	(0.165)	(0.253)	(0.150)	(0.072)	(0.372)	(0.372)
lnGDPpc (-1)	-3.148**	-1.718	-3.290*	-2.962*	-4.051*	-5.023**	-3.926*	-5.564**	-3.321	-2.428	-2.428
	(0.049)	(0.262)	(0.069)	(0.092)	(0.055)	(0.019)	(0.080)	(0.016)	(0.283)	(0.436)	(0.393)
lnTrade % GDP (-1)	-0.466	-0.141	-0.754	-0.703	-0.104	-0.341	-0.521	-0.811	-1.135	-1.057	-1.057
	(0.579)	(0.821)	(0.318)	(0.400)	(0.898)	(0.728)	(0.624)	(0.459)	(0.450)	(0.556)	(0.565)
Unemployment rate (-1)	-0.030	-0.023	-0.043*	-0.033*	-0.055**	-0.062**	-0.054	-0.078**	-0.020	-0.026	-0.026
	(0.211)	(0.311)	(0.063)	(0.098)	(0.018)	(0.013)	(0.109)	(0.039)	(0.637)	(0.633)	(0.607)
Financial Freedom (-1)	-0.040	-0.040*	-0.026	-0.037	-0.046	-0.045	-0.039	-0.047	-0.067	-0.034	-0.034
	(0.125)	(0.095)	(0.271)	(0.166)	(0.109)	(0.125)	(0.240)	(0.164)	(0.106)	(0.467)	(0.462)
Government Integrity (-1)	-0.004	-0.005	-0.003	0.001	-0.012	-0.011	-0.021*	0.004	0.002	-0.017	-0.017
	(0.705)	(0.543)	(0.731)	(0.900)	(0.349)	(0.376)	(0.060)	(0.820)	(0.927)	(0.498)	(0.400)
Constant	39.43**	22.97	41.63**	38.33*	49.64**	61.23**	50.42**	68.51***	49.36	38.62	38.62
	(0.031)	(0.174)	(0.042)	(0.058)	(0.041)	(0.012)	(0.037)	(0.006)	(0.132)	(0.235)	(0.222)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.432	0.419	0.431	0.440	0.476	0.493	0.530	0.592	0.684	0.749	0.861

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C5.

The effects of emissions limit of SOx on GFDI for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
SOx Limit (-1)	-0.020	-0.016	-0.039	-0.053	-0.148	-0.224	-0.224	-0.330	-0.494	-0.015	-0.015
	(0.801)	(0.845)	(0.710)	(0.647)	(0.360)	(0.247)	(0.323)	(0.145)	(0.100)	(0.963)	(0.968)
lnGDPpc (-1)	-3.245**	-2.529	-2.489*	-2.512	-3.261	-3.491*	-3.431*	-4.440**	-2.300	-1.218	-1.218
	(0.031)	(0.128)	(0.097)	(0.159)	(0.123)	(0.080)	(0.076)	(0.034)	(0.341)	(0.632)	(0.612)
lnTrade % GDP (-1)	-0.468	-0.423	-0.940	-0.614	-0.265	-0.848	-0.854	-2.124**	-1.385	-1.816	-1.816
	(0.527)	(0.513)	(0.285)	(0.456)	(0.741)	(0.406)	(0.319)	(0.032)	(0.342)	(0.344)	(0.285)
Unemployment rate (-1)	-0.034	-0.036	-0.044**	-0.041*	-0.044	-0.051*	-0.054*	-0.065**	-0.022	0.006	0.006
	(0.156)	(0.109)	(0.042)	(0.060)	(0.107)	(0.066)	(0.059)	(0.047)	(0.621)	(0.913)	(0.892)
Financial Freedom (-1)	-0.044	-0.034	-0.030	-0.027	-0.032	-0.045	-0.033	-0.046	-0.036	-0.026	-0.028
	(0.113)	(0.202)	(0.230)	(0.338)	(0.195)	(0.153)	(0.279)	(0.234)	(0.340)	(0.563)	(0.538)
Government Integrity (-1)	-0.003	-0.006	-0.005	-0.005	-0.004	-0.012	-0.030**	-0.010	-0.017	-0.018	-0.018
	(0.798)	(0.561)	(0.673)	(0.625)	(0.751)	(0.383)	(0.031)	(0.535)	(0.366)	(0.414)	(0.507)
Constant	40.66**	32.33*	34.21*	32.85	40.32*	47.31**	47.40**	63.78***	38.88	28.56	28.56
	(0.016)	(0.074)	(0.052)	(0.118)	(0.097)	(0.034)	(0.032)	(0.003)	(0.135)	(0.323)	(0.288)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.431	0.416	0.426	0.433	0.470	0.486	0.527	0.591	0.685	0.749	0.861

Note: *p*-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C6.

The effects of emissions limit of PM on GFDI for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 GFDI	q.10 GFDI	q.25 GFDI	q.30 GFDI	q.45 GFDI	q.50 GFDI	q.60 GFDI	q.75 GFDI	q.90 GFDI	q.95 GFDI	q.99 GFDI
PM Limit (-1)	-0.009	-0.015	-0.039	-0.032	-0.044	-0.061	-0.079	-0.0865*	0.020	0.004	0.004
	(0.804)	(0.658)	(0.367)	(0.490)	(0.456)	(0.230)	(0.139)	(0.092)	(0.806)	(0.964)	(0.966)
lnGDPpc (-1)	-3.043*	-2.218	-2.147	-2.573	-2.350	-2.606	-2.667	-2.638	-1.358	-1.320	-1.320
	(0.087)	(0.138)	(0.138)	(0.222)	(0.221)	(0.208)	(0.180)	(0.151)	(0.648)	(0.649)	(0.605)
lnTrade % GDP (-1)	-0.571	-0.344	-0.922	-0.624	-0.352	-0.512	-0.594	-1.431	-3.063*	-2.032	-2.032
	(0.461)	(0.635)	(0.145)	(0.447)	(0.693)	(0.610)	(0.535)	(0.124)	(0.055)	(0.344)	(0.329)
Unemployment rate (-1)	-0.032	-0.032	-0.039*	-0.044*	-0.042*	-0.042*	-0.042	-0.030	-0.005	0.008	0.008
	(0.158)	(0.154)	(0.054)	(0.076)	(0.076)	(0.061)	(0.107)	(0.336)	(0.935)	(0.886)	(0.885)
Financial Freedom (-1)	-0.046*	-0.034	-0.024	-0.030	-0.029	-0.027	-0.021	-0.043	-0.056	-0.036	-0.036
	(0.067)	(0.101)	(0.285)	(0.286)	(0.384)	(0.383)	(0.504)	(0.232)	(0.148)	(0.465)	(0.418)
Government Integrity (-1)	-0.004	-0.009	-0.010	-0.010	-0.015	-0.025	-0.035**	-0.013	-0.008	-0.015	-0.015
	(0.686)	(0.325)	(0.385)	(0.396)	(0.324)	(0.102)	(0.016)	(0.451)	(0.722)	(0.595)	(0.615)
Constant	39.09*	28.74*	30.27*	33.89	31.02	35.13	36.69*	40.44**	36.82	30.90	30.90
	(0.055)	(0.097)	(0.066)	(0.164)	(0.148)	(0.114)	(0.093)	(0.038)	(0.228)	(0.272)	(0.268)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.431	0.416	0.427	0.433	0.469	0.484	0.525	0.585	0.675	0.749	0.861

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX D. Bootstrap Quantile regression results with two-way fixed effects showing the effects of environmental policy variables on M&As for the subsample of 19 EU countries.

Summary of the results indicate evidence of pollution halo hypothesis in the relationship between overall stringency index and M&As. All other environmental policy variables does not support either pollution haven or halo hypothesis.

Table D1.

Bootstrap Quantile regression with two-way fixed effects showing the effects of environmental taxes on M&As for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
EnvTax % GDP (-1)	-0.034	0.011	0.223	0.313	0.307	0.334	0.326	0.337	-0.348	-0.097	-0.097
	(0.892)	(0.962)	(0.244)	(0.137)	(0.186)	(0.164)	(0.393)	(0.468)	(0.600)	(0.893)	(0.889)
lnGDPpc (-1)	0.942	0.372	0.139	1.369	1.185	1.043	1.162	0.437	7.079	7.187*	7.187
	(0.515)	(0.795)	(0.910)	(0.286)	(0.340)	(0.494)	(0.532)	(0.877)	(0.114)	(0.073)	(0.149)
lnTrade % GDP (-1)	-1.071	0.037	-0.896	-0.707	-1.137	-1.207	-1.545	-3.983*	-4.298	-6.551**	-6.551
	(0.397)	(0.976)	(0.343)	(0.539)	(0.315)	(0.326)	(0.372)	(0.100)	(0.201)	(0.034)	(0.132)
Unemployment rate (-1)	0.014	0.009	0.005	0.024	0.030	0.026	0.029	-0.0004	0.121	0.091	0.091
	(0.689)	(0.786)	(0.883)	(0.462)	(0.331)	(0.509)	(0.554)	(0.996)	(0.228)	(0.396)	(0.434)
Financial Freedom (-1)	-0.047	-0.030	-0.014	-0.006	-0.023	-0.021	-0.028	-0.029	-0.127	-0.161	-0.161
	(0.212)	(0.381)	(0.601)	(0.856)	(0.444)	(0.581)	(0.577)	(0.720)	(0.244)	(0.180)	(0.182)
Government Integrity (-1)	-0.001	0.003	0.010	0.006	0.017	0.014	0.023	0.044	-0.022	-0.040	-0.040
	(0.952)	(0.851)	(0.411)	(0.677)	(0.293)	(0.403)	(0.300)	(0.118)	(0.637)	(0.395)	(0.453)
Constant	-1.789	-2.062	2.353	-12.06	-7.830	-5.991	-5.921	11.19	-45.27	-32.78	-32.78
	(0.888)	(0.869)	(0.841)	(0.355)	(0.544)	(0.714)	(0.759)	(0.680)	(0.323)	(0.438)	(0.511)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.239	0.163	0.166	0.177	0.204	0.207	0.218	0.249	0.396	0.534	0.809

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D2.

Bootstrap Quantile regression with two-way fixed effects showing the effects of energy taxes on M&As for the 19 EU countries with data spanning from 2003 to 2019.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
EnerTax % GDP (-1)	-0.029	0.011	0.206	0.319	0.378	0.349	0.417	0.417	-0.365	-0.214	-0.214
	(0.903)	(0.958)	(0.265)	(0.208)	(0.138)	(0.193)	(0.237)	(0.372)	(0.621)	(0.808)	(0.784)
lnGDPpc (-1)	0.844	0.449	0.043	1.631	1.148	1.109	1.004	0.279	7.311*	6.820	6.820
	(0.600)	(0.723)	(0.971)	(0.203)	(0.406)	(0.470)	(0.634)	(0.916)	(0.056)	(0.209)	(0.194)
lnTrade % GDP (-1)	-0.988	-0.038	-0.787	-0.680	-1.131	-1.053	-2.023	-3.959*	-4.455	-6.100	-6.100*
	(0.337)	(0.972)	(0.458)	(0.514)	(0.344)	(0.371)	(0.290)	(0.093)	(0.233)	(0.146)	(0.087)
Unemployment rate (-1)	0.008	0.010	0.0002	0.027	0.027	0.022	0.020	-0.012	0.129	0.078	0.078
	(0.822)	(0.717)	(0.995)	(0.404)	(0.459)	(0.561)	(0.704)	(0.852)	(0.151)	(0.457)	(0.437)
Financial Freedom (-1)	-0.051	-0.031	-0.013	0.0004	-0.013	-0.015	-0.020	-0.026	-0.127	-0.168	-0.168
	(0.122)	(0.375)	(0.597)	(0.991)	(0.714)	(0.682)	(0.659)	(0.709)	(0.289)	(0.208)	(0.201)
Government Integrity (-1)	-0.002	0.003	0.009	0.001	0.014	0.011	0.022	0.043	-0.021	-0.041	-0.041
	(0.907)	(0.867)	(0.503)	(0.959)	(0.364)	(0.530)	(0.257)	(0.139)	(0.646)	(0.411)	(0.480)
Constant	-0.768	-2.514	3.206	-14.66	-7.708	-7.141	-2.378	12.91	-47.42	-30.17	-30.17
	(0.961)	(0.822)	(0.782)	(0.246)	(0.571)	(0.638)	(0.907)	(0.604)	(0.158)	(0.577)	(0.552)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.239	0.163	0.166	0.176	0.203	0.206	0.218	0.250	0.395	0.534	0.809

Note: *p*-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D3.

The effects of the overall stringency index on M&As for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
Overall Stringent index (-1)	-0.027	-0.001	0.093	0.169	0.184	0.149	0.160	-0.037	0.773**	0.881*	0.881*
	(0.871)	(0.997)	(0.573)	(0.289)	(0.239)	(0.406)	(0.402)	(0.909)	(0.047)	(0.074)	(0.061)
lnGDPpc (-1)	0.980	0.544	-0.043	0.120	0.449	0.684	0.827	0.475	7.717*	10.43*	10.43*
	(0.562)	(0.707)	(0.973)	(0.929)	(0.765)	(0.730)	(0.692)	(0.878)	(0.087)	(0.065)	(0.068)
lnTrade % GDP (-1)	-0.936	-0.029	0.076	-0.073	-0.392	-0.441	-0.663	-2.768	-4.175	-5.809	-5.809
	(0.394)	(0.978)	(0.939)	(0.938)	(0.711)	(0.729)	(0.689)	(0.268)	(0.209)	(0.114)	(0.111)
Unemployment rate (-1)	0.013	0.013	0.005	0.013	0.024	0.029	0.043	0.023	0.129	0.210**	0.210*
	(0.711)	(0.728)	(0.879)	(0.704)	(0.505)	(0.512)	(0.381)	(0.725)	(0.204)	(0.046)	(0.060)
Financial freedom (-1)	-0.043	-0.030	-0.014	-0.009	-0.019	-0.026	-0.024	-0.062	-0.130	-0.157	-0.157
	(0.195)	(0.234)	(0.654)	(0.795)	(0.539)	(0.491)	(0.526)	(0.410)	(0.221)	(0.163)	(0.152)
Government Integrity (-1)	-0.001	0.002	0.005	0.006	0.013	0.020	0.019	0.045	0.003	-0.030	-0.030
	(0.922)	(0.875)	(0.740)	(0.707)	(0.386)	(0.284)	(0.425)	(0.192)	(0.951)	(0.557)	(0.579)
Constant	-3.082	-3.525	0.832	-0.852	-2.811	-5.072	-5.726	8.437	-56.53	-74.19	-74.19
	(0.838)	(0.814)	(0.947)	(0.947)	(0.853)	(0.792)	(0.777)	(0.784)	(0.211)	(0.185)	(0.171)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.239	0.163	0.164	0.173	0.199	0.203	0.216	0.248	0.396	0.538	0.811

Note: p-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D4.

The effects of emissions limit of NOx on M&As for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
NOx Limit (-1)	0.015	0.026	0.032	0.063	0.050	0.034	-0.001	-0.022	-0.120	-0.193	-0.193
	(0.801)	(0.649)	(0.548)	(0.187)	(0.516)	(0.580)	(0.994)	(0.839)	(0.486)	(0.332)	(0.401)
lnGDPpc (-1)	0.811	0.622	-0.101	0.722	0.593	0.824	0.289	0.551	7.909	7.137	7.137
	(0.600)	(0.698)	(0.947)	(0.577)	(0.745)	(0.629)	(0.895)	(0.857)	(0.103)	(0.171)	(0.226)
lnTrade % GDP (-1)	-0.831	-0.053	0.247	-0.198	-0.976	-0.281	-0.608	-2.503	-3.759	-5.629	-5.629
	(0.479)	(0.964)	(0.823)	(0.840)	(0.437)	(0.805)	(0.671)	(0.265)	(0.236)	(0.123)	(0.107)
Unemployment rate (-1)	0.004	0.013	0.008	0.023	0.031	0.030	0.027	0.025	0.110	0.099	0.099
	(0.905)	(0.717)	(0.827)	(0.455)	(0.478)	(0.441)	(0.581)	(0.681)	(0.265)	(0.387)	(0.415)
Financial Freedom (-1)	-0.054	-0.025	-0.016	-0.014	-0.018	-0.026	-0.027	-0.068	-0.161	-0.118	-0.118
	(0.108)	(0.409)	(0.623)	(0.592)	(0.604)	(0.488)	(0.562)	(0.388)	(0.156)	(0.370)	(0.364)
Government Integrity (-1)	-0.002	0.001	0.008	0.008	0.014	0.017	0.022	0.049	-0.031	-0.049	-0.049
	(0.911)	(0.948)	(0.575)	(0.537)	(0.346)	(0.340)	(0.358)	(0.149)	(0.511)	(0.278)	(0.319)
Constant	-0.972	-4.512	0.733	-6.518	-1.771	-6.878	0.0652	6.540	-53.79	-38.33	-38.33
	(0.946)	(0.761)	(0.958)	(0.610)	(0.922)	(0.701)	(0.998)	(0.833)	(0.263)	(0.461)	(0.513)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.239	0.163	0.165	0.173	0.199	0.203	0.215	0.249	0.396	0.538	0.811

Note: p-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D5.

The effects of emissions limit of SOx on M&As for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
SOx Limit (-1)	0.031	0.046	0.022	0.059	0.055	0.030	0.017	-0.023	-0.227	-0.276	-0.276
	(0.750)	(0.543)	(0.774)	(0.330)	(0.486)	(0.774)	(0.864)	(0.863)	(0.299)	(0.269)	(0.258)
lnGDPpc (-1)	1.645	0.314	-0.105	0.179	0.610	0.893	0.213	0.748	8.363**	7.795	7.795
	(0.243)	(0.820)	(0.936)	(0.891)	(0.717)	(0.651)	(0.919)	(0.811)	(0.017)	(0.176)	(0.178)
lnTrade % GDP (-1)	-1.391	0.167	-0.058	0.324	-0.395	-0.135	-0.685	-2.729	-4.255	-5.580	-5.580*
	(0.204)	(0.869)	(0.949)	(0.733)	(0.714)	(0.916)	(0.644)	(0.196)	(0.194)	(0.149)	(0.088)
Unemployment rate (-1)	0.029	0.009	0.006	0.012	0.027	0.032	0.023	0.028	0.100	0.089	0.089
	(0.450)	(0.776)	(0.853)	(0.713)	(0.514)	(0.463)	(0.611)	(0.662)	(0.162)	(0.480)	(0.458)
Financial Freedom (-1)	-0.054*	-0.029	-0.014	-0.011	-0.018	-0.030	-0.016	-0.063	-0.161	-0.133	-0.133
	(0.098)	(0.363)	(0.639)	(0.734)	(0.616)	(0.392)	(0.754)	(0.418)	(0.124)	(0.206)	(0.265)
Government Integrity (-1)	0.005	0.003	0.006	0.007	0.012	0.018	0.015	0.046	-0.045	-0.043	-0.043
	(0.788)	(0.846)	(0.688)	(0.685)	(0.512)	(0.322)	(0.471)	(0.108)	(0.276)	(0.398)	(0.365)
Constant	-7.965	-2.168	2.075	-3.027	-4.438	-8.150	0.925	5.312	-54.71	-44.52	-44.52
	(0.570)	(0.866)	(0.870)	(0.817)	(0.776)	(0.676)	(0.964)	(0.865)	(0.137)	(0.450)	(0.435)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.240	0.163	0.164	0.172	0.198	0.203	0.215	0.248	0.394	0.537	0.810

Note: p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D6.

The effects of emissions limit of PM on M&As for 19 EU countries with data spanning from 2003 to 2019 based on Bootstrap Quantile 2-way fixed effects.

	q.05 M&As	q.10 M&As	q.25 M&As	q.30 M&As	q.45 M&As	q.50 M&As	q.60 M&As	q.75 M&As	q.90 M&As	q.95 M&As	q.99 M&As
PM Limit (-1)	0.036	0.022	0.058	0.056	0.040	0.042	0.001	-0.017	-0.098	-0.077	-0.077
	(0.543)	(0.636)	(0.226)	(0.236)	(0.455)	(0.483)	(0.985)	(0.858)	(0.454)	(0.624)	(0.544)
lnGDPpc (-1)	1.538	0.393	-0.106	-0.050	0.339	0.605	0.291	0.751	8.048*	7.142	7.142
	(0.338)	(0.759)	(0.935)	(0.971)	(0.834)	(0.750)	(0.885)	(0.782)	(0.086)	(0.181)	(0.114)
lnTrade % GDP (-1)	-1.114	-0.054	0.269	0.118	-0.556	-0.366	-0.609	-2.562	-4.141	-6.121*	-6.121*
	(0.264)	(0.959)	(0.757)	(0.907)	(0.576)	(0.790)	(0.706)	(0.183)	(0.255)	(0.061)	(0.091)
Unemployment rate (-1)	0.028	0.012	0.007	0.011	0.025	0.028	0.027	0.027	0.108	0.056	0.056
	(0.441)	(0.713)	(0.830)	(0.762)	(0.538)	(0.521)	(0.578)	(0.632)	(0.242)	(0.590)	(0.567)
Financial Freedom (-1)	-0.061*	-0.026	-0.014	-0.007	-0.022	-0.025	-0.026	-0.063	-0.153	-0.176	-0.176
	(0.092)	(0.371)	(0.663)	(0.820)	(0.450)	(0.548)	(0.615)	(0.377)	(0.150)	(0.112)	(0.116)
Government Integrity (-1)	0.007	0.003	0.007	0.007	0.015	0.020	0.021	0.045	-0.034	-0.040	-0.040
	(0.686)	(0.836)	(0.592)	(0.572)	(0.310)	(0.322)	(0.388)	(0.159)	(0.400)	(0.454)	(0.421)
Constant	-7.615	-2.142	0.702	0.246	-0.465	-4.370	0.021	4.514	-54.35	-32.99	-32.99
	(0.624)	(0.856)	(0.957)	(0.986)	(0.976)	(0.822)	(0.999)	(0.873)	(0.235)	(0.530)	(0.465)
Observations	304	304	304	304	304	304	304	304	304	304	304
R^2	0.239	0.163	0.166	0.174	0.199	0.203	0.215	0.248	0.394	0.535	0.810

Note: *p*-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX E. Complete results of IRFs graphs for all variables in the 4 estimations.

Fig E1a.
Estimation 1 – complete IRFs graph results estimated at 95% CI.

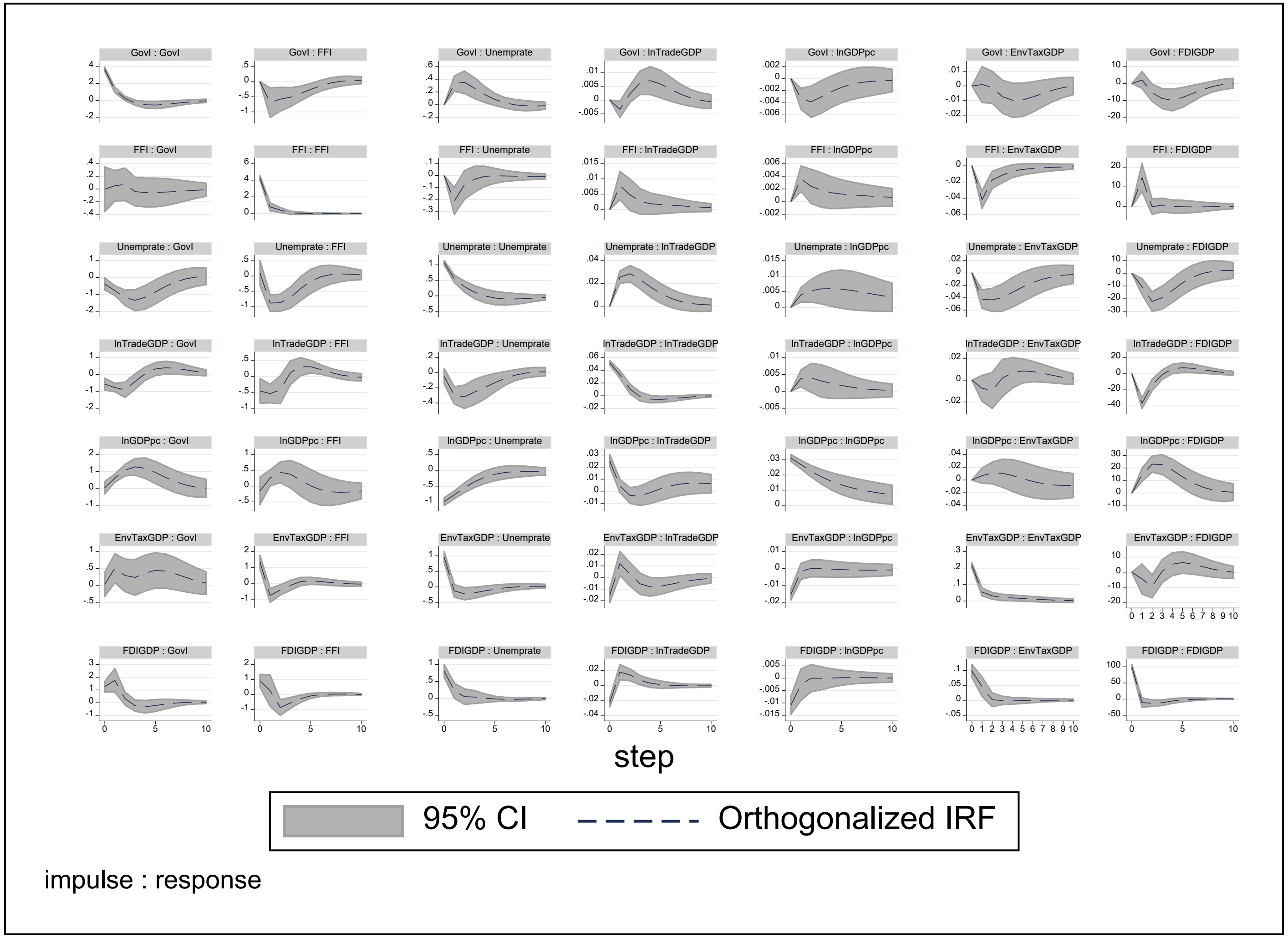


Fig E1b.

Estimation 1 – complete IRFs graph results estimated at 68% CI.

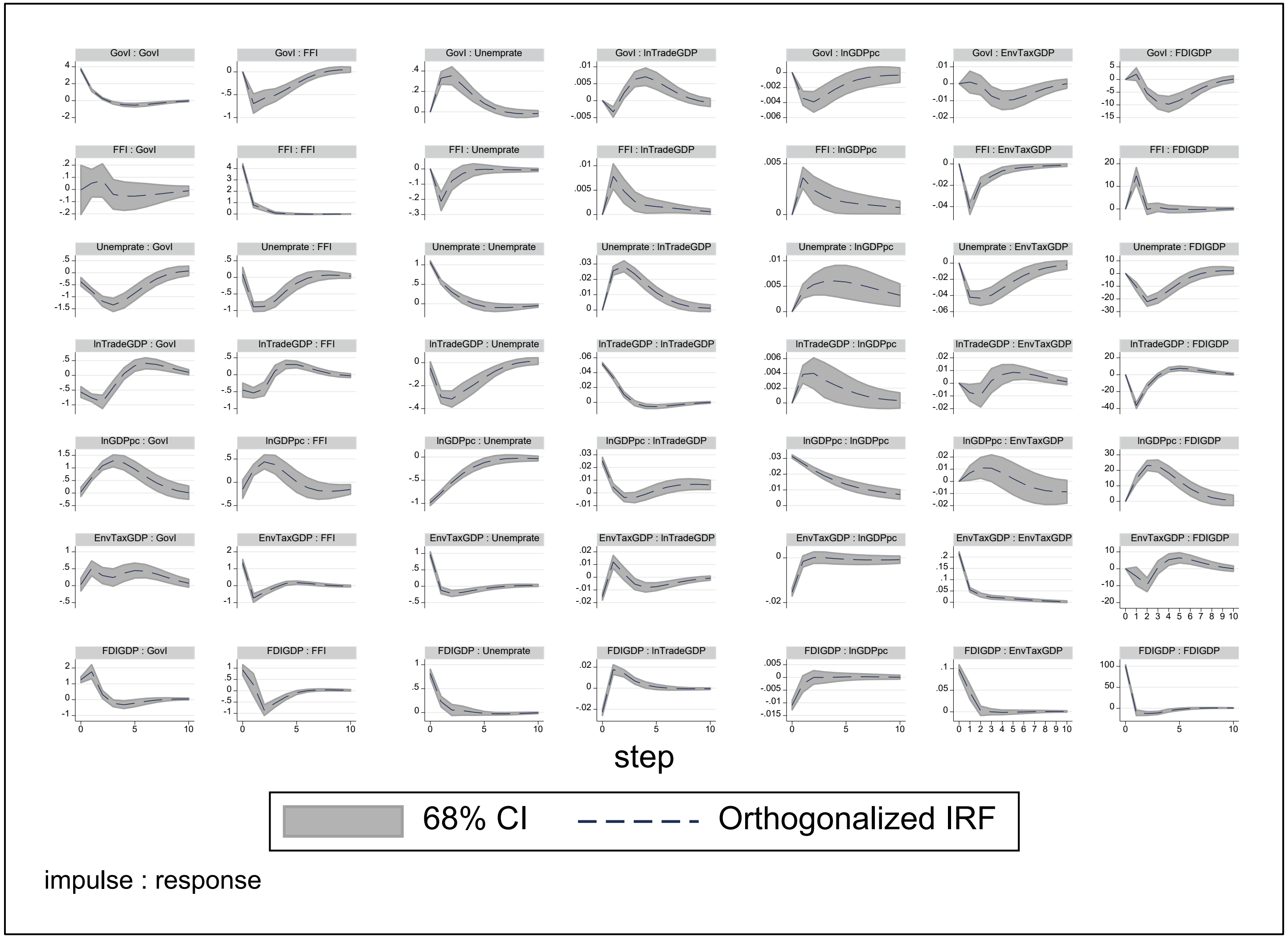


Fig E2a.

Estimation 2 – complete IRFs graph results estimated at 95% CI.

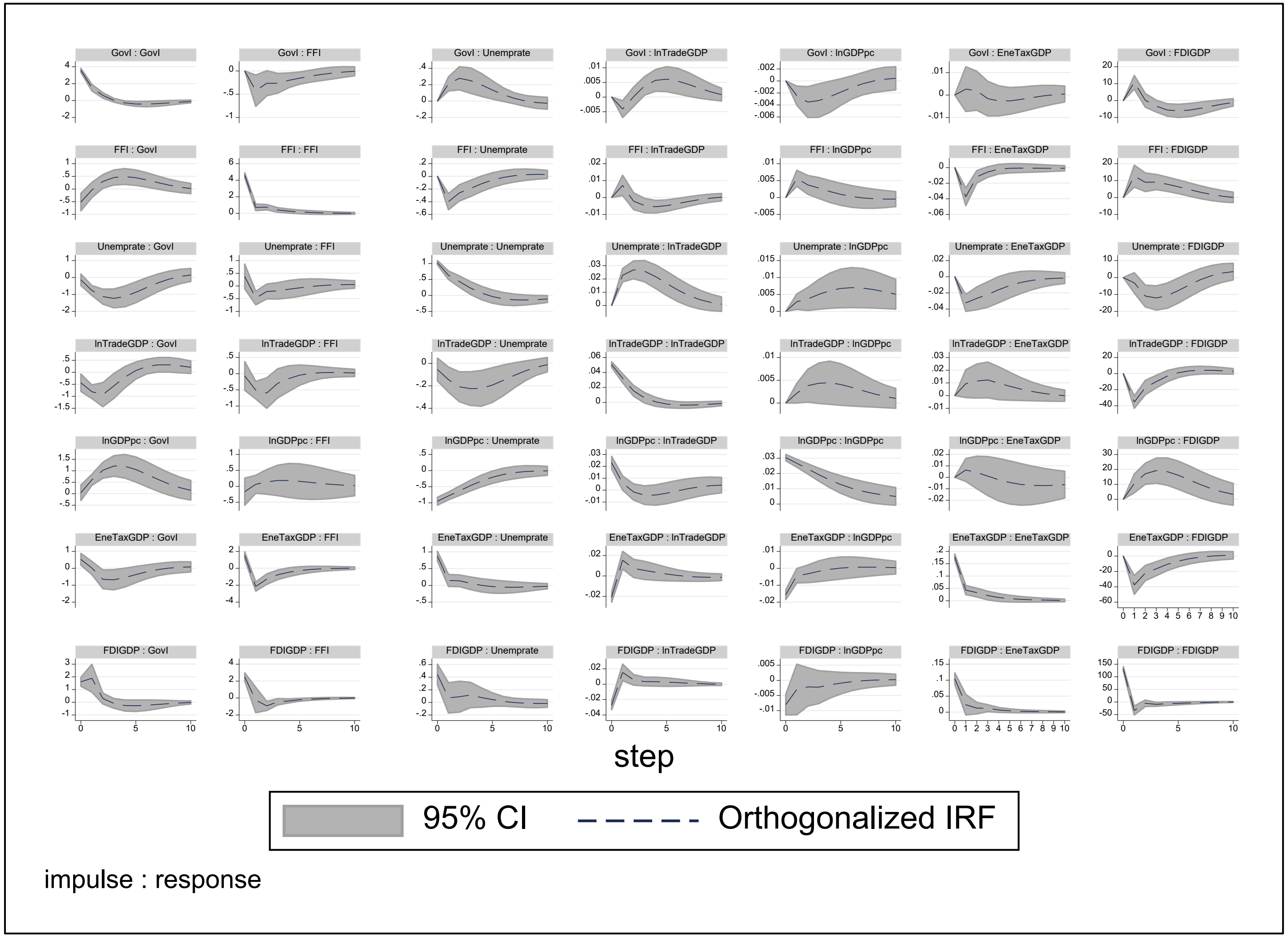


Fig E2b.

Estimation 2 – complete IRFs graph results estimated at 68% CI.

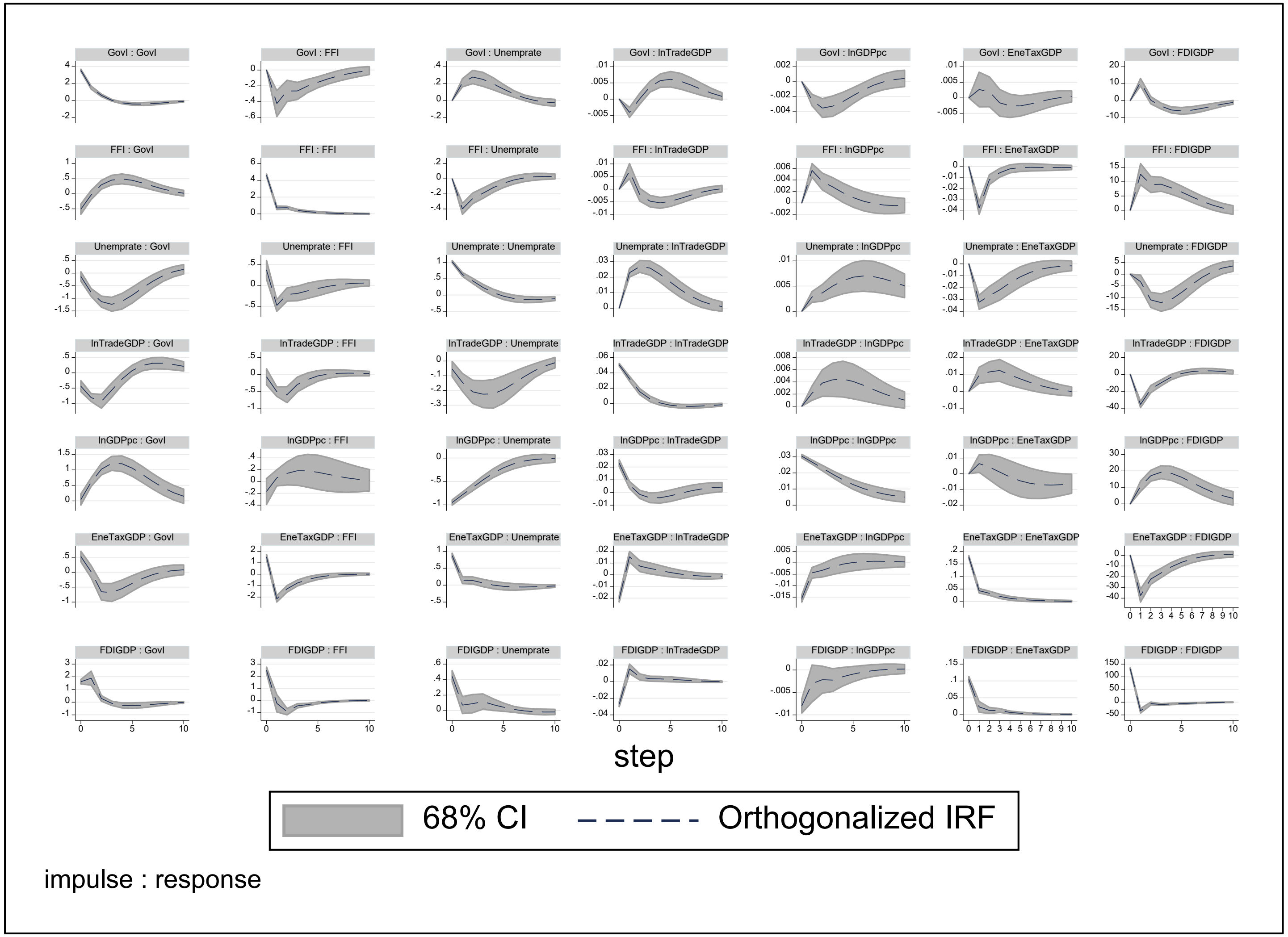


Fig E3a.

Estimation 3 – complete IRFs graph results estimated at 95% CI.

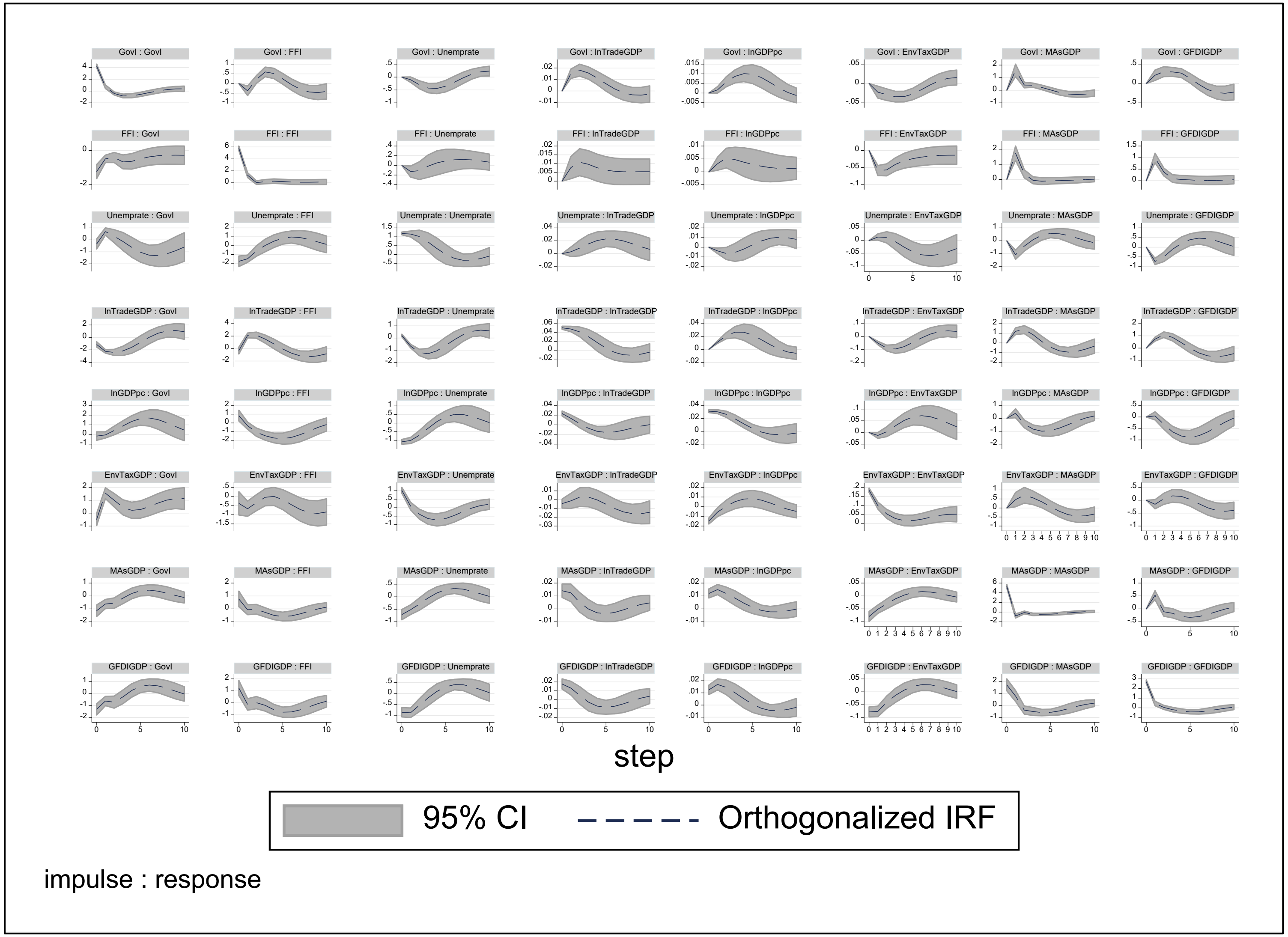


Fig E3b.

Estimation 3 – complete IRFs graph results estimated at 68% CI.

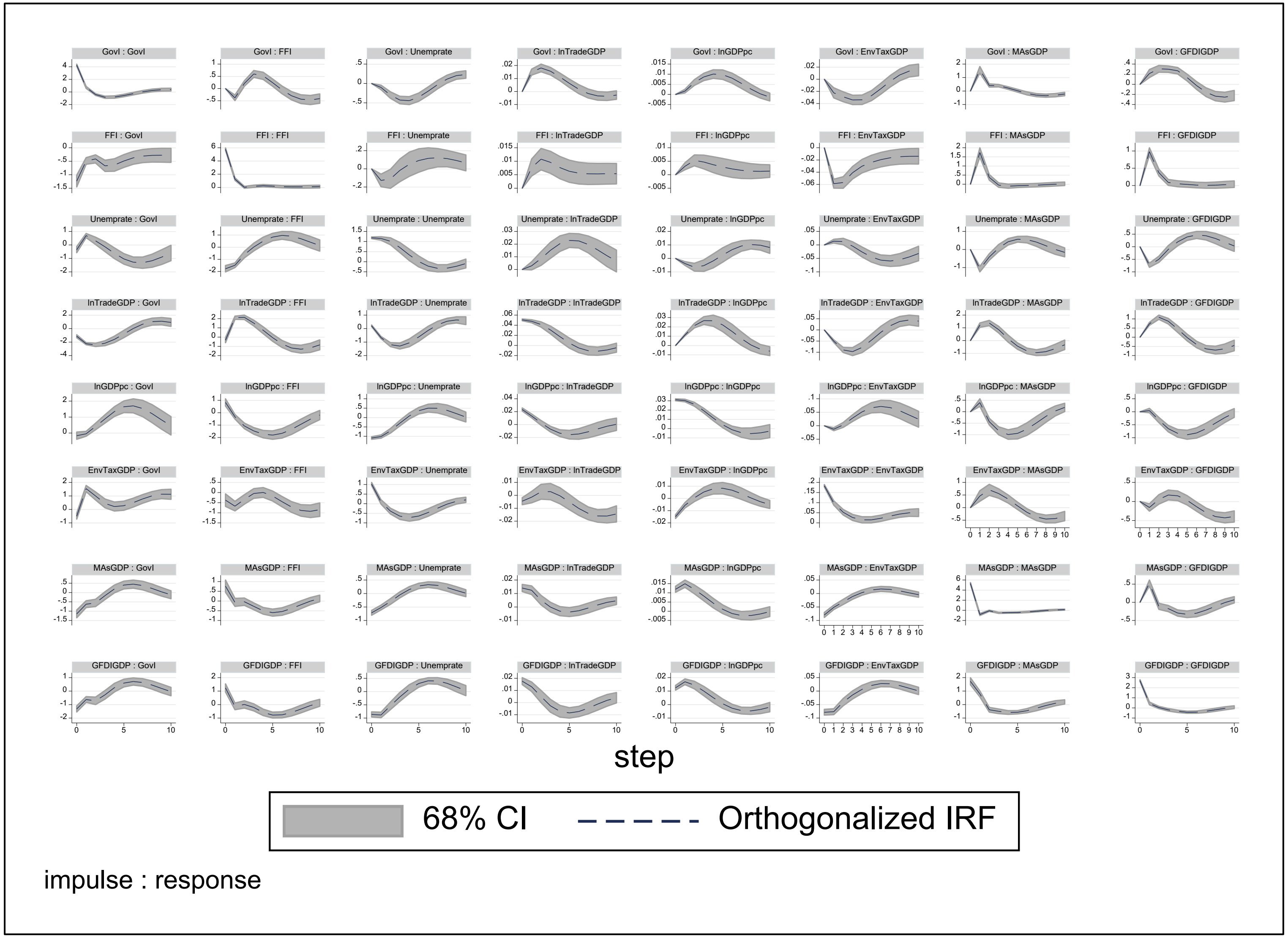


Fig E4a.

Estimation 4 – complete IRFs graph results estimated at 95% CI.

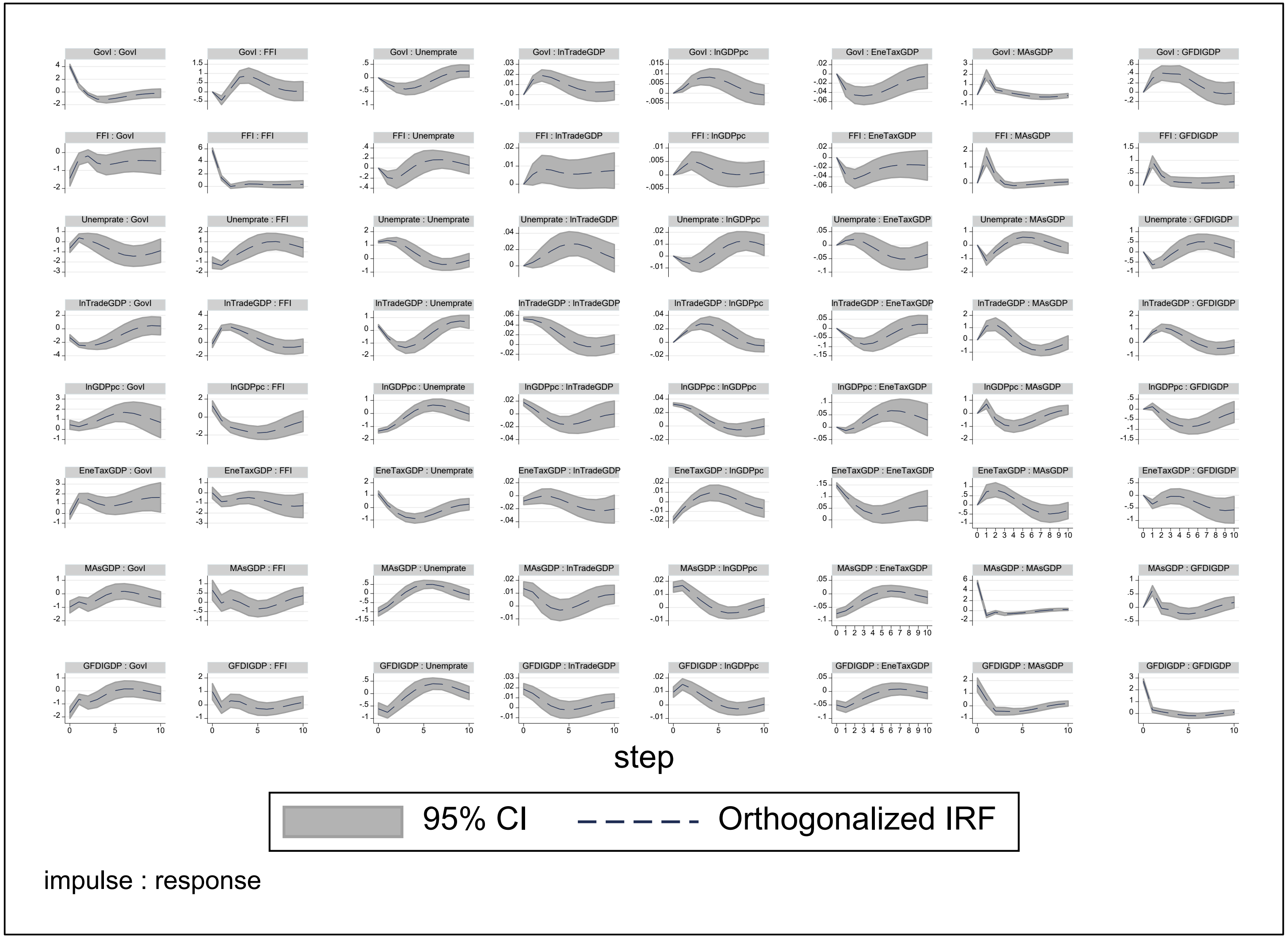


Fig E4b.

Estimation 4 – complete IRFs graph results estimated at 68% CI.