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EXPORT PROCESSING ZONES AND THE ECONOMIES OF EMERGING NATIONS

BY

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DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged. Nevertheless, I bear sole responsibility for all errors and omissions inherent in the study.

15TH DECEMBER, 2025

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CERTIFICATION

We hereby certify that this thesis was supervised in accordance with the procedures laid down by the University of Ghana.

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ABSTRACT

Several attempts have been made across the world to develop the economies of various countries over the years. In this regard, many policies and programmes have been implemented to help nations in their development effort. Export processing zones (EPZs) are one such policy tool that has become popular and is widely embraced particularly in the developing world. It is a trade policy tool premised on the idea of providing varied incentives to manufacture goods for export. The question however is whether the faith in the policy is a justified one since not very many robust econometric/quantitative studies have been conducted to ascertain EPZs' impact on the broader economy. This study thus investigates the direct impact of export processing zones on various macroeconomic variables (exchange rate, economic growth and inflation) in Ghana and Bangladesh. Exchange rate and inflation in particular have no prior studies that have considered how they are impacted by EPZs.

To achieve the study's aims, we applied both the symmetric autoregressive distributed lag (ARDL) and the nonlinear autoregressive distributed lag (NARDL) estimation techniques. Quarterly data for the study were sourced from the Ghana Free Zones Authority (1998Q1-2022Q4) and the Bangladesh Export Processing Zones Authority (1984Q1-2022Q4), augmented with national-level data from various world bodies.

Results for our first objective show the presence of cointegration for both Ghana and Bangladesh. Also, while EPZ investment affects exchange rate positively in the contemporaneous short-term for both countries, with Ghana also experiencing long-term positive effects of the investment variable, export from the zones has no impact on the rate of exchange for the two countries in both the long and short-runs. This means especially in the short-run, free zones investment helps to strengthen the local currency. Vector error correction analysis also

shows that all the independent variables overall jointly Granger-cause exchange rate in the long-run for both countries.

Relative to objective two, the results indicate the presence of cointegration as well as long-run asymmetry between EPZ investment and economic growth for Ghana while relative to Bangladesh, the asymmetric effect was observed in the short-term. Empirically, positive and negative shocks in EPZ investment have insignificant long-term effects on economic growth for both countries while in the short-run, positive shocks impact growth positively for Ghana and negatively for Bangladesh but the negative shocks restrict growth in both countries.

With objective three, we observed cointegration among the chosen variables as well as long-run asymmetry and short-run asymmetry in EPZ export for Bangladesh and Ghana respectively. The results also indicate that negative shocks in EPZ investment and export in the long-term lead to inflation in Ghana and Bangladesh respectively.

From the results, the overall impact of EPZs on the broader economy in Ghana and Bangladesh especially in the long-term is very much limited. Therefore implementing nations should diversify zone operations into higher grade manufactures to rake in more foreign exchange to shore up the local currency. More domestic investors should also be attracted into the zones to enhance revenue retention in the local economy. Policymakers should as well take into consideration the asymmetric effects of the zones on the various macroeconomic variables instead of the regular linear assessments of the zones while encouraging the full integration of the zones into the domestic economy. Future researchers should also look at more benefits of the zones in more countries data permitting while considering the various exchange rate regimes and other monetary policies existing in the EPZ implementing countries.

DEDICATION

I dedicate this work to Madam Cecilia Quaicoe, my ever-supportive mother for all her assistance over the years in my educational pursuit.

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LIST OF ABBREVIATIONS

ACET	African Centre for Economic Transformation
ADB	Asian Development Bank
AfCFTA	African Continental Free Trade Area
AGOA	African Growth and Opportunity Act
APTA	Asia Pacific Trade Agreement
ARDL	Autoregressive distributed lag
BEPZA	Bangladesh Export Processing Zones Authority
DCs	Developing countries
ECM	Error/equilibrium correction model
ECOWAS	Economic Community of West African States
ELG	Export-led growth
EPA	Economic Partnership Agreement
EPUs	Economic processing units
EPZs	Export processing zones
FDI	Foreign direct investment
FEM	Foreign exchange market
FTZs	Free trade zones

GFZA	Ghana Free Zones Authority
GS	Global south
GSP	Generalised System of Preferences
GSTP	Global System of Trade Preferences
HIPC	Heavily Indebted Poor Countries
ILO	International Labour Organisation
ILRF	International Labour Rights Fund
IMF	International Monetary Fund
IPA	Interim Partnership Agreement
LDC	Least developed country
MDGs	Millennium Development Goals
MFA	Multi Fibre Arrangement
NARDL	Nonlinear autoregressive distributed lag
NFCD	Non-resident foreign currency deposit
PPP	Purchasing power parity
PTAs	Preferential trade arrangements
REER	Real effective exchange rate

RTAs	Regional trade agreements
SAFTA	South Asian Free Trade Area
SAARC	South Asian Association of Regional Cooperation
SDGs	Sustainable Development Goals
SAP	Structural Adjustment Programme
SCM	Subsidies and Countervailing Measures
SEZs	Special economic zones
SSA	Sub-Saharan Africa
TEPZ	Tema Export Processing Zone
UNIDO	United Nations Industrial Development Organisation
VAR	Vector autoregression
VECM	Vector error correction model
WDI	World Development Indicators
WTO	World Trade Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background of study

For the greater part of the twentieth century, most developing countries (DCs) were engrossed in sustained battles for political independence from their colonial masters. The clamour at the time for most of these nations was that they had had enough of their domineering rulers and hence the need to govern themselves. Most of these countries were successful in that effort and this culminated in the political liberalisation of the global south (GS). Afterwards, the question then was what could be done to attain economic freedom to match their new political independence status. The answer to this question for most nations was to look inward to make use of their resources for growth as indeed most of these emerging countries (ECs) are actually endowed with a lot of natural resources (Elbeydi et al., 2010). This brought about the then popular concept of *import substitution* (IS).

The import substitution policy is a restrictive inward-looking trade policy that encourages nations to apply import quotas and other trade tariffs to facilitate local production to meet local demand (Elbeydi et al., 2010). The goal here was economic independence with very minimal reliance on the global economy and this policy lasted for most of the 1950-1970 period. Sadly however, most implementing countries of this policy were soon faced with a myriad of economic challenges including a high rate of inflation, unemployment, an uncompetitive export sector and a deterioration in their balance of payments (BOP) (Irwin, 2021). For example, although the goal of this policy was for countries to manufacture what they needed, sadly however, according to the World Bank, by the year 1983, Africa's manufacturing accounted for only 7% of gross domestic product (GDP) simply because of the lack of skilled manpower.

Thus, across the developing world, the implementation of the otherwise well-intentioned import substitution strategy was generally undone by several factors that crippled the policy chief among which was the issue of foreign exchange constraint. This problem was mainly caused by the instability and deterioration in commodity prices of these countries from their export of raw materials, bringing about a worsening terms of trade with its associated liquidity challenges (Abotebuno Akolgo, 2023). Aside the external shocks, over-valued exchange rate, price controls, over-reliance on state-owned industrialisation at the expense of proper support for domestic entrepreneurs, political instability, weak technological base, unanticipated mass migration among several others are known to have caused the failure of the strategy of import substitution.

To overcome these economic difficulties, most developing countries with the help of the World Bank and the International Monetary Fund (IMF) embarked on various policy measures to bring these countries back on track in terms of economic development. The Structural Adjustment Programme (SAP) was one such key policy measure championed by the Bretton-Woods Institutions to help countries deal with their various macroeconomic challenges. SAP as a policy was hinged on liberalisation of trade, increased privatisation and a balancing of government deficit to encourage nations to interact with the rest of the world through export-oriented industrialisation (Malabanan-Rocela, 2017). The recognition here was to the effect that a liberalised economy is able to attract a lot of foreign capital which comes with its own advantages that help countries to diversify their output and to encourage export to bring in much-needed foreign exchange.

Further to the trade liberalisation effort, a single trade policy tool that has been widely embraced by developing countries is the export processing zones (EPZs) policy. The concept of EPZs is premised on the long-held idea that exports boost the growth of nations (Fatemah & Qayyuma, 2018). Hence, in return for mainly foreign firms manufacturing for the export market, nations offer such entities huge fiscal and other non-fiscal incentives to produce especially non-traditional products for the international market (Quaicoe et al., 2017). The ultimate goal is to earn foreign exchange to enhance the balance of payments position of countries, and hence EPZs serving as a major conduit for DCs to increase their share of global trade. This is critical because for a region like Sub-Saharan Africa (SSA) for example, in the year 2003, its total share in global trade was only 1.49%, falling from the previous figure of 3.74% in the early 1980s (Babatunde, 2009). The current situation is equally unimpressive for Africa as its share in world trade at the end of the year 2021 was still less than 3% despite the huge natural resource endowments (Mlambo & Masuku, 2022).

So in effect, the EPZ concept is actually a by-product of the trade liberalisation agenda championed by various world bodies including the World Bank and the United Nations Industrial Development Organisation (UNIDO) to help developing countries overcome the problems brought about by the import substitution strategy. Aside helping with the necessary funding to see to the initial implementation of the EPZ policy for example, such international institutions are also on record to have offered various other non-monetary support services including capacity building. The aim of all this was the belief that export processing zones could further encourage the integration of the implementing nation into the global economy through the attraction of foreign capital and exportation of goods to promote growth and development. Thus, EPZs play a significant role in export promotion through the provision of business-friendly environment geared towards export-oriented firms by the offering of generous incentives to such firms to set up in specific enclaves to produce for the export market.

Export processing zones according to the International Labour Organisation (ILO) are industrial zones that are established to attract mainly foreign investors who are offered huge incentives to process imported materials for re-export (ILO, 1998). For its part, the World Bank defines an EPZ as an economic enclave where imported goods are stored, repacked, manufactured and reshipped abroad with reduced intervention by customs officers (Madani, 1999). So the basic idea of the concept is manufacturing for export with a special focus on the non-traditional exports of the implementing nation. Just as there are several definitions for EPZs by different world bodies, the policy has a multitude of names (Cirera & Lakshman, 2017). For example, whereas it is called special economic zones (SEZs) in countries like China and India, in places like Colombia, Madagascar and Ghana, the policy is known as free zones. In Mexico, Nicaragua and Costa Rica, it is simply termed as maquiladora (Creskoff & Walkenhorst, 2009). These names are mostly used interchangeably in the literature to mean the same thing so far as there is the provision of some incentives to firms to produce for export.

More than 93% of the zones in the world are found in developing countries making export processing zones very popular in those countries (Dorożyński et al., 2021). This is because of the notion that they come with certain short and long-term benefits if they are well implemented (Farhin et al., 2024). Aside from diversifying and increasing a country's exports, EPZs also generate a lot of employment, increase foreign inflows, boost the earnings of foreign exchange, enhance transmission of needed technology and ultimately lead to structural change in the domestic economy (Chaudhuri & Yabuuchi, 2010; Farhin et al., 2024). However, before these benefits accrue to any nation, countries offer potential investors a lot of incentives including duty-free import of raw materials and export of finished goods, lax employment laws in the zones, tax holidays and better infrastructure in the zones in comparison to the other parts of the economy (Adeoti et al., 2025; Angko, 2014). The provision of the vastly generous trade incentives coupled with the fact that production takes place in enclaves has been the major line of scepticism by economists who argue that it leads to a situation where the actual economic impact of the policy on the host country is limited. This brings about the apt description of the policy as a "second-best optimum" (Engman et al., 2007). Also, some international entities, particularly the ILO, hold some kind of negative view about the concept when it comes to employment and other labour-related issues including the safety of workers, unionisation, and working conditions in the zones among others (Obeng et al., 2015).

Notwithstanding the above sceptical views regarding the concept, EPZs are highly regarded by poor governments and at least until lately, also by other international organisations especially the World Bank which sees it as a potent force in the initial development efforts of emerging nations especially when country-wide liberalisation is practically impossible (Vastveit, 2013). The concept is also regarded as a means to boost growth in manufactured exports of DCs (Fakir et al., 2013). Historically, such international bodies have promoted the implementation of the free zones concept in emerging countries with even the United Nations Industrial Development Organisation recommending the policy as far back as the 1950s (Deinibiteim, 2016). Also, the World Bank during the period of the SAP gave a lot of loans to developing countries to set up industrial zones to promote export production (Gibbon et al., 2008). The global push for the adoption of the concept was to enable especially third-world countries to participate in the fierce competition for global foreign direct investment (FDI) and also capitalise on the perceived positive impacts of exports on the economy (Kinunda-Rutashobya, 2003).

Although the EPZ concept has become much more popular in recent decades, it is a phenomenon that has existed from ancient times with records indicating the setting up of the first such specific location for the conduct of trade with the outside world appearing on the island of Delos in Greece around 300 BC (Gibbon et al., 2008). After that, many European countries also hosted free ports in the 17th century, with England setting up its industrial park in the latter part of the 19th century. However, in its modern form, the Shannon EPZ in Ireland set up in the mid-1950s is said to be the first of its kind (Stein, 2012). Kandla in India also hosted the developing world's first zone in the 1960s while a decade later, Mauritius opened the first zone in SSA (Kinunda-Rutashobya, 2003).

Since the inception of the modern variant of free zones, the concept has seen widespread usage across the developing world but this, however, comes as no surprise as countries with broad liberalisation, strong institutions, and an outward-looking export sector do not need export processing zones, and that is why although advanced countries like the United States, United Kingdom, and some other European Union (EU) nations host one form of free zone or the other, these zones are not recognised by international bodies as EPZs (Zeng, 2019). The non-recognition of the zones in the advanced countries stems from the fact that, unlike emerging nations, those developed countries do not qualify to offer the subsidies, most of which are actually in prima facie breach of World Trade Organisation (WTO) rules, to potential investors (Engman et al., 2007).

Incidentally, although continental Africa is regarded as the most impoverished continent in the world, it is the world's last developing region to host EPZs, recommended based on the success story of Asian countries, of which most of its zones are barely three decades old (Stein, 2012).

As a result, Africa only accounted for just about 9% of the global zones in 1990 which has sadly reduced to 4% according to the latest global statistics (Rodríguez-Pose et al., 2022).

In the year 2006, there were some 3,500 export processing zones around the world which employed about 66 million people (Engman et al., 2007). In 2018, there were an estimated 5,400 zones in some 147 countries that employed more than 100 million workers, accounting for about 3% of global employment (Dorożyński et al., 2021). In terms of global trade, output from the global free zones accounts for some 20% of world exports, amounting to about $3.5 trillion annually (OECD, 2018). Most of the zones in operation are located in Asia which is regarded as the most successful region to implement EPZs. Due to its proximity to the world's superpower, Latin American zones have also seen some commendable levels of success as most of the zones in that part of the world were set up as a means to enter the U.S. market (Farole & Moberg, 2014). It comes as no surprise therefore that Hong Kong and Panama are regarded as the nations with the two largest EPZs in the world (Sigler, 2014). Kenya, Nigeria and South Africa also account for the highest number of zones in Africa with more countries making strenuous efforts to either open new zones or expand existing ones (Dorożyński et al., 2021; Rodríguez-Pose et al., 2022).

In the specific case of Asia, many attribute its giant economic strides to its full embrace of the EPZ concept. The then newly-industrialised countries of South Korea, Taiwan, Singapore and Hong Kong are all said to have been major beneficiaries of the free zones concept as they successfully used it to neutralise the anti-export bias in their previous trade protectionist regimes (Farole & Moberg, 2014; Gibbon et al., 2008). For China, which is the global leader when it comes to EPZs, its experience could be described as a miracle, making it the most discussed in the EPZ literature due to its great success (Leong, 2013; Papadopoulos & Malhotra, 2007).

Although zones have been generally disappointing in Africa, the same cannot be said of the Indian Ocean island nation of Mauritius. Due to the significant employment generated by its free zones programme and the exponential growth in its export sector – where the zones' contribution to total exports increased from 3% in 1971 to nearly 70% by 1994 – the literature aptly describes the country as an outlier compared to the rest of Africa (Wignaraja, 2010). Madagascar and Lesotho are the only two other African countries that have seen relative success with their free zone policies, largely capitalising on the African Growth and Opportunity Act (AGOA) initiative by the United States government to boost their garment exports (Cling et al., 2005; Vastveit, 2013). In contrast, other implementing nations across Africa have experienced what can generally be described as minimal contributions from the policy to their national economic growth (Stein, 2012).

Export processing zones, in various forms, are primarily used by emerging countries to diversify and increase their share of global exports. These zones are expected to generate much-needed employment, facilitate technology transfer, and ideally, contribute to structural changes in the broader economy that promote national economic development. To attract foreign firms, however, poor governments often face significant strain on their national budgets, as they must offer attractive incentives to lure companies into these zones. The bigger question that economists and researchers grapple with is whether these zones are having a meaningful impact on the economies of developing countries. This study seeks to provide answers to this unresolved issue, with a particular focus on Ghana and Bangladesh, chosen due to data availability and similarities in their free zones programmes.

1.2 Problem statement

Different countries have different motives for the implementation of the concept of export processing zones, ranging from targeted liberalisation of the economy to increasing the value of foreign direct investment among others. However, most of the published literature on the concept argues that nations implement this policy to achieve several goals. These include diversifying and boosting exports – particularly non-traditional ones – increasing foreign inflows, generating employment, promoting technology transfer, integrating the local economy, and, in the long-run, causing structural changes aimed at promoting national economic development (Milberg, 2007). The literature categorises these benefits into two groups: static and dynamic.

Static rewards are the short-term results a country enjoys from the free zones programme including employment and increased exports and they are easy to quantify. On the other hand, dynamic rewards are the generally long-term benefits that accrue to nations from the policy (Milberg, 2007). The long-term benefits are not easy to quantify and even accessing real data on them is a matter of great difficulty. As a result, the vast majority of the existing literature is skewed in favour of the short-term static benefits. Even with this, most writers such as Aggarwal (2004), Deinibiteim (2016), Graham (2004), Obeng et al. (2015) and Shayo (2015) have largely chosen to focus on one form of these static impacts or the other at a time. Also, although employment, exports and investment generally constitute the static rewards, employment papers such as Deinibiteim (2016), Obeng et al. (2015), Shayo (2015), Azmeh (2014) and Cirera and Lakshman (2017) dominate. There are also quite a few papers that have investigated the export performances of EPZs (Aggarwal, 2004; Angk, 2014 & Lonarkar, 2014). Investment on the other hand has been studied only to a much lesser degree with papers such as Graham (2004) and Leong (2013) focusing on it. However, only a few papers such as Cizkowicz et al. (2017), Engman et al. (2007) and Quaicoe et al. (2017) have looked at a combination of two or more of the static benefits at a time.

On the whole, the EPZ concept is highly favoured by third-world governments and their development partners. This is why in the early years of the policy it was highly recommended by international organisations, especially the World Bank which was at the forefront in the promotion of trade liberalisation to assist the struggling states to benefit from globalisation. The evidence from these efforts, however, is that most of these donor-sponsored programmes especially in Africa failed to live up to expectation with some researchers even arguing that EPZs inhibit liberalisation (Gibbon et al., 2008; Leong, 2013). The situation was also made worse by the fact that most zone programmes were started in response to the implementation of certain multilateral and bilateral trade agreements such as the Multi Fibre Arrangement (MFA) and the African Growth and Opportunity Act. This makes their success contingent on the success of such agreements (Azmeh, 2014). Despite these challenges, many governments remain hopeful about the policy and continue to establish new zones or expand existing ones in the developing world. But is this hope justified? In other words, there is an urgent need to investigate whether export processing zones are truly an effective tool for promoting national growth in emerging countries, and whether their widespread use and popularity are warranted.

As a testament to their faith in the policy and in line with its objectives, governments that implement EPZs offer generous subsidies to investors, including fiscal incentives, superior infrastructure, and relaxed regulations (Cirera & Lakshman, 2017). They hope that luring mainly foreign investors into their zones with these incentives will eventually lead to economic development especially in respect of employment generation and increased exports to help ameliorate the almost permanent constraint they have regarding their foreign exchange

(Aggarwal, 2004). These subsidies can be extremely costly, with some zones, such as those in Senegal, Togo, and Nigeria, unable to recover the initial setup expenses (Stein, 2012). This raises concerns that the resources invested in creating these zones might have been better spent elsewhere to benefit citizens. Therefore, it's crucial to assess whether these zones are contributing to the overall growth of these nations, given the generous incentives they receive.

Generally, in comparison to other areas of finance/economics, the relatively new concept of export processing zones has received limited research attention. This however comes as no surprise as the economic researchers who are expected to study the concept hold the rather pessimistic view that the EPZ policy is a second-best optimum simply because of the treatment it receives in which one trade distortion in the form of customs duty is removed only to be replaced by another in the form of subsidy coupled with the fact that the zones are treated as enclaves (Kinunda-Rutashobya, 2003). Economists argue that this situation prevents the policy from functioning as intended, thereby limiting its impact on the broader economy. This perspective suggests that the effectiveness of the EPZ concept remains uncertain, highlighting the need for further research.

Given the limited literature on the concept, Sub-Saharan Africa, for example, has seen the least amount of research on EPZs. In the case of Ghana, only four studies have been conducted on its free zones programme to date (Angko, 2014; Cook, 2000; Obeng et al., 2015; Quaicoe et al., 2017). Whereas the first two studies considered the export performances of Ghana's free zones based on a qualitative survey of some of the firms, the third one mainly set out to describe the effect of the working conditions in the zones on women empowerment. Quaicoe et al. (2017) on the other hand, quantitatively studied the impact of the zones on Ghana's economic growth in which they segregated the two static zone benefits of export and investment. A recent report by the African Centre for Economic Transformation (ACET) also sought to evaluate the sustainability of Ghana's free zones from an economic, environmental, technological and social perspective in light of the best practices elsewhere (ACET, 2021).

In the case of the Asian country of Bangladesh which is the other nation of interest in this study, it hasn't received any better scholarly treatment either. In fact, to date, the only current and specific studies solely dedicated to that nation are Fakir et al. (2013) and Islam and Mukhtar (2011). Fakir et al. (2013) was a qualitative description of Bangladesh's EPZs. The paper concentrated on export diversification based on a survey of some EPZ firms in terms of their investment, exports and employment trends. This paper was a pure display of statistical figures without the estimation of any quantitative models. Islam and Mukhtar (2011) on the other hand used annual data to investigate the economic contribution of EPZs to development in terms of how the zones affect exports, employment and investment. Apart from these, the only time one could see those two nations in the EPZ literature is when they are treated in some few qualitative cross-country studies (Kinunda-Rutashobya, 2003, Milberg, 2007 & Vastveit, 2013). A study that examines the activities of zones in these two emerging nations is both timely and valuable, as it will enrich the available literature and contribute to a deeper understanding of the subject.

The limited literature on EPZs may be attributed to either the lack of success with zone implementation or the absence of sufficient data. As a result, research has primarily focused on successful zones. In Asia, the most prominent EPZ hosts, such as China, South Korea, Hong Kong, Taiwan, Singapore, and Sri Lanka, have received considerable academic attention (Graham, 2004; Sargent & Matthews, 2009; Wang, 2013). Similarly, in Latin America, countries with notable EPZ success, such as Mexico, Costa Rica, and the Dominican Republic have also been the subject of substantial research (De Armas & Jallab, 2002; Jenkins, 2005; Sigler, 2014).

Africa on the other hand is different since most countries on the continent have not been very successful with zone implementation, except Mauritius which has been moderately successful, hence making it receive some amount of research. This however does not mean that the experiences of the other countries should not be fully ascertained.

Also, in terms of the data issue, there is no internationally available data on export processing zones across the globe with differences in the definition and types of zones as well as opaque incentive regimes most of which violate WTO rules accounting for this (Siroën & Yucer, 2014). In fact, to date, the only available statistics on EPZs is the 2007 International Labour Organisation statistics compiled by Boyenge which only gives information on the total number of countries with zones, the number of zones across the world and the total number of employment (Boyenge, 2007). The vast majority of EPZ host countries do not provide any time series data and even where they do the data are mere estimates which diverge from reality (Gibbon et al., 2008). The total effect of all this is that it does not allow for proper cross-country studies of the concept involving the use of robust econometric models to be conducted.

A careful glance through the EPZ literature shows that there are two broad strands of papers on the concept. The first consists of descriptive case studies and the second one involves formal econometric analyses that mainly use dummies to represent the EPZ policy (Cizkowicz et al., 2017). The unavailability of time series data on even the simple short-term effects of the zones means that researchers have only resorted to studying these zones on a case-by-case basis or at best at the national level based on a description of what is supposed to be happening in the zones and these case studies make up the chunk of the published work. Aggarwal (2005), Leong (2013) and Rodríguez-Pose et al. (2022) are some of the few papers that cut across nations and they are mainly descriptions of zone activities. For the econometric analyses, the use of dummy variables in place of real data does not allow us to see the real effect of zones seen in measures such as investments into the zones and exports from the zones on economic development, not forgetting the challenges associated with dummies such as non-accountability for heterogeneity of zones or even countries.

Moreover, the literature indicates that the social and environmental impact assessments of EPZs have been the major preoccupation of many researchers. Issues such as labour standards in the zones, women empowerment, feminisation of zone employment, unionisation, health and safety of workers and remuneration have received a considerable amount of research (Cirera & Lakshman, 2017; Obeng et al., 2015; Sannassee, 2007). However, regarding the economic contribution of the zones to various nations, little has been done. Even those that exist are micro-level studies that have used data at the firm-level or the level of the zones. Relative to the use of aggregate data to do a serious quantitative study to investigate the impact of the policy of export processing zones on the national economy, the literature is found to be lacking or insufficient.

This study highlights the experiences of two key implementing nations of the export processing zones policy – Ghana and Bangladesh. In the case of Bangladesh, export processing zones are a critical component of its economy, making an overall contribution of nearly 20% to gross domestic product as measured by the various activities in the zones including exports and investments (BEPZA, 2022). Relative to Ghana, free zones activities contribute 3% to that country's GDP (GFZA, 2022), still a sizeable portion of the economy and hence the need to study this critical policy for these two countries. Also, access to data on zone activities coupled with the fact that the two nations have not been adequately investigated justifies their inclusion in this study. The two countries have also experienced some sort of British colonial rule and they have similar economic characteristics in terms of level of economic progress and other macroeconomic features making them ideal to be studied together. Regarding the specifics of their zone programmes, these nations share common traits, particularly in the nature of investments targeting key raw materials, the types of exports generated, employment activities within the zones, investor incentives, and zone management practices, among other aspects.

Since countries establish zones to support their development goals, it is essential to determine if these objectives are being met. A key approach to this is to assess the zones' impact on the broader economy through various indicators, such as economic growth, inflation, and exchange rates. Unfortunately, as far as we know, there is no existing research specifically addressing the effects of zones on inflation and exchange rates. However, some studies have explored the relationship between zones and economic growth (Cling et al., 2005; Leong, 2013; Quaicoe et al., 2017). The evidence shows that such studies have generally been either qualitative or have not been conducted at the national or cross-country level. Again, results from such studies have been very much ambiguous with some papers claiming a positive impact of the zones on economic development (Cizkowicz et al., 2017; Fakir et al., 2013; Kinunda-Rutashobya, 2003; Leong, 2013) while others have concluded that the zones have not been impactful (Farole & Moberg, 2014; Newman & Page, 2017; Quaicoe et al., 2017). The focus on economic growth is therefore well-founded, as the zones aim to attract foreign investors who bring in capital to invest in the host country. These investments enhance the host economy's productive capacity by creating employment opportunities and boosting foreign exchange earnings through the export of goods produced within the zones.

A look at the impact of EPZs on the rate of exchange in the emerging world is crucial because such countries usually grapple with various problems on their forex front. Meanwhile, the zones are meant to attract foreign investors who have to produce largely for export thereby generating foreign exchange (Newman & Page, 2017). Foreign exchange generated through EPZ investments and exports is also expected to help stabilise the local currency but it is inconspicuous if this goal is being realised. This work thus enables policymakers to know whether such an aspiration is realisable by the adoption of export processing zones.

Inflation is a key macroeconomic variable that many countries, especially those in the global south, struggle to manage. This challenge often leads them to employ trade policies such as export processing zones as a tool to mitigate inflationary pressures and support economic stability. The belief is that the zones will attract the necessary investments especially from abroad to produce for the export market with such investments into the zones and exports from the zones helping with the stabilisation of the exchange rate which will then affect inflation. Also, a portion of the output from the zones (usually, about 30%) (Engman et al., 2007) is sold on the domestic market and this affects inflation. The key question however is whether this goal is being achieved as to date as far as we are aware, not even a single paper has considered the specific impact of free zones investment and export on inflation.

Finally, while existing studies on the role of free zones in promoting national economic growth often assume a linear relationship between these variables, this work considers asymmetries. Specifically, it examines the differential impacts of zones on economic growth and inflation, analyzing how each may vary depending on specific conditions within the economy. It is important to consider the issue of asymmetry because, in the words of Shin et al. (2014), the majority of economic variables are by default asymmetric in their dynamic relationships. Specifically, in our case, the investments into the zones originate from foreign lands and are greatly impacted by economic conditions in the various originating countries and the shocks in the investments also impact exports from the zones. It is therefore essential to determine whether fluctuations in these inflows, and the subsequent outflows in the form of free zones exports, have any significant impact on their host countries. We therefore argue in line with papers such as Adhikari et al. (2023) and Dung et al. (2024), that the increases and reductions in investments into the Ghanaian and Bangladeshi zones and exports from the zones have dissimilar effects on the various economic variables selected for our study.

In summary, the current study is of absolute relevance for the following reasons:

Firstly, governments in the developing world place significant faith in the free zones concept, largely due to the perceived benefits it offers. However, an important question remains: is this confidence justified?

Secondly, given the fiscal and non-fiscal incentives offered free zones investors, it is crucial to find out whether they are contributing to the overall development of these nations.

Thirdly, with generally limited research on the concept of EPZs relative to other fields of finance/economics and also such studies producing mixed results regarding the impact of the zones on national economic development, there is a need for more studies to ascertain the true impact of the policy.

Fourthly, while existing studies are largely dominated by qualitative case studies, this study employs robust econometric analysis to investigate the impact of zone activities in two emerging countries (i.e. Ghana and Bangladesh).

Again, while the previous studies have largely looked at one form of EPZ benefit or the other at a time, the current one is a concurrent analysis of two key rewards associated with the policy namely investment and export.

Moreover, most of the existing studies have used firm/zone-level data and dummies to represent the presence of EPZs in their analyses while the present study uses real data at the aggregate level.

Also, whereas the existing literature is dominated by social/environmental impact analysis of the zones, this study looks at the real economic impact of these zones with special focus on exchange rate, economic growth and inflation.

Finally, unlike the chunk of the existing studies even at the aggregate level, we consider the key issue of nonlinearities in the dynamic relationship among our selected variables.

1.3 Research purpose

The concept of export processing zones receives nearly equal amounts of praise and criticism. International development agencies, such as the ILO and WTO, often lead the critique, particularly due to concerns about low labour standards in these zones and non-compliance with international trade rules regarding the generous incentives offered to firms. That notwithstanding, EPZs are still held in high esteem with the view that the policy can liberate poor countries and put them on the path of economic progress as has been witnessed in a lot of Asian and Latin American countries. So the idea is still to offer subsidies in specific geographically delineated enclaves to lure investors to produce goods for export in the hope that the exports will promote economic development since firms that export come with a lot of beneficial effects that inure to the advantage of the host country. Employment generation, increased volumes of FDI and technology transfer are thus some of the other benefits linked to the concept of EPZs.

The key question, then, is whether all nations that have implemented export processing zones have truly realised the anticipated benefits. Put differently, have these zones effectively contributed to the broader economic well-being of their host countries? The answer to this question cannot be a simple yes or no as different countries have different experiences of free zones. The situation concerning finding the answer to the above question regarding the economic impact of EPZs has been further made difficult by the limited amount of scholarly work on the concept simply caused by the lack of internationally available data on global EPZ activities and the somewhat lack of interest in the policy by some economic researchers. Ghana and Bangladesh are two emerging nations that have not been exempted from this situation with very patchy views on the performances of their EPZs. With the current authors having been successful in obtaining aggregate data on the two countries in terms of investments into their zones and exports from their zones, the goal of this study is to use those measures to find out the economic contribution of the zones in those two countries regarding their impact on exchange rate, economic growth and inflation.

1.4 Research objectives

The specific objectives of the study are therefore to:

i. Examine the impact of export processing zones on exchange rates in Ghana and Bangladesh.
ii. Investigate the effect of export processing zones investment on national economic growth in Ghana and Bangladesh.
iii. Ascertain whether export processing zones affect inflation in Ghana and Bangladesh.

1.5 Research questions

i. Do export processing zones impact exchange rates?

ii. Do export processing zones affect national economic growth?

iii. Do export processing zones affect inflation?

1.6 Significance of the study

Policymakers, practitioners and future researchers must all benefit in one way or the other from every true and proper research. The ultimate goal, therefore, is to make society a better place by bringing forward meaningful insights into specific social problems. To this end, with most governments across the developing world clamouring for the implementation of export processing zones by either opening new ones or expanding existing zones, the current study will help them know whether such a stance is justifiable. In other words, it will help policymakers know the actual economic contribution of the policy given the huge incentives they offer zone investors. This will help them take the necessary actions to improve their zone programmes where necessary to get the full benefits of the policy.

Many economists and other researchers shy away from studying the EPZ concept. Although there are issues regarding the availability of data and lack of policy success, the current study will contribute to whipping up the interest of other researchers in EPZs. That is, by making more literature available to complement what is in existence, the study will allow other would-be authors to know more about the issue of EPZs while encouraging them to also learn more about it. The paper will serve as literature for other researchers to reference in conducting their studies.

With respect to the entities or investors that patronise the various zones across the global south, a study of such nature comes in handy in helping them to know the impact of what they are supposed to be doing. That is, given the massive attention afforded to such investors through the provision of various incentives at the expense of the rest of the broader economy, the study will make it possible for the zone patrons to know whether their activities are also having any meaningful impact on the host economy. Where they are lagging, it will help them take the necessary remedial steps to improve on what they do to be more impactful and continue to operate.

Again, a study that looks at whether export processing zones impact the rate of exchange in the emerging world is crucial because such countries usually confront various problems in their exchange rates. In other words, most of the EPZ implementing nations adopt the policy in the first place with the aim of expanding their foreign exchange earnings through increased investments and exports. The hope through such activities is that such foreign inflows will help shore up the local currency by making more foreign currencies available. This work will thus enable policymakers to know whether such a goal is being achieved by the adoption of such a trade policy tool.

Economic growth is one of the major goals of economic managers. This is why they put in place various programmes and policies to achieve a desired level of growth since this will benefit the masses in the long-run by taking a lot of them from the grips of poverty. The adoption of export processing zones by policymakers is thus justified, and this study aims to evaluate the extent to which these zones impact economic growth. Specifically, it will provide policymakers with critical insights into the direct contribution of free zones to national economic development, helping to assess whether the policy effectively meets its intended objectives.

Closely associated with achieving a desirable level of economic growth is the issue of stable prices. This is attained by making sure that inflation is kept in check. The hope therefore is that more investments into the zones and exports from the zones will help stabilise prices. This study will thus allow policymakers to know whether this critical goal is being realised. Particularly, with export being a key feature of the policy of export processing zones in which the greater part of output (about 70%) must be exported, this study will help to know whether such a stance is tenable, especially in the light of the fact that more output could be sold domestically to help reduce inflation with more goods becoming available on the local market.

Finally, many international organisations have different opinions on the concept of EPZs. Some express a bit of cynicism about it whilst others still think it is capable of facilitating the economic development of nations. Such a study will therefore make it possible for such world bodies and other development partners including advanced nations some of which are still major donors to the poor countries to know the contribution of the policy in terms of its developmental impacts. This will help them to know which areas or sectors to direct their assistance to relative to the EPZ policy.

1.7 Organisation of study

This thesis is organised into nine different chapters. The first chapter gives an introduction of the work and covers the background, problem statement, purpose of the study and its objectives, research questions, significance of the study and outline of the work. Chapter two constitutes the literature review segment of the work, covering both the empirical and theoretical literature on the concept of export processing zones. The chapter also highlights the nature of EPZs. In chapter three, there is the conceptual review of the thesis. This chapter critically discusses the chosen economic variables (economic growth, exchange rate and inflation) relative to the general empirical and theoretical literature and also more specifically to the EPZ variables bearing in mind the unique experiences of Ghana and Bangladesh. Chapter four is the context of study which puts the spotlight on the export processing zones programmes in those two emerging countries while highlighting the features of their broader economies. Chapter five is the methodology, focusing on data and its sources, model specification, variable description/justification and the general approach used to answer the stated research questions. In chapters six, seven and eight, the results from the application of the selected estimation techniques are succinctly displayed and appropriately discussed with respect to exchange rate, economic growth and inflation respectively. The last chapter summarises the work and concludes it while at the same time offering appropriate recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, the empirical and theoretical foundations that underpin this thesis are discussed. The theoretical literature describes the various theories on the concept of export processing zones that have been put forward by various theorists that are mainly hinged on the impact of the concept on the welfare of implementing nations. The chapter also highlights the export-led growth hypothesis which sees exports as a panacea for economic growth and development. Our empirical literature also describes other studies conducted by different authors in various contexts relative to the key measures for evaluating the efficacy of EPZs in emerging countries. However, before all that, the chapter begins with a brief note highlighting the nature of the concept of EPZs.

2.2 Nature of export processing zones

Emerging countries around the world have become accustomed to the idea that the concept of export processing zones can spur them on in terms of economic growth (Johansson, 1994). This accounts for its proliferation in that part of the world. So in return for the perceived benefits, countries with actually limited financial resources continue to compete among themselves fiercely for the global supply of FDI through the provision of generous trade subsidies (Gibbon et al., 2008). Incentives are provided to foreign investors to make potential host countries more appealing in terms of business environment. A favourable business environment lowers the cost of doing business, which can lead to the production of higher-quality products that meet international standards.

The World Bank defines an export processing zone as a delineated area within an economy into which goods are imported, stored, repacked, manufactured and reshipped with little or no interaction by customs officers of the implementing nation (Madani, 1999). This however could best be described as a generic definition as according to the literature there are more than thirty names given to the concept. These names range from special economic zones which could encompass an entire province, to economic processing units (EPUs) which are single-firm units without any locational restrictions that operate as EPZs (Stein, 2012; Waters, 2013). The plethora of names together with the varied definitions assigned to the policy also accounts for the current situation where even no recognised international body can host data on the concept.

However, whatever shape or form the policy takes in a particular country, it is associated with certain common features aside from the generous fiscal and non-fiscal incentives offered to investors. Zones are either privately owned or publicly owned. During the initial years in the implementation of the concept, most of the zones were constructed with donor funds making them largely state-owned (Gibbon et al., 2008). Meanwhile, to overcome the challenges now imposed by various international trade rules, especially the World Trade Organisation's Subsidies and Countervailing Measures (SCM), most zones are now being set up, owned and operated by private entities (Creskoff & Walkenhorst, 2009). This is because only governments or states are members of these international bodies, meaning that zones owned and operated by private entities within those countries are not subject to these trade rules. These rules specifically address subsidies offered to investors, with the goal of promoting fairness in international trade.

Also, in terms of firm ownership in the zones, these free zones companies could be owned internationally, domestically or through a joint venture. In other words, there is no limit on the ownership composition of companies that operate in EPZs in most countries. Since the main goal in terms of investment attraction is to lure foreigners to invest in the enclaves, the indigenes are also free to situate their firms in the zones without any hindrance since the enclaves are viewed as foreign territory relative to customs operations, thus making all investments in the zones to be classified as foreign direct investment (Engman et al., 2007). In the case of the expatriates, the idea is to give them no cause for concern regarding the expropriation of their investment or seizure of their companies. Most nations therefore offer foreign investors the opportunity to either completely own their firms or to operate in collaboration with local partners with full assurance given regarding the certainty of such arrangements. This is in contrast to what used to be the case in most developing countries where especially foreign firms could easily be taken over at will by the government.

Most nations host EPZs simply to increase their exports. That is why the policy is called export processing zones in the first place. So the notion is that enlarging the export sector of the country can lead to economic growth. This is because exports can accelerate economic development through technological spillovers and other beneficial externalities (Jordaan & Eita, 2010). For this reason, most governments encourage the exportation of the greater part of the output from their free zones. For most countries, firms in the zones are encouraged to export about 70% of their output while the remaining 30% is sold on the domestic market. This is one of the key requirements that firms are to meet before they are even offered the incentives. This means that potential EPZ investors must demonstrate their capacity to sell the major part of their output to foreign buyers, allowing the host country to earn foreign exchange. Only a few EPZ programmes, such as Brazil's Manaus Export Processing Zone, permit unrestricted domestic sales of zone output (Bost, 2019).

Aside from the increase in FDI and expansion and diversification of the export sector, EPZs also play a major role in generating employment in most developing countries. Globally, EPZs have succeeded in creating more than 100 million jobs (Rodríguez-Pose et al., 2022). Most of the employment in the zones is taken by women leading to what has been termed the feminisation of employment in the zones (Gibbon et al., 2008). Most women, some of whom are in their teens are preferred to their male counterparts to work in the zones because of their agility with their hands and diligence. These are two vital features required for the generally repetitive labour-intensive work in the zones (Obeng et al., 2015). For example, in the EPZs in Bangladesh, women constitute about 70% of the labour force (Islam & Mukhtar, 2011). With very high labour turnover among female employees in the zones, most managers employ them knowing that such workers are most unlikely to engage themselves in labour union issues coupled with the fact that most women are willing to accept wages that are smaller than what their male counterparts receive. The result of all this is the obvious relaxation of labour standards in the zones with some countries even having different legal regimes for zone and non-zone firms. This usually leads to some firms compromising on the safety of workers and other health-related issues.

One significant feature of the EPZ concept is the idea that it is supposed to help emerging countries overcome the challenges they have concerning accessing the global market. In other words, it is seen as a potent force to help such nations liberalise their economies (Graham, 2004). What this means therefore is the fact that the zones are only supposed to be used as a temporary measure to put mainly poor countries on a sound footing in their national economic development effort. In countries such as those in Asia which have been chief implementers of the policy, they have succeeded in applying the concept of EPZs in their initial effort to develop (Graham, 2004).

The zones are therefore used as a laboratory in which if successfully employed, those conditions in the zones are replicated in the other parts of the country to ensure economy-wide liberalisation and growth – and the Chinese example comes in handy.

2.3 Theoretical literature

The literature on export processing zones is broadly underpinned by three main theories: the neoclassical theory, the new growth theory and the cost-benefit theory. All these theories hinge on the very nature of EPZs which takes into consideration the advantages nations are supposed to get from the policy *vis-à-vis* the costs borne by these nations. The theories thus aim to determine the net welfare effect of the policy on countries by taking cognizance of all the factors associated with EPZs.

2.3.1 The neoclassical theory of EPZs

Hamada (1974) was the first theorist to examine the concept of EPZs, proposing the neoclassical theory. He argued that the policy tends to reduce welfare in terms of its impact on national development. This theory is based on the Rybczynski effect which argues that when FDI is imported into the zones, labour is withdrawn from the domestic market to engage in the production of capital-intensive goods. This reduces the amount of labour-intensive goods produced in the economy. This thus leads to a distortion of production from its factor-based comparative advantage. This theory is premised on the two-sector two-factor Heckscher-Ohlin model and assumes full labour employment and the production of labour-intensive goods taking place outside the free zones.

Hamada's theory suffers a great deal of criticism not least the fact that most EPZ-implementing nations are generally poor and experience acute unemployment or underemployment. Again, it fails to acknowledge the spillover effects of FDI in the domestic economy (Johansson, 1994).

Also, the argument under the Heckscher-Ohlin model is based on final goods and the international immobility of capital/input goods. These assumptions are however untenable because most EPZ activities are centred around intermediate goods and the EPZ firms are also footloose by nature (Warr, 1987). The point here, therefore, is that if these factors are properly recognised, EPZs can have beneficial effects on welfare (Devereux, 1995). For example, by adding volume and factor terms of trade effects, Devereux argues that EPZs will naturally increase welfare in the host country coupled with the fact that the policy leads to the liberalisation in tariff regime.

2.3.2 The new growth theory of EPZs

Some of the pitfalls embedded in the neoclassical theory of EPZs particularly its failure to recognise the spillover effects of FDI in the host economy gave rise to the new growth theory (Johansson, 1994). These spillover effects come as on-the-job training for managers and labourers, demonstration and catalytic effects, and copying, and all these help in increasing the rate as well as the level of human capital formation in the domestic economy (Johansson, 1994). This theory therefore acknowledges the key role played by foreign capital whose attraction is one important yardstick for measuring zone success. FDI is said to help domestic firms gain access to international distribution channels, connecting them to the global market and contributing to growth in the EPZ host country.

In all, the new growth theory adds three key factors to the traditional neoclassical theory. The first point is the acknowledgment that most local firms lack relevant technical expertise, along with essential marketing and managerial skills. These key resources are effectively packaged and introduced into the local economy by foreign firms attracted to the zones. Secondly, foreign entities provide domestic firms with access to international distribution channels, which local exporters typically struggle to reach on their own. Lastly, entering the global market poses challenges for local companies; however, the international firms based in EPZs have already established contacts abroad, which indirectly benefits local producers. The net effect is that, if these spillover and catalytic forces are fully recognised, export processing zones can significantly enhance welfare.

2.3.3 The cost-benefit theory of EPZs

Warr's (1987) cost-benefit theory is another popular approach used to assess the performance of EPZs on countries. The approach calls for a rather painstaking calculation of all costs and benefits associated with the EPZ policy to arrive at a bottom line net present value (NPV) for workers, government and society as a whole. Warr (1987) and other authors such as Jayanthakumaran (2003) who employed this approach promoted the use of EPZs to improve the welfare of nations. Subsequent studies such as Stein (2012) however contend that the policy is not the most effective tool to use to promote export-led industrialisation. The cost-benefit theory is fraught with several difficulties including inadequate data for the methodology, determination of the appropriate social discount rate and rate of return to capital and social benefits.

This theory thus sees the offer of the generous trade incentives to the EPZ firms to come at a certain cost to various actors including the government, employees and society as a whole. There is, therefore, a need to evaluate all such costs against the employment, export, investment, and other benefits that will accrue to the implementing nation. The goal is to ensure that the policy makes economic sense in terms of the net rewards the nation will derive.

2.4 A look at the export-led growth (ELG) hypothesis

As per its name, export processing zones are premised on exports. The rationale behind giving financial and non-financial incentives to investors to operate in the various zones is mainly to produce for export. The idea thus finds support in the ever-famous export-led growth hypothesis which contends that export is a critical element in the growth of nations (Balassa, 1978; Dervis, 1979). This is because the global export market has virtually unlimited demand for a wide range of goods and services, which is why many countries encourage their zone firms to export around 70% of their output.

The popularity of the ELG hypothesis as seen by both policymakers and researchers is in the fact that there are so many vital benefits attached to exports. First of all, compared to the local domestic market which has a relatively small number of people buying products, the international market is very vast and the demand there is almost inelastic (Huntington et al., 2019). To meet the requirements for entering the international export market, producers improve both the quality and quantity of their products, which, in turn, increases overall productivity in the local economy.

Secondly, for every nation, exports bring in foreign exchange. This is, in fact, the single most important reason why nations pursue export trade. This is especially true for developing countries that struggle to maintain a stable currency. By exporting goods, these countries earn foreign currencies, which alleviate pressure on their exchange rates. Reduced pressure leads to a more stable local currency, positively impacting inflation and enhancing the economy’s growth prospects (Fabling & Sanderson, 2015).

Again, the export sector is a key promoter of technology transfer. This is because as companies improve their output to meet international standards, they learn from best practices elsewhere. These standards are integrated into the production of goods and services, allowing other local firms to learn from these exporters. It is the case also that most export trade is undertaken by foreign investors who come in with advanced technology and high levels of production skills and these skills are copied by local producers and this together with the high-tech production causes the productive capacity of the local economy to expand (Tintelnot, 2016).

In the literature, countless empirical studies have been conducted to support the ELG hypothesis, highlighting the significant role of exports in promoting national economic growth and development. A few of such studies include Kollie (2020), Mensah and Okyere (2020) and Ouassaf et al. (2023).

Sadly however, the experiences of many developing countries with the ELG hypothesis have not been the best, to say the least, as most of these countries' export sectors are largely composed of primary products (Freund & Pierola, 2015). These primary exports usually do not command higher prices on the global market and their prices are also unstable thus bringing about a lot of uncertainties in their foreign exchange generation. Moreover, these natural resources are largely produced in specific geographical areas especially the mining sector thereby constraining their connection with the macroeconomy. Unfortunately, this is the nature of most free zones programmes across the developing world with production taking place in specific enclaves, hence exports from these zones having limited effect on the macroeconomy and this is the main line of criticism of economists who shun the policy.

2.5 Empirical literature on export processing zones

Empirically, studies on export processing zones in the developing world have produced mixed results regarding their goal of promoting economic development. Different aspects of the zones such as their FDI attraction, export, and employment generation activities have been investigated but with no consensus on the efficacy of the policy to promote development. In fact the only agreement in the literature is the profound statement that export processing zones are a sub-optimal policy (Gibbon et al., 2008). Despite this opinion, the available literature shows some considerable amount of research work on Asian and Latin American zones which are the largest, the most successful, and not surprisingly, the most discussed. Only a limited amount of work has been done on African zones.

Overall, in using the various measures of zone performance, most studies have concluded that Asian and Latin American zones are more successful as compared to African zones. Specifically, in countries such as China, Taiwan, Singapore, South Korea, Hong Kong, Mexico, Costa Rica and Dominican Republic, the zones are said to have contributed meaningfully towards the process of economic development (Cañas, 2022; Graham, 2004; Jenkins, 2005; Kim & Lee, 2025; Seiler et al., 2023; Sigler, 2014; Wang, 2013). For Africa, the limited literature mainly points to zone successes in Mauritius, and to some extent Madagascar and Lesotho (Cling et al., 2005; Kinunda-Rutashobya, 2003; Wignaraja, 2010) with the vast majority of the countries not making any impactful gains from their respective programmes.

Take China for example, Graham's (2004) study provides valuable insight into the factors that made that country's special economic zones successful in attracting foreign direct investment. By establishing these zones in coastal, well-developed areas with advanced infrastructure and an educated workforce, China was able to leverage both physical and human capital advantages. The liberalised regulatory environment within these SEZs further facilitated investment flows, creating a favourable setting for foreign businesses. The SEZ initiative, which began in the 1980s, proved so effective that it gradually influenced national policies, leading to the broader opening of China to the global economy in the early 1990s. This approach not only attracted FDI but also helped catalyse economic growth through the spillover of technology, skills, and enhanced productivity, setting a precedent for other countries considering SEZs as a development strategy.

Still on the Chinese example, in a subsequent study based on a unique dataset from the municipalities in that country from the period 1978 to 2007, Wang (2013) examined the economic impact of the SEZ programme in China based on the ability of the zones to attract FDI. Using panel data regression, Wang (2013) found that the SEZ policy had contributed to raising per capita FDI by 58%, enhancing total factor productivity in the process by 0.6%. He concluded by saying that the adoption of the SEZ policy does not only bring badly needed foreign capital but more importantly modern technology.

In terms of Bangladesh, Fakir et al. (2013) examined the role of Bangladesh's export processing zones and their contributions to key economic indicators like exports, investment, and employment. Without relying on an econometric model, the study used a descriptive survey approach, drawing on primary data to assess EPZ outcomes. The findings suggest that the EPZs in Bangladesh have achieved notable success in these areas, primarily due to the provision of sufficient infrastructure that supports firms operating within these zones. Fakir et al. (2013) argue that EPZs can be a valuable tool for emerging economies, enabling them to access advanced technology, develop managerial and technical skills, and improve their competitive stance in the global market. This insight highlights EPZs as potential catalysts for economic growth and integration into international trade networks. Although this paper does well by considering multiple measures of zone benefits including exports, employment and investment, it is overly qualitative with no evidence of quantitative backup, thus making any recommendations based on strong causal/comparative claims suspect. There is therefore the need for more such studies that are quantitatively-oriented.

Islam and Mukhtar (2011) is also another paper conducted in Bangladesh that evaluated the impact of the zones in that Asian country. The authors concentrated on three key measures of the policy, namely exports, investment and employment to see how the EPZ policy had impacted the Bangladeshi economy through these three static measures. The study involved regression analysis in which annual time series spanning the period 1983-2008 was used. Based on the three measures, the study found that the adoption of the free zones policy had contributed to the general economic development of Bangladesh. In the specific case of exports, for example, the writers found that the zones' contribution to national exports stood at about 17%. Also, regarding employment, viewed as one important measure of zone success, the study found that the zones had contributed greatly in offering jobs to the labour force in that country with women constituting nearly 70% of the employees in the zones.

For his part, Aggarwal (2005) conducted a cross-country study involving three South Asian countries: India, Sri Lanka and Bangladesh. He sought to find out the factors that are critical in the successful operation of the zones in those countries and also to explore the export and investment trends in the zones. In obtaining primary data for the study, the writer considered all the zones in India and Sri Lanka whereas in the case of Bangladesh, only two zones out of the eight were surveyed. Using zone performance as the target variable, the paper analysed the factors that significantly affect the performance of EPZs. It concluded that the location of the zones, governance and facilities are the three major determinants of zone success (Aggarwal, 2005). The paper also found that the incentives given to the zones in comparison to the rest of the economy afford them the opportunity to attract investment whilst overall infrastructure and governance in the country determine the export competitiveness of the EPZ companies.

A follow-up paper to this one was written in 2008 in which the researchers studied South Asia's special economic zones focusing again on India, Bangladesh and Sri Lanka. In this study, Aggarwal et al. (2008) did a comparative assessment of the three countries' SEZs in which they were analysed as three separate case studies. What the paper sought to do was to find out whether the zones in those countries were actually industrial islands or real vehicles for the diversification of the various economies, concentrating on the institutional elements that determine zone success. The research identified various conditions including good infrastructure as well as fiscal and regulatory environment to be critical for the success of zones in the three countries. Thus, in those three countries, the availability of those key factors led to the attraction of quite a substantial amount of foreign inflows which generated a lot of economic activities and employment for the indigenes (Aggarwal et al., 2008). The paper also found little evidence to support the establishment of zones in retarded regions of those countries as such zones performed poorly in comparison to those set up in prime industrial areas. Characteristic of other EPZ studies however, the paper could not assess the trade performance and institutional features across the various zones and countries as a result of lack of data.

Similarly, Murayama and Yokota (2009) surveyed the special economic zones in South Korea, Bangladesh and India in which they looked at labour and gender issues in those zones. Based on the historical trajectories of zone activities in the three countries, the study concluded that in the case of South Korea which is an early implementer of the policy, export processing zones were no longer the focus of labour issues as compared to the other two countries. Overall, working conditions and remuneration in the zones were higher than those outside the zones in the case of South Korea as well as Bangladesh where the workers were offered better conditions in their work as some form of compensation for the prohibition of unionisation in the zones. Relative to the various measures of the study, the special economic zones in India were found to have underperformed notwithstanding the diverse generous subsidies offered to the firms in the SEZs.

Again, a study on the global perspective of export processing zones was done by Vinod and Meerabai (2016) which examined the significance of the zones. The descriptive study examined numerous countries in the global south, drawing on their experiences with policy implementation. The major issue from the study was the key finding that the policy has helped many of these poor countries to upgrade their production activities from the common basic goods such as plastic and apparel to more sophisticated output such as machinery, chemicals and information technology. By so doing, the EPZ concept through its foreign direct investment attraction activities has led to the improvement in the quality of the labour force through the process of learning by doing in many developing countries. Thus overall, the policy has caused an upsurge in employment, global trade and FDI, and the transfer of technology (Vinod & Meerabai, 2016).

Another such paper with an international perspective is the one by Milberg (2007). This was a survey report that considered the issue of economic development and conditions of workers in EPZs. The paper was actually in two folds: the first looked at the general macroeconomic issues including trade and employment patterns and the second part was focused on labour standards and the overall working conditions in the zones. Based on the analysis conducted by the paper, the issue of wages among workers in the zones in some of the studied countries was found to be better than those outside the zones. Zone employees were also found to have poorer health and safety standards than those outside the zones with most of these workers working more overtime than elsewhere. However, the paper could not come up with any definitive conclusion on the issue of freedom of association in the zones. On the issue of trade and employment, the paper admits that the enormous growth in the export sector of most of the countries propelled by the EPZ policy has led to the generation of a lot of employment, although in terms of the broader issue of economic development, the available evidence is disappointing.

Zeng (2016) also assessed the global special economic zones experiences with particular focus on China and the African continent. The paper looked at the SEZ development experiences of China and Africa, highlighting the lessons the latter could learn from the former, and also summarised the initial results of Chinese investments in Africa's SEZs. The paper lists conducive business environment in the zones, strong support from government, strategic selection of locations and strong linkages with the domestic economy to be some of the key factors responsible for China's success story with SEZs. On the other hand, the paper found African zones (except Mauritius), to have performed poorly relative to their stated set-up goals. It catalogues weak institutional and regulatory framework, poor infrastructure, lack of effective governance and implementation capacity and poor strategic planning among others as the reasons for the poor state of affairs relative to Africa's zones. Also, while admitting that Chinese investments in Africa's zones which started in 2006 were starting to attract foreign inflows and contribute to the various domestic economies, it was too early to conduct any meaningful evaluation of such projects.

Export processing zones and the make-up of greenfield FDI were also the focus of Davies and Desbordes (2018). The goal was to analyse the correlation between EPZs and greenfield investments for some 62 countries. The study period was from 2003 to 2014 and the data were sourced from Siroën and Yucer (2014). Although regression models were specified, the authors mainly used dummies to represent EPZs due to the perennial challenge regarding the availability of real data. The paper realised the FDI attraction into the EPZs to be mainly composed of investments with a manufacturing predisposition. These manufacturing units were found to be in sectors that were very much trade and labour-intensive. This gives credence to the long-held view by especially poor governments that EPZs are good vessels for the creation of employment.

Newman and Page (2017) also examined the present state of SEZs as industrial clusters in Africa. The paper evaluated, at a country level, the current status of special economic zones and the various policy measures implemented to promote these zones. This qualitative study provides insights into Africa's track record with SEZ policies. The findings reveal a generally poor state of affairs regarding Africa’s adoption of SEZs, with most zones falling short of expectation. The study highlights that many of these zones have contributed marginally to attracting foreign direct investment, expanding the export sector, and creating employment, with limited integration into the local economy. The paper concludes by recommending that African policymakers enhance their SEZ programmes to align with the standards seen in regions such as Asia and Latin America, to fully realise the potential benefits.

With the issue of employment, Hancock (2006) also studied women empowerment in Sri Lanka’s zones. The paper analysed female employees' perceptions in two EPZs in Sri Lanka, bordering on their empowerment in terms of both positive and negative impacts of zone work. The study was a mixture of qualitative and quantitative methods that involved using focus groups and questionnaires to survey a total of 370 mostly young and unmarried Sri Lankans. The study found evidence of both empowerment and disempowerment in Sri Lanka’s EPZs. On the positive side, female employment in the zones was found to come with pertinent benefits to poor households where the issue of regular income is a problem. Additionally, the paper adds that such employment is associated with regular income, other benefits from working overtime, acquisition of modern industrial skills and a certain level of independence. On the other hand, the women employees in the zones were often confronted with various negative issues such as discrimination and gender inequality both in the workplace and society at large.

Another Sri Lankan paper was by Karunaratne and Abayasekara (2013). The authors aimed to measure the impact of Sri Lanka's export processing zones on poverty alleviation and trade facilitation. This is a qualitative paper that interviewed individuals both inside and outside the zones between the period 2012 and 2013. This paper identified numerous positive effects of EPZs in the host country. These benefits include the generation of both direct and indirect employment in urban and rural areas, particularly for women. Additionally, the study found that EPZs facilitated trade through the simplification of various customs procedures and promoted both forward and backward linkages. However, regarding the workers in the zones, the paper found that they suffered from poor nutrition as a result of their low levels of education. The paper's concentration on multiple employment-related measures is a good thing. However, its focus and use of small and geographically restricted survey limits relevant comparisons and hence its conclusion that EPZs are welfare-enhancing.

More so, Shaw (2007) looked at the employment decisions of female employees who worked in Sri Lanka's EPZ garment industry. This was a descriptive study that made use of questionnaires, interviews and focus groups to obtain data from some 120 workers in the Katunayake Export Processing Zone in Sri Lanka. The study found that most of the young female employees who complained about the lack of job opportunities in their villages were actually pushed rather than pulled into zone employment by poverty and the fragile labour market. Such workers were found to have low job satisfaction with their employment choices severely impacted by unattractive alternatives. The paper however found that wages for these zone workers almost served as the main source of family income back home thereby improving household welfare.

Tantri (2012) also considered the issue of trade performance of India's special economic zones over their predecessor export processing zones. The author aimed to evaluate whether the SEZ policy was more effective than the previous EPZ policy in terms of trade performance at an aggregate level. The study utilised data from seven special economic zones, covering the period from 1986-1987 to 2007-2008. The paper also made use of the structural stability (dummy) regression model, and was conducted in line with the perceived lack of success from the earlier EPZ programme which necessitated its transitioning to the SEZ policy by the Indian government. It came up through this study that the change of policy has had an enormous effect on the country's overall trade although it was below what had been anticipated by the policymakers. The paper also found evidence of SEZ susceptibility to external trade shocks coupled with the fact that the policy had not influenced the diversification of India's export sector.

Another Asian study was the paper by Ye and Zhang (2020) that looked at the establishment process of free trade zones (FTZs) in China. The paper mainly focused on the relatively new inland FTZ set up in Shanghai in 2013, a location chosen for its superior transport infrastructure and high level of liberalisation. Governmental support was found to be a key factor for the successful operation of inland FTZs in China with such zones actually contributing to the balanced development in that country. According to the paper, the significant benefits of such zones include a reduction in the cost of imports, allowing citizens in inland areas to enjoy goods and services at prices similar to those along the coast. Additionally, these zones optimise the distribution of human and other resources, reducing shortages in other areas and lowering production costs. This helps to highlight and utilise resources in inland regions more effectively.

In other parts of the developing world, Jenkins (2005) looked at the zones in Costa Rica. He investigated the economic and social impacts of the zones in that country by employing regression models. He found that the zones can play a critical role in diversifying the implementing nation’s industrial exports. The paper however concedes that EPZs play a limited role when it comes to the development of the retarded regions in the host countries.

Another paper by the same author was published the following year and it analysed the sourcing patterns of Costa Rica’s export processing zones entities (Jenkins, 2006). In this study, a total of 84 out of the existing 126 EPZ firms were surveyed using Tobit models that were estimated with the maximum likelihood techniques to evaluate a company’s measure of backward linkages. The study concluded that a firm’s industry as well as capital intensity, age and size of the company, the amount of firm output sold on the domestic market, and ownership structure of the entity (i.e. whether the majority of the owners of the firm are indigenes) all have some relationship with a firm’s propensity to source intermediate inputs domestically. The paper advises that potential EPZ host countries should aim to attract capital-intensive firms, as these firms are more likely to establish linkages with local suppliers. It also recommends allowing greater domestic sales of output from these firms, as this practice encourages them to maintain stronger connections with local suppliers for inputs.

Similarly, Wunnik and Costa (2008) investigated the maquila industry as a catalyst for Nicaragua’s industrial development. This study centred on the Nien Hsing Textile Company, a Taiwanese textile firm that operates in Nicaragua’s only export processing zone called “Las Mercedes”. This company in 1998 was the largest EPZ entity in that Latin American country, employing more than 16,000 labourers. However, the paper found no evidence to support the idea that foreign firms contribute to the development of the domestic economy's industrial structure.

Pantaleon (2003) is another Latin American paper with the Dominican Republic as its context. This was an International Labour Rights Fund (ILRF) investigation that looked at the critical issue of sexual harassment in EPZs. Three zones in different regions of that country were considered in which some 370 workers were contacted. Interviews and focus group discussions were the main tools employed to obtain the needed data. The paper found issues of widespread sexual harassment in the workplace with about 40% of the mostly young women employees between the ages of 19 to 25 years reporting various forms of abuse. Most of the abuses which led to various disorders or problems such as low self-esteem, alienation, humiliation and psychological imbalance among the victims were perpetuated by male bosses. The paper encourages women to report such abuses and emphasises the importance of increased legal education and training to help curb this issue.

Again, Panama, which hosts the second largest export processing zone in the world after Hong Kong, was the country of interest to Sigler in his 2014 paper. The goal of this study was to conduct a comparative analysis of the country's two main special economic zones, where re-exports and regional headquartering of operations were the primary focus. The paper argues that not only are SEZs likely to be an inadequate strategy to achieve the goals of social development, but they could increase inequality in the host country (Sigler, 2014). This conclusion was arrived at as a result of the policy's promoters' failure to complement it with well-thought through strategies that are also correctly directed and implemented at the local level to address the chronic social issues that confront the local people.

In the case of Africa, the research attention has usually been focused on Mauritius due to its successful experience with the policy. Papers such as Kinunda-Rutashobya (2003) and Wignaraja (2010) have looked at the impact of the zone programme on that nation. In Kinunda-

Rutashobya's (2003) paper, he set out to investigate the potential of EPZs as a strategy for economic development. Based on the Mauritian success story, the paper posits that EPZs can be applied as an important policy tool in the socio-economic development of nations, arguing that the effect could even be more pronounced if it is used as an overall trade liberalisation strategy instead of just treating the zones as enclaves (Kinunda-Rutashobya, 2003).

Another key Mauritian paper was conducted by Sawkut et al. (2009). These researchers set out to evaluate more formally the net effect of the EPZs in Mauritius in the light of the popular and yet very tedious benefit-cost analysis. In so doing, the modified version of the enclave model was employed in which as a result of the lack of real data, dummies were rather used to proxy some variables. While acknowledging the significant impact of the zones in Mauritius in terms of their job creation and foreign exchange earning potential, the paper admits that the zones in that Indian Ocean country have cost more to that nation’s economy than the benefits that have accrued to it. This comes about mainly due to the extravagant incentives that are offered to the companies in the zones which are more expensive overall than the returns from the zones. The paper identifies electricity and domestic borrowings as two critical incentive variables that increase the cost of operating the zones.

Aside from Mauritius, Madagascar is considered the second most successful country in implementing the EPZ concept on the African continent. However, its progress was significantly impacted by the post-election violence that followed the 2002 election. Cling et al. (2007) is therefore a paper that has carefully analysed the impact of that country’s EPZs by considering the effect of the removal of the clothing quotas on jobs and labour standards in the zones. The paper estimated the extended Mincerian earnings function between 1995 and 2006 using primary data. Although exports from the Malagasy zones accounted for nearly 50% of aggregate national exports, the dismantling of the clothing quotas had negatively affected the zones' contribution to same. The paper concludes that on average, wages in the zones were lower than those in the formal industrial sector outside the zones although there were relatively higher labour standards in the zones compared to the average outside the zones.

Regarding the issue of EPZ incentives, Kuria (2017) studied the zones in Kenya where the aim was to investigate the impact of corporate income tax and value-added tax (VAT) incentives on the effectiveness of free zones entities. A total of 86 EPZ companies were involved in this study in which both secondary and primary data were sourced through the use of questionnaire. Both descriptive and inferential statistics were used alongside regression models in this study with the number of jobs created and the return on assets (ROA) being used to measure firm performance. Corporate income tax and VAT incentives were found to have a significant positive impact on the functioning of the EPZ firms. In light of this, the paper strongly advocates for the offering of more tax incentives as a means to attract and possibly maintain more foreign investment in developing countries.

Another Kenyan study was conducted in 2018 by Thuita and Oiye. This was an employment paper that examined the factors responsible for the satisfaction of employees using the Kilifi Export Processing Zones as a case study (Thuita & Oiye, 2018). From the zones, a total of 45 employees including managers from 15 firms were studied in a descriptive research design. The paper found compensation to have a stronger relationship with job satisfaction as compared to the issue of working conditions. In other words, the studied respondents expressed a greater level of satisfaction in their employment from the compensation they received from their work as opposed to the various working conditions under which they worked. On the whole, however, the paper contends that when EPZ workers are well compensated in the presence of good working conditions, they tend to be more productive with reduced labour turnover.

On their part, Kinyondo et al. (2016) looked at the effectiveness of Tanzania's state-owned special economic zones. This survey research focused on the nature of interactions between SEZ firms and their workers, as well as the technology transfers occurring between the zones and the wider domestic market. It also examined the perceived advantages and challenges associated with special economic zones. This research work involved a total of 379 workers including managers from some 24 companies in Tanzania's SEZs. Very minimal interaction was found to exist between the SEZ entities and the local economy although there was some evidence of the transfer of technology through the supply chain. The zone firms were also found to be facing challenges relative to energy supply with the overall competitiveness of the firms severely hampered by the presence of red tape and cumbersome bureaucratic procedures leading to an increased cost of production. The overall effect of all these is the conclusion that the policy of SEZs had not meaningfully benefited the local economy of that East African country.

The publication by William Angko also examined the export aspect of Ghana's free zones with 2003 to 2008 as the study period. Out of the 176 companies at the time of the study, only 100 were surveyed through the use of questionnaires and interviews to collect primary data. Also, the writer used the growth rate in exports, imports and value addition as a measure of EPZs' export performance as well as graphs and other descriptive measures in place of robust models in this generally qualitative analysis. The author strongly recommends the use of more advanced econometric tools to accurately determine the real effects of the policy in Ghana and other regions. The main finding of this study revealed that the policy's impact on exports from the zones had been highly inconsistent over the period, with such exports accounting for less than 10% of total national exports (Angko, 2014).

Quaicoe et al. (2017) is also an econometric analysis of the role of the Ghanaian zones on economic growth. Using quarterly data on zone investment and exports, the paper looked at how the zones had impacted the Ghanaian economy. The study used gross domestic product to represent economic growth as the dependent variable and separated the two key static benefits of free zones investment and exports to find out their total impact on Ghana's economy. The results from the vector error correction (VECM) analysis demonstrate that the zones in Ghana have not played a significant role in advancing the country's economic growth agenda. Inasmuch as this a unique study that econometrically investigated the direct effect of Ghana's free zones programme on economic growth for the first time, it is fraught with some fundamental weaknesses that need an improvement. The first is the paper's use of nominal GDP as the proxy for economic growth. The use of this measure of growth, unlike real GDP or GDP per capita, has the potential of mixing price and quantity effects. The second problem of the paper is its use of only trade openness as a control variable and this has the potential of bringing into the equation the issue of omitted variable effects. These challenges coupled with the reliance of the paper on only normality and stability tests, leaving out other post-estimation checks such as serial correlation and heteroscedasticity tests, make the paper's telling conclusion that calls for the scrapping of the free zones programme in Ghana questionable, hence the need for further investigation into the policy's impact.

2.6 Summary of gaps in existing literature

The above literature review conducted has brought to the fore the urgent need for more nuanced studies to critically look at the impact of the free zones concept on the economies of implementing nations. This is seen in the several gaps in the existing literature. Such gaps include the fact that inasmuch as some studies have been conducted to examine the efficacy of the free zones, such studies overall are not many and they do not particularly capture the experiences of the selected nations for this current study. Secondly, the focus of most previous authors has generally been on the social impacts of the policy such as employment and other worker-related issues, of which the real economic impact has been relegated to the background. The zones are meanwhile to aid in the overall economic development agenda, therefore the need to find the policy's impact on the various macroeconomic variables.

Again, the majority of the studies have been conducted at the firm or zonal level, with very few of them being done at the aggregate level with real national data. These studies that have suffered from the obvious data unavailability problem have also not considered multiples of countries at a time, and hence the need, having been able to access data at the national level, not just to consider the impact of the policy on just one country, but across two countries.

Moreover, the literature in existence shows that most studies have focused on one EPZ benefit or the other at a time, with only very scanty number of papers considering more than one of such benefits at a time. Meanwhile, the zones are associated with two broad strands of rewards – static and dynamic – with the static benefits such as more inflows of foreign capital, enhancement of the export sector, employment generation among others being the key yardsticks for the measurement of zone success, hence the need for more studies that concurrently consider more than one of such EPZ benefits.

Also, more critically, the very few economic studies that exist which have actually not involved the use of real data, but rather dummies, have assumed a linear relationship between the various

EPZ rewards and the various macroeconomic variables, chiefly economic growth. There is however the need to investigate any asymmetric relationships between and among these variables since most macroeconomic variables are nonlinear by their very nature (Shin et al., 2014).

Finally, on the decision to focus this work mainly on Ghana and Bangladesh, it has to be said that the availability of data on these two countries' EPZs is a major consideration. However, aside that, these two nations have not been adequately studied in terms of their experiences with export processing zones. They also have a lot of commonalities in their broader macroeconomies and in the specific characteristics of their free zones programmes and hence the appropriateness in studying them together. Again, the very few papers on Ghana and Bangladesh have largely concentrated on their individual firms or zones without using aggregate data to look at the impact of the policy of EPZs on the broad national economy. This work thus fills all these gaps and involves for the very first time the analysis of the asymmetric effects of free zones investment and export on economic growth and inflation, which to the best of our knowledge has never been done.

2.7 Conclusion

Chapter two so far has shed some light on the nature of export processing zones while at the same time discussing the key theories that have shaped the study of the policy of EPZs. It has also offered some insight into the available empirical literature by looking at various studies that have been conducted in various contexts. These empirical papers are generally of descriptive nature and have largely emanated from the most developed parts of the developing world where the implementation of the policy has had some measure of success on economic development although the same cannot be said of the African continent. Overall, however, results from the previous studies have generally been mixed aside from the literature being relatively limited. This calls for more studies that especially employ more robust econometric techniques. The next chapter is the conceptual review which critically discusses the chosen economic variables relative to the general empirical and theoretical literature and also more specifically to the EPZ variables bearing in mind the unique experiences of Ghana and Bangladesh.

CHAPTER THREE

CONCEPTUAL REVIEW

3.1 Introduction

A lot of literature exists on the relationships between investments and exports, and the various economic variables such as the rate of exchange, economic growth and inflation. In this chapter, the spotlight is thrown on such general literature – both the empirics and theories. This is done while at the same time taking cognizance of the peculiar issue of our export processing zones variables regarding the experiences of the two countries of study – Ghana and Bangladesh.

3.2 Theories of exchange rates

The available studies that have looked at the issue of exchange rates in various contexts have been based on different theories. The key exchange rate theories include the purchasing power parity theory, the monetary theory of exchange rate, the portfolio balance theory and the balance of payments theory.

3.2.1 Purchasing power parity (PPP) theory

Although Cassel (1918) is credited with the systematic development of the PPP theory in its current form, the theory is said to have originated from the work of David Ricardo and John Wheatley. Purchasing power is simply the power of money seen in the quantity of goods/services that one currency unit can afford, and which can be affected by the rate of inflation. The purchasing power parity (PPP) theory postulates that exchange rates are dependent on price levels, asserting that buyers should be able to purchase the same quantity or bundle of goods in any country for an equivalent amount of currency. According to this theory, when inflation rises rapidly in a given country, national price levels change, leading to fluctuations in the exchange rate (Puaschunder, 2019).

The PPP theory reveals itself in two forms, namely the absolute and relative versions. Whereas the absolute PPP (also known as the law of one price) argues that prices of goods in two different countries should be the same when a common currency is used to measure those prices, relative PPP on the other hand says both the rate of exchange and inflation rate in two countries should equal out with time. The PPP theory inherently relies on the efficient market hypothesis. However, it faces challenges such as trade restrictions, quotas, tariffs, and differences in the nature and quality of goods and services between countries. Additional factors like transportation costs and varying tax policies further complicate its practical application. Despite these challenges, PPP is considered relatively more reliable in the long term than in the short-term.

3.2.2 The monetary theory of exchange rate

The monetary exchange rate theory is an improvement on the PPP theory and was formulated by Polak (1957). This theory sees the rate of currency exchange to be reliant on the aggregate demand and supply of money between two countries. Whilst the money demand is determined by real income level, inflation and the interest rate, money supply on the other hand is independently determined by the monetary authorities of the different countries. An increase in the money supply has an immediate impact on financial markets and the exchange rate, according to the PPP theory. It reduces interest rates and leads to a rise in price levels, which results in the depreciation of the domestic currency relative to external currencies. There would however be a balancing act when the rate of inflation in the foreign country starts to increase relative to the home country's leading to the domestic currency's appreciation.

By way of criticism, aside from this model being overly reliant on the power of money rather than trade, it erroneously assumes that financial assets on the local market can perfectly be substituted for foreign ones.

3.2.3 The portfolio balance approach

Also termed as the asset market approach, the portfolio balance approach theory to exchange rate determination was propounded by Branson et al. (1977). It principally adds the issue of trade as a means of correcting some of the weaknesses in the monetary approach. It also views foreign and domestic financial assets as not being perfect substitutes. The theory acknowledges that an increase in the local money supply causes a decrease in interest rates compared to other countries. This leads to an increase in the purchase of foreign financial assets and a subsequent decline in the value of the domestic currency. However, it argues that, in the long run, such currency depreciation will expand the export sector and reduce imports. Consequently, for the exporting home country, there will be a trade surplus all things being equal which will invariably lead to an appreciation of the local currency.

3.2.4 The balance of payments (BOP) theory

Based on the original work of David Ricardo, the BOP theory of exchange rate, also known as the general equilibrium theory, holds that the rate of exchange between two currencies is largely affected by a country's balance of payments position, and not merely inflation and money supply. The exchange rate for a particular country is thus determined by its balance of payments position. If the BOP position is favourable, the country's currency will appreciate in external value. Conversely, if the BOP position is unfavourable, the currency will depreciate.

The exchange rate is thus a function of the demand and supply of foreign currency and not necessarily a function of price levels in the two countries as espoused by PPP. The equilibrium exchange rate is therefore attained when such supply and demand are equal. This theory is criticised because it does not offer any indication as to what determines the internal value of a currency aside from its unrealistic assumption of no government intervention in the foreign exchange market (FEM).

3.3 Economic growth theories

The dominant theories that have been used to study the critical issue of economic growth over the years have been the classical growth theory, the neoclassical growth theory, the endogenous growth theory and the recently added unified growth theory.

3.3.1 Classical growth theory

The work by Adam Smith in his 1776 book titled "The wealth of nations" set him up as the pioneering brain behind the classical economic growth theory. After this, other theorists such as David Ricardo, Thomas Malthus, Karl Max, John Stuart Mills and Jean-Baptiste have done other works to enhance the theory of classical growth in economics. David Ricardo for example in his work during the Industrial Revolution era came up with the idea that nations should focus on the production of goods in which they have the most efficiency, better known as the theory of comparative advantage.

The original idea from Smith's work though states that the wealth of nations depends on trade which promotes profit-making through competition among nations to engender growth caused by the division of labour and accumulation of capital. The classical economic growth theory therefore postulates that nations grow when they accumulate capital and reinvest profits obtained from economic specialisation, division of labour and the pursuit of a country's comparative advantage. A limitation of this theory is that it fails to recognise the role of technology in the growth process. This omission is significant, as technology is believed to have the potential to mitigate the diminishing returns associated with the two main inputs: capital and labour.

3.3.2 The neoclassical growth theory

This theory emerged in the 1950s and 60s. It was advanced by scholars such as Alfred Marshall, Irving Fisher, Carl Menger among others. However, the credit for its current manifestation is assigned to the American Nobel laureate Robert Solow and his Australian counterpart Trevor

Swan. Also known as the exogenous growth model, the neoclassical theory, as introduced by Solow in his 1956 paper "A Contribution to the Theory of Economic Growth" and further elaborated in "Technical Change and the Aggregate Production Function" in 1957, along with Swan's contributions, argues that the growth of a national economy occurs through the interaction of labour, capital, and technology (Solow, 1956, 1957; Swan, 1956).

According to this theory, both capital and labour experience diminishing returns. For instance, labour, which is accumulated through investment, decreases over time due to depreciation. The theory critically argues that technical progress is the only significant factor driving continuous national growth, resulting in an improvement in per capita income, which serves as a measure of living standards. According to this perspective, countries with higher population growth rates tend to have a lower capital-labour ratio, leading to smaller per capita incomes. Furthermore, the theory posits that technological advancements are accessible to all countries at the same rate of progress. This means that if poorer countries increase the share of GDP they invest in technology, they have the same potential for long-term growth as wealthier nations.

3.3.3 Endogenous growth theory

The endogenous growth model is an improvement on the exogenous model and factors in the issue of labour productivity attained through skill and knowledge acquisition. It was developed by Robert Lucas and his protégé Paul Romer. The theory contends that technical progress which is an endogenous factor is not the only significant force responsible for the growth of an economy and that growth is affected by the quality of the workforce, protection of intellectual property amid competition, development of science and technology and the creation of an enabling business environment to stimulate economic activity (Lucas, 1988; Romer, 1986).

The theory therefore acknowledges the significant role of the state in economic growth. It also rejects the notion of diminishing marginal productivity of capital and rather argues that there is an increasing rate of return to human capital. Economic growth is therefore very much reliant on the quality of the human capital and hence countries with high accumulation of human capital through quality education and healthcare stand a greater chance of growing faster as compared to those which lack it. Aside from human capital development, there is also greater emphasis on research and development and the expansion of the national frontiers through the free participation in global trade.

3.3.4 The unified growth theory

The promotion of this relatively new theory of economic growth is attributed to Galor (2011). This theory came about as a result of the perceived inadequacies in the endogenous model to explain some germane empirical observations from studies conducted on various economies of the world. The theory captures the various phases of human progress in terms of economic development in a single framework.

According to the unified growth theory, for the most of man's existence, technical progress was undone by increased population growth, and across time and space, human beings were almost subsisting in terms of their living standards. However, improvements in the population in terms of its size and composition championed through education has led to more progress on the technological front with more people also being able to use those technologies. Higher levels of education lead to a decline in fertility rates. This shift has allowed governments to allocate more resources toward increasing per capita income rather than supporting population growth, resulting in sustained economic growth for many nations.

3.4 Theories of inflation

For inflation, the time-tested demand-pull inflation and cost-push inflation have been used as the principal theories to study it alongside the now popular structural theory of inflation which seeks to address the peculiar challenges experienced by developing nations in addressing the phenomenon.

3.4.1 Demand-pull inflation/monetary theory of inflation

The monetary theory of inflation, also called the conventional view, explains how inflation occurs. It was independently formulated by economists of the Keynesian persuasion particularly Friedman (1968). The theory states that the increase in the prices of goods and services in an economy is caused by an upsurge in the demand for such goods and services where such demand is not adequately matched by supply. In that case, there is an imbalance between the two key forces of demand and supply, a phenomenon which normally occurs when an economy is greatly expanding.

An increase in government spending coupled with an increase in the supply of money are two key factors noted for such a situation where a lot of money is in the system to chase fewer goods leading to an increase in the prices of goods and services. An increase in the money supply can also occur when more people become gainfully employed due to improvements in the general economic situation. This increased employment boosts their purchasing power, leading to higher demand for the limited goods available in the market, which, in turn, puts upward pressure on prices.

3.4.2 Cost-push inflation

Cost-push inflation or wage-push inflation or simply new inflation as put forward by Otto Eckstein in the late 1950s is the kind of inflation that occurs due to a rise in the prices of goods and services as a result of increased cost of production. It may also be as a result of an increase in the price level due to a reduction in aggregate supply caused by a rise in the production cost. An example is when there is an increase in the prices of raw materials in which case producers will most likely increase the prices of their output to make for the increase in the cost of producing a particular good or delivering a service.

The higher cost of production could lead to a decrease in the aggregate output. When this happens, and barring any changes on the demand side, such price increases from the production side are passed on to the buyers. Increased cost of raw materials, rise in wages for workers, rise in indirect taxation, increased cost of borrowing and an upsurge in the prices of imported raw materials due to changes in the rate of exchange are some of the notable causes of the cost-push inflation.

3.4.3 The structural theory of inflation

This theory was developed to address the specific needs and unique characteristics of developing countries. Conceived by Gunnar Myrdal and Paul Streeten, it originated in Latin America. The theory emerged in response to the inherent structural imbalances and bottlenecks present in the economies of developing countries. For this reason, it is argued that traditional theories of inflation are insufficient for addressing the economic realities of these emerging nations.

The structuralists contend that increased investment spending coupled with an increased supply of money to finance it are the only closest but not the ultimate forces that account for price rises in the developing world and for which reason the traditional demand-supply model cannot be correctly applied to explain inflation (Myrdal, 1957). Imbalances in the DCs are caused by sectoral challenges such as resource under-utilisation, market imperfection, lack of demand and other structural rigidities, causing some sectors to have less supply relative to demand while in some other sectors, there is the existence of excess capacity because of less demand. The end effect of all this is the fact that these bottlenecks will cause relative prices in the economy to rise for which reason the usual measures associated with the supply-demand inflation such as the reduction in the money supply will just not work to reduce inflation in the developing world.

3.5 General empirical literature on investments, exports and exchange rates

Various studies have looked at the individual impact of investments and exports on exchange rates for various countries of the world. Results from such studies have however produced mixed conclusions with some reporting a positive impact whilst others claim a negative impact, and for some others, no impact. The kind of exchange rate regime in the various countries, environmental factors such as the availability or otherwise of natural resources and quality of state institutions, extent of trade liberalisation, composition of the export sector as well as the methodology applied by various researchers are some of the factors accounting for the differences in findings.

From the empirical standpoint, Bank-Ola (2021) is one such paper that focused on the Nigerian economy as a time series investigation into the impact of foreign direct investment on that country's exchange rate. Using real effective exchange rate as the target variable and FDI as the key regressor, the paper employed both the autoregressive distributed lag (ARDL) and error correction models after determining the mixed integration orders of the selected variables. Data for the study were sourced from the World Development Indicators and the Central Bank of Nigeria for the period 1986 to 2018. The study's findings brought to light that in the case of the Nigerian economy, FDI had a positive impact on the rate of exchange in the long-run for the study period. To help improve general levels of productivity and overall trade position, the paper suggests the need for managers of the Nigerian economy to see to the stability and sustainability of FDI into Nigeria.

Another time series study was conducted in Asia by Qamruzzaman et al. (2021). The aim was to determine the nexus between foreign direct investment and financial innovation, and the volatility in exchange rate. In total, four individual countries were considered: India, Bangladesh, Sri Lanka, and Pakistan. With annual data mainly coming from the World Bank's World Development Indicators for the period 1971 to 2018, the study investigated both the symmetric and asymmetric relationship between the chosen variables by the use of the autoregressive distributed lag and the nonlinear autoregressive distributed lag (NARDL) methodologies. This followed the realisation that the variables were of different levels of integration. The main result of interest pointed to the fact that FDI inversely affects exchange rate volatility in the long-run and hence the need for more such inflows to curtail any volatility on the forex front.

For their part, Igwemeka et al. (2015) also looked at the impact of foreign investments on the Nigerian exchange rate. 1987 to 2012 was the study period with annual data coming from the Central Bank of Nigeria (CBN). The paper separated inflows into portfolio investment and FDI and made use of a growth model via ordinary least squares (OLS) regression and Granger causality analysis. The causal analysis indicated no relationship between both portfolio investment and FDI and exchange rate. Based on the regression analysis however, foreign portfolio investment was found to cause an appreciation of the local currency in Nigeria although the impact of FDI on the other hand was found to be insignificant which the paper attributes to the poor business climate in that West African country.

Lajevardi and Chowdhury (2024) also considered the relationship between Canada's exchange rate volatility relative to its foreign direct investment inflows using data from 2007 to 2022. To examine both the long and short-run impacts between the series, the authors employed the autoregressive distributed lag technique. Volatility in real effective exchange rate was found to have significant long and short-run effects on FDI into Canada.

Finally, Huong et al. (2020) also empirically investigated the relationship between Vietnam's exchange rate and foreign direct investment. The study utilised quarterly data from 2005 to 2019 and employed the vector autoregression (VAR) model due to the absence of cointegration among the study variables. The authors made use of real effective exchange rate as proxy for exchange rate having sourced data mainly from the International Financial Statistics and the IMF. Importantly, the study observed a positive impact of FDI on the Vietnamese exchange rate with a depreciation of that country's local currency found to lead to a spike in foreign inflows into Vietnam.

In terms of export, a key measure of EPZ success, the general empirical literature concerning how that variable affects the rate of exchange and vice versa has also produced inconclusive or mixed results. One such study has been the work by Thuy and Thuy (2019). This is a Vietnamese paper that analysed the effect of volatility in exchange rate on exports. Quarterly data from the year 2000 to the year 2014 were used. The study involved the use of a log-linear specification based on an autoregressive distributed lag framework. The paper concludes that volatility in the rate of exchange has a negative impact on the amount of goods exported. Regarding currency depreciation and/or appreciation, the study found that in line with the J-curve effect, a depreciation of the local currency has a negative short-term effect on exports but a positive long-term effect on the same.

Gondaliya and Dave (2015) is also a time series study of the effect that the rate of exchange has on a country's imports and exports based on Granger causality analysis. India was the country of study and monthly data was sourced for the period 2006-2015. Whereas in the case of exports the paper contends that increased exports result in a strengthening of the Indian rupee, the opposite was found to be true in the case of imports.

In their evaluation of the foregoing relationship, Kenya was the country of interest in the case of Kiptui et al. (2013). The researchers studied the nexus between the real exchange rate and Kenya's exports for the period 1999-2012 based on quarterly data. An error correction model was applied in this study. The findings from the analysis were that in the long-run, real exchange rate significantly affects exports while economic activity in foreign countries has only a short-run positive effect on Kenya's exports. For long-term benefits from exports, the paper therefore highlights the importance of ensuring that the local currency is not over-valued to engender more exports.

Ngondo and Khobai (2018) also examined the impact of South Africa's exchange rate on that country's exports. Using annual data from 1994 to 2016, this time series analysis employed the autoregressive distributed lag model after various stationarity tests confirmed the existence of different levels of stationarity for the chosen variables. Data were internally sourced from various governmental bodies. The empirical conclusion of the paper was to the effect that exchange rate negatively impacts exports in South Africa hence the need to leave the determination of the rate of exchange to the forces of demand and supply to avoid misalignment.

Lastly, Demir and Ozkan (2018) on the other hand focused on the economy of Turkey to assess the association between the country's exports, imports and exchange rate. Quarterly data for the study spanned the period 2003 to 2016 in which the rate of exchange between the Turkish lira and the U.S. dollar was used as the measure of exchange rate. The study also employed the symmetric autoregressive distributed lag model as well as the error correction model. The writers found a short-term positive effect of exports on the rate of exchange of the studied country with both exports and imports responding to exchange rate in the long-term.

3.6 General empirical literature on investments and economic growth

As with many other economic variables, the results from the impact analyses between investment and economic growth have been very ambiguous, to say the least. Some have found such impact/relationship to be positive and others have concluded otherwise. Erum et al. (2016) for example, studied the influence of FDI on economic growth based on the experiences of the countries of the South Asian Association of Regional Cooperation (SAARC). The fixed effects model was applied to data covering the period 1990 to 2014 to analyse the effect of FDI, domestic capital, government expenditure and labour on growth. The paper concluded that FDI and local private investment both have positive effect on economic growth although investments from local private sources were found to be more reliable. The paper advises governments to pay more attention to the development of human capital to secure the full benefits from the various investment activities.

Atakpa et al. (2024) also examined the Nigerian economy by focusing on how that economy is impacted by foreign direct investment. The period of study was from 1990 to 2023. The study employed both Granger causality test and the asymmetric autoregressive distributed lag methodology to investigate the impact of FDI and other economic variables including expenditure by government in the health sector, foreign portfolio investment, remittances, foreign aid and debt, on Nigeria's real GDP. In terms of the variables of interest, foreign direct investment was observed to have a significant impact on economic growth in both the short and long-terms. Specifically, positive shocks in FDI led to enhancement in the growth prospects of

Nigeria and negative shocks decreased economic growth. This study advocates for the provision of more infrastructure coupled with increased health and education spending to aid in the attraction of more foreign inflows.

Similarly, Demir (2022) assessed the effect of foreign direct investment on economic growth in Turkey. GDP per capita growth rate was used as the dependent variable in this study that specified a Cobb-Douglas production function and made use of both the linear and nonlinear ARDL. The period of study was from 1970 to 2020. There was the presence of both linear and nonlinear cointegration among the study's variables having observed the variables to be of mixed levels of integration. The empirical results for both the short-term and long-term found no significant growth effects of FDI on Turkey's economy. Asymmetrically, both increases and decreases in FDI also had no significant impact on economic growth in Turkey.

Hassan (2023) focused on the United Arab Emirates in a similar study that examined the impact of foreign inflows on economic growth, with data sourced from the World Development Indicators of the World Bank for the period 1986 to 2021. The study also made use of the nonlinear autoregressive distributed lag model. Along with the other independent variables included in the model as control including employment rate, exchange rate and industrialisation, FDI was observed to have significant positive impact on the UAEs economy.

A similar time series analysis of the effect of FDI on growth was conducted in Malaysia by Mohamed et al. (2013). Specifically, the goal was to find out whether investment (both foreign and domestic) had any long-term causal impact on economic growth in that Asian country. The authors made use of the vector error correction model and sourced data for the period 1970 to 2008. Whereas in the case of domestic investment, there was evidence of long-run bi-causality, there was no such relationship between foreign capital and growth. The analysis also suggests a short-run crowding-in effect on domestic capital caused by FDI.

Siddique et al. (2017) also studied the Pakistani economy in terms of how that country has been impacted by the inflows of foreign capital in the form of FDI. The study covered the period 1980 to 2016 and utilised the Granger causality test and the linear ARDL model. It found that foreign inflows had played a pivotal role in promoting economic growth in Pakistan while observing a unidirectional causality that runs from economic growth to FDI, pointing to the fact that higher levels of economic growth also promote the attraction of more inflows. To this end, the paper suggests the need for the government to employ several measures to secure more FDI by focusing more on the development of human capital through education and training.

For Pandya and Sisombat (2017), the Australian economy was the context for their study which made use of multiple regression analysis to investigate the effect of FDI on the economy of that country. Data for the study covered the 2001-2013 period and the authors highlighted the key sectors responsible for the attraction of Australia's inflows. The paper came up with the critical finding in support of the fact that FDI is a promoter of growth. The study highlights the role of these inflows in expanding the country's GDP, exports, and employment. It suggests that the Australian government should prioritise attracting more FDI into the most promising investment sectors of the economy.

Nguyen (2022) also looked at the impact of FDI on the economy of Vietnam. The paper made use of the vector autoregression model via impulse response and variance decomposition mechanisms by making use of time series from 1990 to 2020. The paper found that, in the long run, FDI has a negative impact on growth in that Southeast Asian country. Despite substantial inflows following the nation's reforms, their effect on the economy has been limited. The primary reason cited for this outcome is the lack of technology transfer.

Adhikari et al. (2023) also concentrated on the economy of Nepal by looking at how that economy is impacted by both foreign direct investment and financial development. The study covered the 1980 to 2021 period and also employed the NARDL technique. By distinguishing between positive and negative shocks in the key independent variables and analyzing their impact on per capita GDP growth rate, significant asymmetric effects were observed. More specifically, increases or positive shocks in foreign inflows were found to lead to economic growth in Nepal whereas the decreases or negative shocks did not have any significant impact on growth.

Finally, Mohamed and Abdulle (2023) also looked at the relationship between the key issue of foreign direct investment and economic growth on the economy of Somalia. Since all the study's variables became stationary only after first differencing, the authors employed the nonlinear autoregressive distributed lag technique. The analysis was conducted using data spanning the period from 1977 to 2021. In both the short and long-runs, FDI was found to have asymmetric relationship with economic growth, where positive shocks in inflows enhanced economic growth and negative shocks impeded growth.

3.7 General empirical literature on investments, exports and inflation

Although there is a lot of pessimism and anxiety surrounding the issue of inflation in both the industrialised and up and coming nations, the empirical studies conducted to examine its effect on investment have produced no unanimous conclusions. In the West African nation of Nigeria for example, Henry et al. (2020) evaluated how inflation affects foreign direct investment. Data for the paper were sourced from the central bank of that country, covering the period from 1971 to 2019, and the vector error correction model was applied. The results from the econometric analysis indicated that, in both the short and long-runs, inflation did not have any significant impact on FDI.

Another West African study was conducted by Iyke and Ho (2020) with Ghana as the country of interest. They used annual data from 1963-2016 to evaluate the impact of inflation uncertainty on domestic private investment. With Ghana experiencing what could be described as low, moderate and high phases of inflation uncertainty over the study period, the writers chose to look at inflation from both temporary and permanent angles. The autoregressive distributed lag approach was used in this study after the generalised autoregressive conditional heteroscedasticity (GARCH) model had been applied to separate the inflation variable into the two component parts. The major finding of this research was that, in the short-run, inflation uncertainty has varying effects. However, in the long-run, its impact is negative and statistically insignificant. The paper concludes that while inflation uncertainty may boost domestic investment in the short-run, consistent with economic theory, long-term domestic investment could be hindered by inflation and its associated uncertainty.

The study by Mustafa (2019) is also another time series paper that considered the link between FDI and inflation in the Asian country of Sri Lanka. Annual series for the period 1978-2017 was obtained from the Central Bank of Sri Lanka with inflation and FDI respectively serving as the dependent and independent variables. The author employed a cointegration test as well as Granger causality and a simple linear regression model to conduct this study. From the results, there was evidence to the effect that the two variables had a long-run relationship in which inflation was found to negatively affect FDI. Likewise, FDI was also found to impact inflation in the long-run.

The relationship between foreign direct investment and inflation was also studied by Azim and Hassan (2021). Quarterly data for the period 2000 to 2019 were sought for this work that considered some ten emerging nations. The nonlinear autoregressive distributed lag methodology was employed by the authors. In terms of the asymmetric results, positive shocks in FDI were seen to be leading to more inflation while negative shocks decreased inflation. Overall, FDI was found to positively relate to inflation in the short-run while over the long horizon, its impact was negative.

Finally, Oyinlola and Ajayi (2020) examined the impact of foreign inflows on inflation across twenty African countries. The study utilised the NARDL bounds testing approach and covered the period from 1980 to 2018. The findings revealed that FDI had a positive effect on inflation in the short-term, while in the long-term, FDI was found to have a negative impact on inflation. Regarding the nonlinear effects, increases in FDI were observed to have a positive impact on inflation, whereas decreases in FDI negatively affected inflation.

On the other hand, with the causal impact of exports on inflation and vice versa, several empirical studies on the overall economy exist but still with no consensus. One such paper is Kiganda et al. (2017). The researchers set out to find whether exports cause inflation in the Kenyan economy. The study employed vector autoregression, Granger causality, and impulse response analysis, using the consumer price index (CPI) as a proxy for inflation. Monthly data were obtained for the period 2005-2015 from the Central Bank of Kenya. Also, exports were segregated into domestic exports and re-exports. Based on the various tests, domestic exports and re-exports were found to have significant positive and negative effects respectively in the long-run on inflation. Between the two, however, domestic exports were found to have a greater impact in determining inflation in Kenya.

Elsewhere, Sahoo and Sethi (2018) analysed such a relationship in India. Specifically, they examined the relationship between exports, imports, and inflation over the period from 1975 to 2017. They also made use of test of cointegration alongside variance decomposition and impulse response analyses with CPI being used as proxy for the inflation variable. The study found that exports had a greater impact on inflation in India than imports. Additionally, there was unidirectional causality running strictly from exports to inflation. Inflation was also seen to be Granger-causing imports. Overall, the results from the study proved that in the case of India, exports have been a major determining factor in the variation in inflation.

The situation in neighbouring Pakistan was also investigated by Ahmed et al. (2018). Inflation, exports and imports were also the variables of interest to these researchers and their study period covered 2001 to 2017. For both short-run and long-run analyses, error correction model and cointegration and Granger causality tests were employed. Again, inflation was represented by the consumer price index with monthly data being used. From the causal analysis, there was evidence of a unidirectional causality running from exports to inflation with both the export and import variables having a positive relationship with inflation in both the short and long-terms. The paper attributes the positive impact of exports on inflation to the dwindling exports from Pakistan and calls for more vibrant policies to increase the sector.

Another Asian study was conducted by Muktadir-Al-Mukit and Shafiullah (2014) in Bangladesh. Using monthly time series, the study focused on examining the nexus between inflation and exports and imports. The period of focus was 1994-2011 and the paper employed error correction and variance decomposition analysis. Granger causality test was also conducted to examine the causal relationship. A bi-directional causality was observed between inflation and exports whereas in the case of inflation and imports a unidirectional causality running from inflation to imports was realised. The export variable was found to have the greatest neutralising impact on inflation in Bangladesh with a one per cent increase in it for example causing a 1.91 per cent decrease in the CPI, unlike imports whose increase rather surged inflation.

Lastly, Azim et al. (2019) explored the relationship between the export-led growth hypothesis and inflation in South Africa, China, Brazil, Turkey and India. Annual data for the study spanned the 1975-2016 period. The writers also utilised the nonlinear autoregressive distributed lag methodology put forward by Shin et al. (2014). The nonlinear effect of exports on the rate of inflation was found to be positive in the short-run but negative over the long-run. The paper suggests the need for the implementation of export-oriented policies to curb inflation.

3.8 Conclusion

Chapter three examined various macroeconomic variables in greater detail from both empirical and theoretical perspectives. In other words, with the full knowledge that the export processing zones concept is only a sub-sector in the broader economy, we have tried in this chapter to survey the general literature regarding how our chosen macroeconomic variables are affected by the overall issues of investment and exports as per the available literature. This provides a clearer perspective, allowing us to effectively position the concept of EPZs within the broader macroeconomic context. However, from the papers reviewed, it is unsurprising that the general conclusion indicates mixed results regarding the relationships between the various variables. This highlights the urgent need for further research, particularly focusing on the specific issue of EPZs. The next chapter provides the study's context, where the EPZ programmes in both Ghana and Bangladesh are thoroughly discussed in relation to the broader economic characteristics of each country.

CHAPTER FOUR

CONTEXT OF STUDY

4.1 Introduction

This chapter describes the study's context. Specifically, it throws light on the concept of export processing zones as it pertains to Ghana and Bangladesh. In connection to this, the pertinent issues that characterise economies of developing countries generally are highlighted alongside a description of trade liberalisation efforts that have been made in the two nations. The chapter also gives some notes on how EPZs are perceived internationally in terms of trade rules and preferential trade arrangements. It finally ends with a spotlight on the free zones programmes in Ghana and Bangladesh.

4.2 A brief overview of the economies of developing countries

Independent states with less developed industrial base and a generally lower human development index (HDI) compared to other countries are referred to as developing countries, or DCs (Ranis et al., 2006). It must be admitted however that this can best be described as a very controversial definition as it is not universally accepted not even by international bodies since there is a lot of debate on what is used to measure it or even which countries make the list of DCs. This is why in the recent literature, the mild term "global south" is used to describe such nations that exhibit such traits.

According to the United Nations (UN), there are 195 countries in the world as of the year 2022 and out of these countries, the World Bank classifies the world's economies into four main categories (WDI, 2022). The classifications include low, lower-middle, upper-middle and high-income countries. The World Bank has aimed to use a common benchmark – gross national income (GNI) per capita – to characterise and classify these economies, thereby reducing controversy. Notably, most high-income countries, which are considered advanced economies, are located in the Northern Hemisphere, while the less developed countries are primarily found in the Southern Hemisphere. Of these countries in the Southern Hemisphere, the continents of Asia and Africa are noted to contain most of the least developed countries in the world with the latter being particularly notoriously described as the poorest continent in the world (WDI, 2022).

A lot of things feature in most countries that are described as developing where most negative things seem to be on the high side and positive things are on the low side. Chiefly, by way of the features that describe developing countries, most of such nations are noted for having their access to safe drinking water, energy, infrastructure, sanitation and hygiene to be generally low with higher levels of pollution relative to the other countries of the world (Ranis et al., 2006). Concerning the human conditions in those countries, there is limited access to employment and education, very high rates of poverty, hunger, malnutrition, corruption and inequality in the economic sense. Again, access to healthcare is a major challenge, bringing about high rates of infant and maternal mortality with generally low life expectancies as compared to elsewhere (Ranis et al., 2006).

Also, by way of statistics, the combined population of the developing countries in the world as at the year 2022 stood at 6.7 billion out of the world's 8 billion people and this indeed is a huge market for economic activity with great potential for overall global welfare (WDI, 2022). The gross national product (GNP) per capita in the developing world in 2022 was \$5,620 as against the world figure of \$12,070 (WDI, 2022). Regarding employment, whist the global unemployment rate stood at 6.2%, the developing countries registered a rate of 6.6%, with an average life expectancy of 71.4 years, against the global figure of 72.98 years. Also, most economies of the developing world are saddled with huge levels of debt, with the region's average debt-to-GDP figure for 2022 hovering around 56%, placing a limit on how much is expended on critical services like education and healthcare (WDI, 2022).

To correct a number of the challenges making up for the variations in global living conditions, various attempts have been made at the country and global levels with the ultimate aim of bridging the developmental gap. At the multilateral level, one such initiative in this regard has been the Sustainable Development Goals (SDGs - formerly, Millennium Development Goals (MDGs)). This initiative, led by the United Nations, aims to transform the world by promoting human welfare and protecting the planet.

Ghana and Bangladesh are an integral part of the 152 countries in the world that constitute the global south. Additionally, according to the World Bank classification, both countries fall within the lower-middle income brackets. Whist Ghana is found in Sub-Saharan Africa, Bangladesh on the other hand is in South Asia. Both Asia and Africa are rich in natural resources, and their economies, particularly those in Sub-Saharan Africa, have largely depended on these resources since before independence. The South Asia region is the most heavily populated in the world and accounts for nearly a quarter of the global population with an estimated GDP in excess of $4 trillion in nominal terms ($14.83 trillion in PPP terms) as at 2022 (WDI, 2022). SSA also has a population of over 1.2 billion with a nominal GDP of about $1.9 trillion which is in excess of $5 trillion in PPP terms (WDI, 2022).

To capitalise on their vast populations and promote economic growth, various organisations have been established in these regions to foster development through trade. In South Asia, one such key body that has been in place since 1985 has been the South Asian Association for Regional Cooperation. Africa on the other hand has various regional blocs depending on the location on the continent but the African Union has at various times championed the issue of trade on the continent culminating in its recently formed African Continental Free Trade Area (AfCFTA) with its headquarters in Ghana's capital, Accra.

4.3 The economy of Ghana in perspective

Just like many other emerging countries that looked inwardly to produce whatever the citizens needed after independence, Ghana was one key nation that championed the implementation of the famous import substitution strategy (Nomfundo & Odhiambo, 2017). This was spearheaded by the socialist government headed by Ghana's first president Dr. Kwame Nkrumah. The goal was to achieve economic independence that would align with their political independence. This policy was largely in place up until the early 1980s in which for the most part, there was the imposition of various prohibitive tariffs on imports to discourage the importation of foreign goods alongside the implementation of various quantitative controls on imports with the Bank of Ghana determining foreign exchange allocations (Asiedu, 2013).

The import substitution strategy, characterised by low-capacity utilisation in the country, faced numerous economic challenges. These challenges distorted many major economic indicators, resulting in a recorded mean growth rate of only 1.34% between the late 1970s and early 1980s, with some years even experiencing negative growth. Both imports and exports also started to decline with the ratio of import to GDP and export to GDP falling respectively from 18.5% to 3.3% and 20.7% to 3.6% between the 1970-1982 period (Asiedu, 2013). Around the same period, inflation also hovered around 50% with huge deficits in the country's BOP.

Overall, however, Ghana's economy just like before independence has been very much basic, agrarian and heavily reliant on primary production (Bonga-Bonga & Ahiakpor, 2016). Most of the citizens are into agriculture and mining is a major economic sector in the country. The country is the leading producer of gold in Africa and the second-largest producer of cocoa globally, ranking just behind its neighbour, Côte d'Ivoire. In addition to gold and cocoa, the country is well-known for exporting timber, oil, bauxite, manganese, diamonds, and various horticultural products, with the majority of its exports going to countries such as India, the United Arab Emirates, China, and Switzerland. The key economic sectors include oil and gas production, light manufacturing, agro-processing, as well as mining and agriculture. Although agriculture is a major economic sector in the country, employing nearly half of the labour force, it contributes only 18% to GDP while the services sector's share to GDP stood at 57% during the 2017 fiscal year (Diao et al., 2019). Industry on the whole contributed about 24% during that year.

As a result, it is unsurprising that many Ghanaians live in poverty, and the country is classified as a lower-middle-income nation (Poku-Boansi et al., 2020). This remains the case despite various efforts by successive governments to grow the economy and alleviate poverty among the population. These efforts include joining the Heavily Indebted Poor Countries (HIPC) initiative in 2004 and redenominating the currency in 2007. The aim for joining the Germany-initiated HIPC platform was to ensure the cancellation of most of its debt although borrowing has since been encouraged almost unabatedly leading to a situation where the country's current debt-to-GDP is now in the region of 80% (WDI, 2022). The currency redenomination was also undertaken to enhance the value of the local currency and to reduce inflationary pressures.

Historically, the Ghanaian economy has seen various attempts to open up in order to address the distortions caused by the implementation of restrictive trade policies. The issue of trade liberalisation in Ghana can therefore be traced to the involvement of the Bretton Woods Institutions of the IMF and the World Bank which were actually brought in to help put the country on the path of growth although records indicate that the then government of Prime Minister Kofi Abrefa Busia actually started the adoption of market-based policies in the late 1960s (Asiedu, 2013). The Structural Adjustment Programme introduced by these multilateral agencies aimed at economic recovery for the Ghanaian economy beginning from the early 1980s in which policy direction was offered by the IMF and the World Bank provided the relevant financing to go with it (Heidhues & Obare, 2011). As part of this, the various import restrictions were either reduced or completely removed in order to open up the economy to the outside world. Liberalisation was thus seen on the foreign exchange, export and import fronts whereby the quantitative controls were removed with exporters no longer required to submit their foreign exchange receipts to the central bank and tariffs adjusted downwards (Asiedu, 2013).

Trade liberalisation could be said to have brought a lot of rewards to the country in which there have been huge inflows of capital helping the country to ultimately attain the status of the fastest growing economy worldwide in the year 2011 (WDI, 2022). According to the World Bank, in its early years, imports and exports increased from $712.5 million and $773.4 million in 1986 to $1.73 billion and $1.2 billion, respectively, by the early 1990s due to the liberalisation of the import and export sectors. During the same period, real GDP grew at an average rate of around 4%, while inflation decreased to approximately 30%.

In terms of the current country statistics, Ghana as a stable democracy in a region of highly volatile political uncertainty is the second most populous nation in West Africa with an estimated population of nearly 32 million that grows at 2.1% every year (WDI, 2022). The labour force participation rate stood at 68.4% in the year 2021 with an average unemployment rate of 4.7%. The country's nominal GDP for the year 2021 was $74.26 billion making it the 75th largest economy globally with a growth rate of 5.36% up from the low value of 0.51% recorded in the previous year following the ravages of the Coronavirus pandemic. Current total export and import values respectively for 2021 were $23.21 billion and $22.13 billion and inflation has averaged 16% over the past quarter of a century (WDI, 2022). Ghana also has a life expectancy at birth of 64 years.

4.4 The economy of Bangladesh in perspective

Bangladesh gained independence from neighbouring Pakistan in 1971. Like many newly independent states, it embarked on an import substitution programme to produce goods and services domestically for its population (Mohajan, 2013). A reduction in imports was a major priority for the new government since it had the potential to reduce the country's balance of payments deficits and make efficient use of limited foreign exchange while at the same time protecting local industries to attain economic self-sufficiency (Raihan, 2008). Under the import substitution policy, high import tariffs were put in place along with other restrictions on the quantity of goods imported. There was also a deliberate over-valuing of the local currency (taka) with the amount of foreign currency available to importers being rationed (Raihan, 2008). As seen in many countries that adopted this strategy, the policy brought significant challenges to that Asian nation, leading to distortions in various economic indicators.

The economy of Bangladesh has equally been very much basic with agriculture the mainstay of that economy. This is not surprising, as more than half of the population resides in rural areas and is largely unskilled, primarily engaged in producing the main staple crop, rice. Out of the eight countries in the region of South Asia, Bangladesh is the second largest economy although it is still very much a developing country that has a very high population density (Mohajan, 2013). Nearly a third of Bangladeshis are classified as poor and most of them take to migration to escape the economic difficulties in their home country (Mohajan, 2013). With huge numbers of the indigenes travelling abroad, their remittances have become a key source of revenue for the local economy. For example, in the year 2021, more than $22 billion was remitted back home by Bangladeshis, making the country the eighth highest remittances receiving nation in the world (WDI, 2022). Economic growth in Bangladesh hanged around 5.8% between the period 1994 and 2021, although it is on course to grow even a bit faster in the succeeding years after the global pandemic. The main economic sectors in Bangladesh include textiles, jute, pharmaceuticals, plastic and electronics, and the European Union, USA, India, Canada and Japan are the main countries into which it exports.

Trade liberalisation has also been implemented in Bangladesh as part of an overall agenda of economic reform to correct the self-imposed difficulties associated with the policy of import substitution. This was initiated as part of the Structural Adjustment Programme that was initiated in that country in 1987 by the IMF and the World Bank. To meet the requirements for the SAP loans from the World Bank, reforms were instituted regarding state ownership of industries, fiscal and exchange rate controls, monetary policy formulation and overall trade to attract more foreign inflows (Raihan, 2008). As part of the liberalisation drive, the unweighted average tariff rate was drastically reduced from more than 70% to 13.5% from the early 1990s to the mid-2000s, and tariff quotas, seasonal tariffs and variable import levies were abolished (Raihan, 2008). Key incentive schemes were introduced to boost exports, including reduced interest rates, tax exemptions on the importation of essential production equipment, cash subsidies, and exemptions from the payment of value-added tax and other excise duties.

With regards to the current country statistics, Bangladesh is a country with a very huge market in terms of size of population with a current estimated population of more than 160 million which grows averagely at 1% per year, with a labour force participation rate of 56% and an unemployment rate of 4.2% (WDI, 2022). The country is the 35th largest economy globally, with a nominal GDP of $460.76 billion. In purchasing power parity terms, its GDP is $1.36 trillion, making it the 25th largest economy in the world (WDI, 2022). GDP per capita is nominally $2,734 (or $7,985 in terms of PPP measurement). The country's total exports for year 2021 stood at $52.1 billion while the import figure for that same period was $82.5 billion, largely made up of petroleum products, machinery and equipment, food items and chemicals from China, India, Singapore and the EU. The public debt-to-GDP stood at 40.7% with an outstanding external debt in excess of $72 billion for the 2021 fiscal year.

4.5 Export processing zones and global trade protocols

In theory, export processing zones are not subject to any international trade rules. This is because there is no single international regulator that monitors the zones to formulate laws for their implementation. They are not even made mention of in any World Trade Organisation agreements and neither have they been subjected to any form of WTO dispute settlement (Creskoff & Walkenhorst, 2009). No wonder there are no internationally available data on the operations of the zones coupled with the lack of consensus even in the nature and definition of the concept, making any form of programme comparison very challenging. That notwithstanding, in order to ensure fairness in global trade and to promote the welfare of those employed in the zones across the world, the WTO and the International Labour Organisation keenly track activities in the world's zones. The WTO rules aim to create a transparent system of international trade. Member states are expected to adhere to disciplines that typically prohibit the use of trade restrictions to gain undue advantage over others, except in the case of negotiated tariffs (Cottier, 2015; Creskoff & Walkenhorst, 2009).

Of all the laws of international trade enacted by the WTO, the Uruguay Round Agreement on Subsidies and Countervailing Measures (SCM) (Act 3.1(a)) is the most relevant one that affects the operations of EPZs (Waters, 2013). A countervailing measure is simply an action that one country takes concerning imports notably through the use of increased duties to offset subsidies offered to producers in a country from which it imports (Creskoff & Walkenhorst, 2009). The SCM rules primarily focus on the issue of subsidies, specifically export subsidies provided to producers in member states based on their export performance. The SCM defines a subsidy as a financial contribution in the form of income or price offered by a government or a public body whose intention is to confer some sort of benefit to the recipient (Creskoff & Walkenhorst, 2009). The following are some of the measures according to Act 3.1(a) that constitute export subsidies:

- A direct subsidy that is contingent on export performance offered to a firm or an industry
- Exemptions, remissions or deferrals of direct taxes in relation to exports
- Favourable transport arrangements and charges for exporters compared to what pertains in the domestic market
- Currency conservation and other schemes that involve a benefit on exports
- Special tax deductions in relation to exports above what is given to those who produce for the local market
- Provision of goods and services for exporters on more advantageous terms than what is offered producers of similar products domestically
- Indirect tax relief for producing and distributing export products above what is charged on goods produced, distributed and consumed locally.

Gleaning from the above, it is very much obvious that export processing zones are in direct contravention of WTO rules and hence WTO member countries that host such zones are evidently in breach of international rules regarding trade (Waters, 2013). This is because many of the incentives provided to zone operators are, in fact, based on their export performance. However, these WTO rules mainly apply to member states and since most EPZs are privately owned and operated, they are largely unaffected by the rules. That aside, in the year 2007, there were exemptions given to member states with GNI below $1,000 (measured in 1990 dollars) with ad hoc extensions given to developing countries that did not qualify based on the GNI criterion (Waters, 2013). This is why although many advanced nations host one form of export processing zone or the other, they are not even recognised by international bodies or experts. However, all the exemptions and extensions were phased out in the year 2015 and hence the need for reforms regarding the operation of zones. Although some countries since that deadline have successfully brought in the needed changes in their respective zone programmes to make them WTO-compliant, others are still struggling with the issue of compliance (Waters, 2013).

In the case of Ghana and Bangladesh which are two key members of the WTO, they both qualified for exemption from the rules prior to 2015 but since they are still members of the trade body and also host EPZs, rules put in place by WTO very much affect them (Creskoff & Walkenhorst, 2009). What they can do in order not to be seen to be flouting international law is to continue to privatise their zones while capitalising on the existing WTO rules that still permit the giving of certain incentives to producers. They can also make use of the negotiated tariffs platform that is open to member countries. This is because the critical issue not just for the two countries, but for all DCs operating EPZs is the fact that they cannot phase out their programmes but the sustainability of the policy will very much depend on their ability to reform so as to obtain the maximum benefits from their zones. In fact, the zones, employing nearly 3% of the global workforce cannot go extinct; at worse, they can only contract.

4.6 Export processing zones and preferential trade

Throughout the history of mankind, well-resourced individuals have tried to assist the less-privileged. This can also be seen at the international level where most wealthy countries attempt to assist poor nations to bring them up by way of economic development. There have therefore been various preferential trade arrangements (PTAs) to give opportunity to less-endowed countries to access the markets of those that are well-off. One such key trade arrangement was established by the United States government in 1974 with the passage of the Trade Act that brought into being the Generalised System of Preferences (GSP). The GSP is the largest and oldest PTA by the U.S. government and came into full force on 1st January 1976 (Jones, 2017). It offers duty-free treatment for goods entering the U.S. market from some 119 countries with the ultimate aim of providing such countries the opportunity to grow (Williams, 2015). Ghana has since been a beneficiary of this platform although same cannot be said of Bangladesh.

Since its inception, the GSP has been re-authorised more than ten times with the majority of it having retrospective effect and the last authorisation expired on 31st December, 2020 (Gresser, 2023). The GSP gives preferential treatment to more than 3,500 products from eligible beneficiary countries. Although it is a non-reciprocal trade arrangement, the U.S. benefits from it through the importation of less expensive inputs while at the same time promoting Western values including the protection of intellectual property rights, rule of law and the defence of the rights of workers (Williams, 2015). It also ensures that the key inputs used in the manufacture of those exports are from the U.S. or at least from other beneficiary states. Developing countries also benefit from better state institutions and policies while at the same time growing their economies through the exportation of their products on a duty-free basis to the world's most advanced market (Williams, 2015).

Aside from the U.S.-initiated GSP platform, Ghana is also a signatory to other trade agreements including the Economic Community of West African States (ECOWAS) protocol, the African Continental Free Trade Area, and also has a bilateral Economic Partnership Agreement (EPA) with the European Union as well as an Interim Partnership Agreement (IPA) with the United Kingdom. For its part, the People's Republic of Bangladesh has GSP arrangements with Australia, Canada, Japan, New Zealand, Russia, the U.K. and the E.U. as well as duty-free treatment with China and South Korea for being a least-developed country (LDC). It has also signed up to various regional trade agreements (RTAs) namely the Asia Pacific Trade Agreement (APTA), the Agreement on South Asian Free Trade Area (SAFTA), South Asian Preferential Trade Arrangement (SAPTA) and the Global System of Trade Preferences (GSTP) among developing countries. The government is also in the process of developing new policy guidelines on preferential trade as most of the existing duty-free export privileges are expected to be lost particularly as it is expected to pass its U.N. status as a least-developed country by the year 2024 (Raihan & Ashraf, 2017).

Apart from the half-a-century old GSP programme, another relatively new trade protocol that has been formulated by the government of the United States is AGOA. Although it is meant for only the African region, AGOA is an enhancement on the GSP and adds about 1,500 products to the GSP list including textile for the first time (Williams, 2015). It is a Clinton-era trade arrangement that was enacted by the Congress of the United States on May 18, 2000 to encourage export-led growth on the African continent while at the same time strengthening commercial ties between the USA and SSA (Williams, 2015). There are currently 36 eligible countries on the platform with its current re-authorisation expected to expire on 30th September, 2025.

In the first eight years of its passage, AGOA enhanced the volume of trade between Africa and America, registering a figure of \$66.3 billion from its previous \$8.15 billion. Although only 1% of total U.S. imports is from Africa most of it made up of oil from Nigeria and Angola, there is evidence to the effect that the implementation of AGOA has led to an overall upsurge in the share of African exports especially apparel to the U.S. (Didia et al., 2015). Most of these textiles are also from the export processing zones in Africa with, for example, Madagascar timing the setting up of its *Zone Franche* to coincide with AGOA's implementation to export its mainly garment output (Gibbon et al., 2008). Other countries such as Kenya, Lesotho and Ghana have all benefitted from the exportation of EPZ garments to the U.S. In the case of Ghana, about 92% of all its exports to America enter that country through the AGOA platform.

In all, AGOA has been of enormous benefit to Africa, creating a lot of employment for the people while propelling growth (ACET, 2021). It is however criticised on the grounds of being non-reciprocal while at the same time imposing a lot of restrictions regarding the origin of inputs (Williams, 2015). Also, most of the textiles produced for export to the U.S. require only low skill and hence not much is made by way of skill development for Africans. However, in order to build on AGOA and other already existing U.S. initiatives such as Prosper Africa and Power Africa, the U.S. at its summit with Africa in December 2022 pledged \$55 billion over a three-year period to support the growth effort in Africa. It is also set to sign a memorandum with AfCFTA to unlock new trade and investment opportunities.

4.7 General worldview on export processing zones

There are varied opinions worldwide regarding the impact of EPZs in the developing world. Governments, economists, researchers and international organisations proffer differing views on the operations of EPZs. In the case of governments in emerging countries that struggle constantly to balance their national budgets, they predictably see the EPZ policy as a good and timely tool to employ to help them develop their countries. Due to the perceived benefits associated with EPZs such as the expansion of the export sector to rake in more foreign exchange, creation of employment for the youth, attraction of badly needed foreign capital, technology transfer among others, these governments virtually see EPZs as a saviour (Graham, 2004; Wang, 2013).

As a result of this, a lot of resources are channelled into the provision of vital services to attract investment into the zones as countries continue to compete fiercely for external inflows. These services constitute the vastly generous incentives that are offered to investors geared towards reducing the cost of undertaking business (Angko, 2014). Since these government-initiated subsidies are very much expensive, people then question the notion held by governments regarding the effectiveness of the policy as such resources could be directed elsewhere in the economy. In other words, the benefits could actually be far more expensive than citizens are being made to believe.

On the other hand, most economists display a lot of pessimism about EPZs (Engman et al., 2007). Although they actually struggle to obtain any up-to-date data to conduct meaningful studies and especially do cross-country comparisons, the cursory assessments from the operation of most zones have not given the world's economists any room to be hopeful about EPZs. The source of the pessimism for the economists is simply the way the zones are treated. That is, the zones are usually offered the generous trade incentives in the name of trade liberalisation while in actual fact the larger economy is left unattended to (Kinunda-Rutashobya, 2003). In other words, the zones are almost regarded as an economy within an economy in which the conditions that pertain in the zones usually differ from what exist in the wider economy. While infrastructure for example in the zones is superior and entities in the zones enjoy huge tax exemptions, similar producers elsewhere in the economy have to grapple with difficulties regarding issues like electricity, water, roads among others aside having to pay exorbitant taxes in most EPZ countries. Such an arrangement is what does not make the policy more impactful, thus the need for a broader and a more comprehensive opening up of the whole economy to benefit all producers in all sectors (Quaicoe et al., 2017).

Connected to this is the idea of sub-optimality attached to export processing zones. This is similar to the pessimistic view of economists in which it is argued that EPZs are a sub-optimal policy in the sense that it only confers advantages on a few while at the same time distorting the allocation of limited resources (Engman et al., 2007). The advantages here are the popular incentives to attract firms into the zones which make operators enjoy better services in comparison to producers elsewhere. There is also a distortion in zone operation since resources are directed to places where they may not be put to an optimal use. This happens as a result of the belief held by governments that businesses in the zones perform better than firms outside the zones. The argument here therefore is the need for a better policy for developing countries that offers all producers equal opportunities through a proper agenda of a more systematic and robust economy-wide liberalisation.

Again, there is also a negative view of export processing zones in relation to labour issues, stemming from the fact that in most EPZ countries, labour codes in the zones differ from what exist in the rest of the domestic economy (Cirera & Lakshman, 2017). This is why a lot of national and international bodies especially the International Labour Organisation fault EPZs because of poor treatment of workers. Some of these labour issues concern working conditions, wages, health and safety of workers, unionisation, etc. With the different labour laws in the zones which are mostly more flexible in most cases, employers usually engage the services of young women for their very dexterous nature which is more suited to the generally repetitive work in the zones, and who also tend to be more disciplined relative to their male counterparts and are often prepared to accept lower wages without bothering about union issues (Cirera & Lakshman, 2017). These factors invariably lead to abuses in some zones where even basic conditions to promote the welfare of workers are usually non-existent. It thus comes as no surprise that most EPZs have a very high labour turnover ranging from 5% to 10% every month.

Also, in terms of the general efficacy of the EPZ policy, there is a divided opinion based on various studies carried out in various contexts. Some argue that the policy is a good one while others have an opposite view based on results from their studies. Most of the differences emanate from the incentives offered investors. Li (2015) for example argues that investment promotion that is based on generous tax incentives is not effective. Overall however, the incentive scheme seems to be similar across the developing world but the benefits thereof have differed (Gibbon et al., 2008). Whilst the zones have also been generally successful in some countries, same cannot be said of others. The approaches used by researchers have also been a cause of the divergence in opinion with most studies conducted along the neoclassical and cost-benefit lines arguing against EPZs while those that have centred on the new growth theory have argued otherwise.

4.8 The Ghana Free Zones programme: An overview

4.8.1 Establishment, goals and composition of the Ghana Free Zones Authority

Ghana's free zones programme traces its roots to the trade liberalisation agenda that was embarked upon during the 1980s (ACET, 2021). The idea was however firmed up in the mid-1990s with the setting up of the Ghana Free Zones Secretariat which metamorphosed into the Ghana Free Zones Board and now Authority. The Parliamentary Act (Act 504), as amended, is the legislative instrument that provided the foundation for the establishment of zones in Ghana. This Act was passed in 1995 and it came into full effect the following year.

Having achieved some appreciable level of openness occasioned by the dictates of the adjustment programme, and to capitalise on the strategic location of the country within the West African sub-region, the government passed the Ghana Free Zones Act with the aim of seeing to the setting up of free zones in the country to promote economic development (GFZA, 2022). This goal of capitalising on the generally untapped West African market with an estimated population of more than 400 million people has since been further boosted by Ghana's enrollment in the AGOA platform. The goal of economic development envisaged in Act 504 is to be seen through the attraction of foreign inflows, employment creation, skills training, diversification of the export sector and the generation of foreign exchange (GFZA, 2022).

The Ghana Free Zones Authority is run by a nine-member board that is chaired by the Minister in-charge of Trade and Industry (GFZA, 2022). The nine members are appointed by the President acting on the advice of the Council of State. However, in terms of the day-to-day operations of the Authority, it is handled by the Chief Executive Officer (CEO). The administrative headquarters of the Authority is in Accra. The Authority as part of its mandate also offers various services to investors including providing investment information, issuing licences to free zones enterprises, providing facilities such as serviced land and utilities in the zones and assisting investors to secure permits from other governmental bodies (GFZA, 2022).

4.8.2 Incentive package for free zones firms in Ghana

The Republic of Ghana as a country is generally regarded as a stable democracy, and coupled with its abundant natural resources, the government tries to attract foreign inflows into the various sectors for which the country is comparatively advantaged thereby making the nation the gateway to West Africa. Aside from the political stability and the availability of abundant natural resources, the country also has a competitive edge over many of its peers in terms of high-quality labour force, the existence of a vibrant industrial base, progressive private sector participation in economic activity, excellent sea and air connections to the rest of the world, a competitive wage rate together with the fact that it is now the headquarters of the African Continental Free Trade Area (Anarfo et al., 2017).

In terms of the specific issue of attracting investment into Ghana's free zones, Act 504 offers vastly generous fiscal and non-fiscal incentives to investors. According to the Ghana Free Zones Act (Act 504), the fiscal incentives include:

- Tariff-free import of inputs and export of products
- A complete exemption from income tax payment for a ten-year period which shall not exceed 15% afterwards
- A 100% waiver from the payment of withholding taxes on dividends
- Honouring of double taxation agreement for investors and employees originating from countries with which Ghana has such an agreement
- Non-requirement of import licensing for free zones firms.

The non-fiscal incentives on the other hand include:

- 100% ownership of firms by foreigners or nationals
- No restrictions on repatriation of dividends, net profit, payments from technology transfer agreements or proceeds from sale of free zones entities
- Unhindered ability to run foreign currency accounts with local banks
- Assurance against nationalisation and expropriation of investment
- Freedom to sell up to 30% of output on the domestic market.

Free zones firms take advantage of the above incentives to locate in one of the four priority sectors of the scheme. The sectors include manufacturing, service, commercial and developer (GFZA, 2022). Also, in line with its abundant natural resources, various investment opportunities are promoted under the Ghana Free Zones programme such as agro-processing, ICT, petrochemicals, textile manufacturing, seafood processing, light industry/assembling plant, pharmaceuticals, jewellery production among others.

4.8.3 The zones in Ghana

In principle, a free zones firm in Ghana does not necessarily have to be sited in a particular zone. In other words, investors have the freedom to establish their businesses anywhere in the country and still be classified as free zone entities, provided they meet the basic requirement of exporting approximately 70% of their production. To this end, the country has two main schemes relative to its free zones programme – the single-factory location and the enclave schemes (GFZA, 2022). The single-factory location scheme permits investors to operate in any part of the country usually to capitalise on the availability of local raw materials to produce for export. Whilst promoting commercial activity, the aim for both types of schemes is to vary the country's exports by especially enhancing the share of manufactured goods.

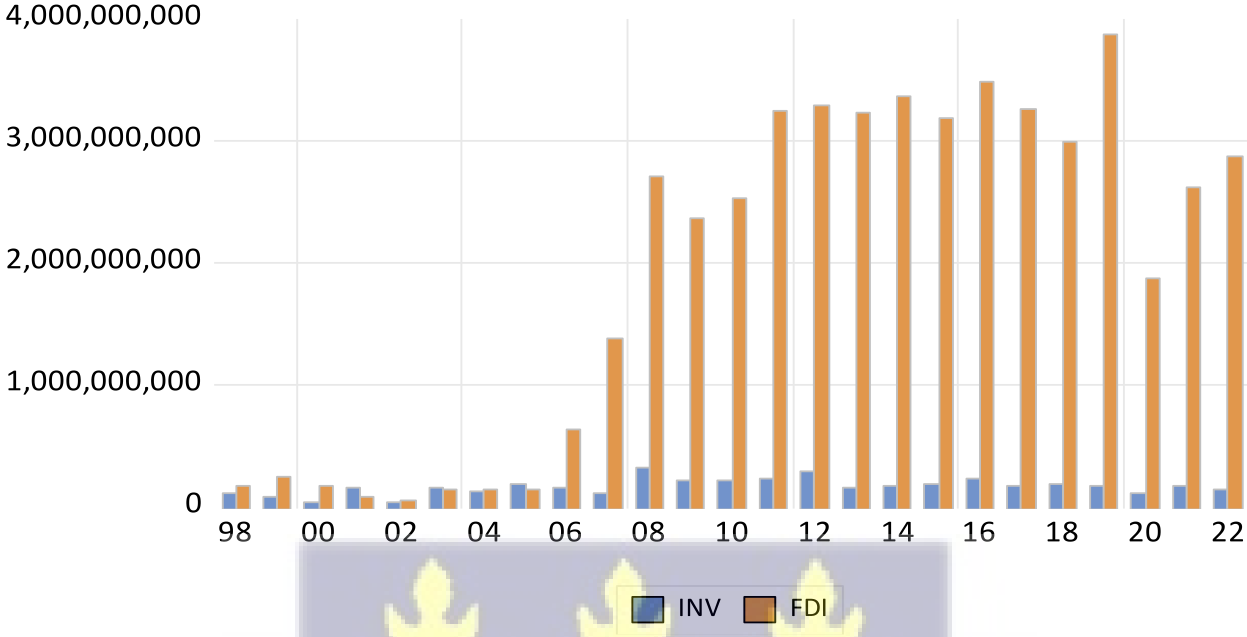
With the enclave scheme, there are in all four zones in Ghana. These are the Sekondi Industrial Park, Ashanti Technology Park, Shama Industrial Park and the Tema Export Processing Zone (TEPZ) (GFZA, 2022). Both the Sekondi and Shama industrial parks are located in the Western Region of Ghana, with Sekondi being Ghana's second port city. The Sekondi Industrial Park has a railway line connection to the port and it has a total land area of 2,200 acres. Its purpose is for heavy and light industrial manufacturing and warehousing. The Shama Industrial Park on the other hand is situated on a 2,800-acre land and it is just about two kilometres from the Takoradi Port. It is also reserved for oil and gas activities. In the case of the Ashanti Technology Park, it is situated in Boankra which is only about twenty kilometres from Kumasi which is the capital of the Ashanti Region of Ghana. It is earmarked for economic activities such as cocoa processing, light and heavy industrial manufacturing, Information and Communication Technology and bio-technology development. It has a land area of 1,099 acres and is adjacent to Ghana's proposed inland port. However, all these three Ghanaian zones are not fully operational and investors are still being sought for them (Quaicoe et al., 2017).

The Tema Export Processing Zone is therefore the main enclave scheme run by the Ghana Free Zones Authority in the sense that it is very much fully functional and boasts of about a quarter of all free zones firms in Ghana (GFZA, 2022). It is located in Ghana's main industrial city of Tema which is only 24 kilometres from the Kotoka International Airport in Accra, linked by a very good road network. As an industrial hub which has Ghana's largest seaport, the city of Tema also boasts of a large pool of skilled manpower. The total land area for the TEPZ is 1,200 acres and is well-serviced with electricity, water, telecommunication and central sewage system.

The TEPZ actually started as a World Bank funded project to help expand Ghana's manufactured exports. Its ideal location makes it conducive for the production of manufactured goods as the city itself has the highest concentration of Ghana’s industrial enterprises. To facilitate the ease of doing business, the Tema enclave is also fully supported by the agglomeration of various governmental institutions including the Customs Excise and Preventive Service (CEPS), Environmental Protection Agency (EPA), Immigration Service, Internal Revenue Service (IRS) and the Ghana Police Service among others (GFZA, 2022).

There are about 495 firms in operation under the Ghana Free Zones programme. About 80% of these entities are into manufacturing with the rest operating either in the service sector or as enclave developers (GFZA, 2022). The developers privately develop the zones in Ghana including seeing to the provision of the relevant infrastructure for a fee through rent payment by the free zones companies. Out of all the free zones firms in Ghana, 38% are owned by expatriates while 31% are owned by Ghanaians. Another 31% are jointly owned, an indication of a very high domestic ownership of firms leading to a high retention of foreign exchange in the local economy (ACET, 2021). Agro-processing, oil and gas, textile, ICT, pharmaceuticals and jewellery production are some of the key priority areas in Ghana’s zones (GFZA, 2022).

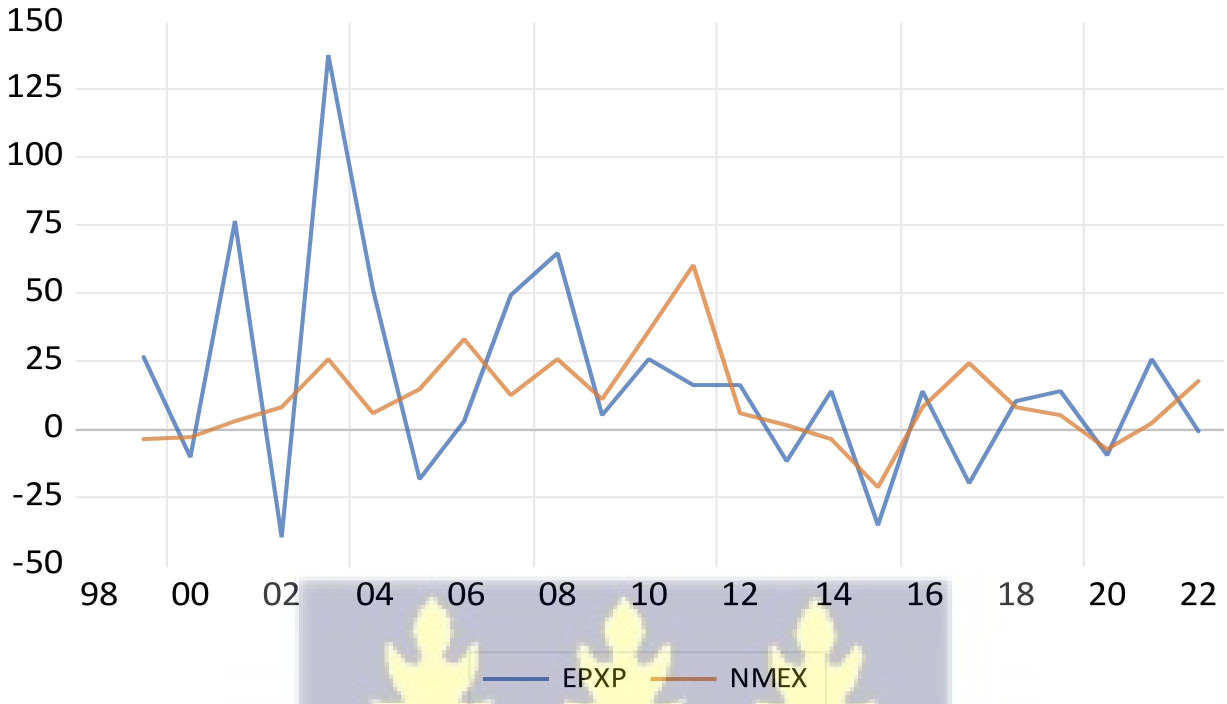
Figure 4. 1 A graph of free zones investments and total foreign direct investment into Ghana



Source: WDI (2022) and GFZA (2022)

Figure 4.1 depicts the relationship between investments made in the various free zones in Ghana (INV) over the 1998-2022 period as against all foreign direct investment inflows (FDI) into the country. During that period Ghana attracted a total of $4.15 billion in investments made up of both foreign and domestic capital into its free zones whilst overall inflows into the rest of the Ghanaian economy amounted to $48.08 billion. This means the share of all inflows into the various zones only accounted for just about 8% of Ghana's total foreign direct investments over the study period.

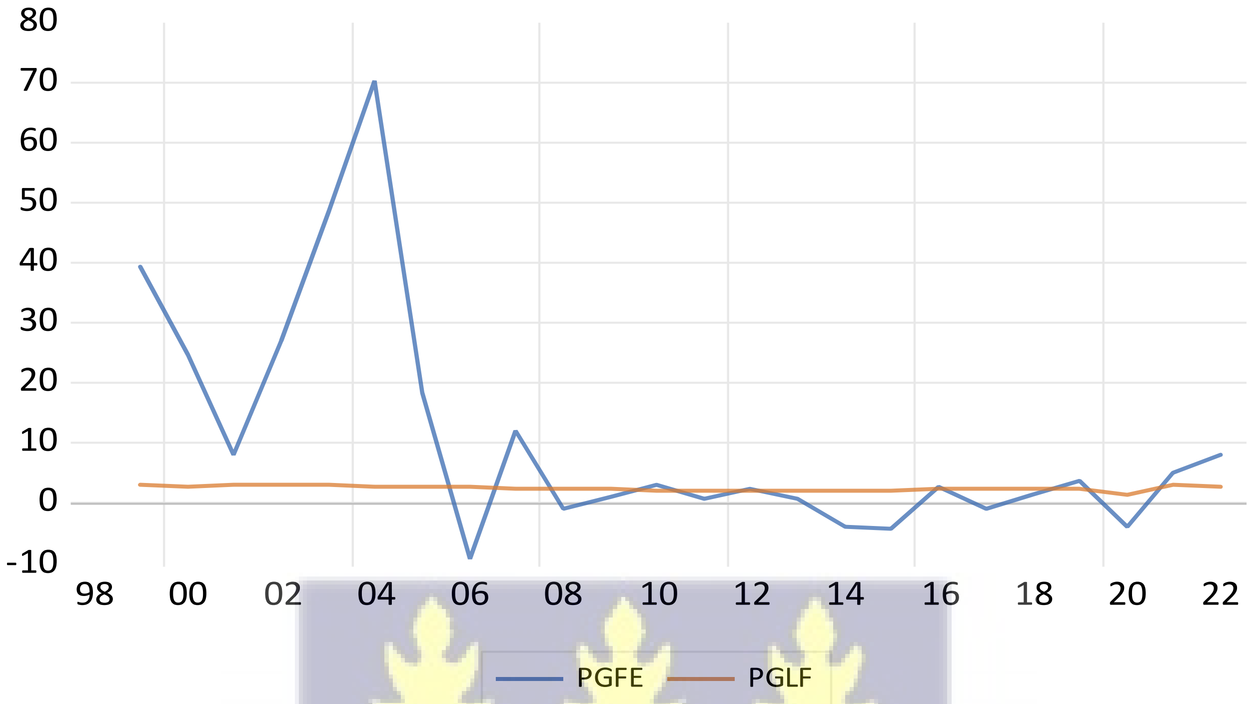
Figure 4. 2 A graph of free zones exports and Ghana's total merchandise exports



Source: WDI (2022) and GFZA (2022)

In Figure 4.2, the relationship between all exports made from Ghana's free zones (EPXP) and the country's total merchandise exports (NMEX), all in terms of annual percentage growth, is succinctly displayed. Between 1998 and the year 2022, all free zones companies in Ghana made a combined total export of \$30 billion, with an average percentage growth rate of 16.74%, compared to the overall national export figure of \$209 billion from the rest of the economy which also averaged 11% per annum. Thus, compared to the national figure, free zones exports accounted for 12.55% of all merchandise exports from Ghana over the study period.

Figure 4. 3 A graph of free zones employment and total labour force in Ghana



Source: ILO (2022) and GFZA (2022)

Figure 4.3 above illustrates the relationship between employment in Ghana's free zones (PGFE) and the total labour force of the country (PGLF) from 1998 to 2022, measured by their annual percentage growth rates. During the period, Ghana's free zones averagely employed 24,203 workers, with an average annual growth rate of 10.65% while the average total labour force was 11,085,376, also growing averagely at 2.53%. Overall, the free zones in Ghana averagely employed 0.22% of the total labour force. It is noteworthy that only 2% of all free zones employment is held by foreigners. Interestingly, however, this relatively small workforce in Ghana's free zones contributes to more than 12% of the country's total exports.

4.9 The Bangladesh Export Processing Zones programme: An overview

4.9.1 Establishment, goals and composition of the Bangladesh Export Processing Zones Authority

With the need to open up the country of Bangladesh following the acceptance of liberal trade policies in the 1980s, the government sought to industrialise the economic base of the country to engender growth and development. The Bangladesh Export Processing Zones Authority (BEPZA) was established as the primary government body responsible for attracting export-oriented firms to operate within the country's zones (BEPZA, 2022). BEPZA holds the sole responsibility for creating, developing, operating, and managing the zones in Bangladesh (BEPZA, 2022). The Bangladesh Export Processing Zones Authority derives its powers from Act No. 36 of 1980.

The ultimate goal for the establishment of BEPZA is to promote national economic development in Bangladesh. This is envisioned in a rigorous industrialisation agenda hinged on an open-door policy adopted by the government. To achieve the broad aim of economic development, BEPZA hopes to increase the volume of both foreign and domestic investment, create employment, generate foreign exchange through the expansion and diversification of the export sector, promote the transfer of technology and skill development among others (BEPZA, 2022).

The Bangladesh Export Processing Zones Authority is placed directly under the Prime Minister of the People's Republic of Bangladesh who chairs it but the day-to-day management of the Authority is however in the hands of the Executive Chairman who is the Chief Executive Officer (BEPZA, 2022). The head office of the Authority is situated in Chittagong. As part of the Authority's efforts to fulfill its mandate, the Bangladesh Export Processing Zones Authority Act, 1980 mandates it to provide various services to investors. Some of these services include the granting of permit for the setting up of an EPZ industry, allotment of fully-serviced plots to investors, issuance of work permits for foreigners, granting of import/export subsidies, provision of utilities and security and other administrative support services among others.

4.9.2 Incentive package for export processing zones firms in Bangladesh

With an estimated population in excess of 160 million, the Asian country of Bangladesh has a huge advantage in terms of market size for investors. There is therefore a vast pool of labour force for investment purposes coupled with a hugely competitive wage rate. The country also holds a competitive advantage in agriculture, particularly in the production of jute. Aside from its vast population, its prime location in South Asia with a total population of nearly 2 billion makes it an attractive investment destination for many foreign investors (Wijoyo & Cahyono, 2020).

Just like many other export processing zones in the developing world, BEPZA offers both fiscal and non-fiscal incentives to potential investors. The fiscal incentives offered by BEPZA according to Act No. 36 include the following:

- Duty-free import of inputs and export of finished goods
- Exemption from multiple taxation
- Tax holiday of between 5 to 7 years
- Immunity from dividend tax during the tax amnesty period
- Exemption from import duties for machinery, equipment and construction materials.

The non-fiscal incentives also include the following:

- 100% ownership of firms by foreigners or locals
- Freedom to operate foreign currency account locally
- Ability to contract foreign currency loan under the Off-Shore Banking Unit (OBU) facilities

- Non-resident Foreign Currency Deposit (NFCD) granted to "A" type investors (i.e. 100% foreign-owned entities).

While taking advantage of the various subsidies, EPZ firms in Bangladesh are encouraged to go into certain priority economic sectors. These include textile, agro-processing, chemicals, pharmaceuticals, jewellery, electronic products among many others. The zones in Bangladesh also have different labour laws from what exist in the rest of the domestic economy.

4.9.3 The zones in Bangladesh

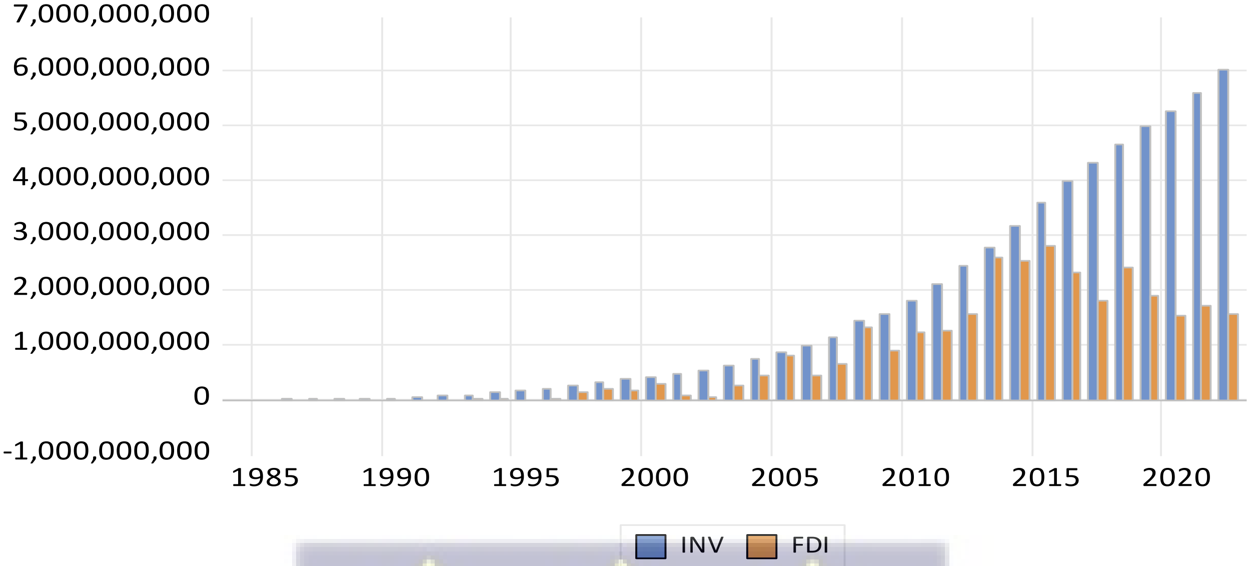
There are currently eight operational zones under the Bangladesh Export Processing Zones Authority. These zones are of different sizes and distances from the main port city of Chittagong. They were also set up at different time periods. The eight zones are the Chattogram Export Processing Zone, Dhaka Export Processing Zone, Adamjee Export Processing Zone, Cumilla Export Processing Zone, Ishwardi Export Processing Zone, Karnaphuli Export Processing Zone, Mongla Export Processing Zone and Uttara Export Processing Zone (BEPZA, 2022).

The Chattogram EPZ was set up in 1983 making it the oldest zone in Bangladesh. It has a total land area of 453 acres and it is just about 3 kilometres from the Chittagong Sea Port and 8.2 kilometres from the international airport in Chattogram. The second oldest zone after Chattogram is the Dhaka EPZ located just about 35 kilometres from the city centre of Dhaka. It was established in the year 1993 and has a land area of 356 acres. It is also 304 kilometres from the Chittagong Sea Port. In the case of the Adamjee EPZ, it came into being in 2006 and has a size of 293 acres. It is also 15 kilometres away from the Dhaka city centre and 255 kilometres from the seaport in Chittagong. 1998 was the year of establishment of the Mongla EPZ, making it the third oldest zone in Bangladesh. It is 303 acres in size, 210 kilometres from the capital city of Dhaka and 407 kilometres away from the nation's main seaport.

The next zone, the Cumilla EPZ was set up in the year 2000 with a land size of 467 acres. It is 97 kilometres away from the Dhaka city centre and 167 kilometres from the seaport in Chittagong. The sixth zone, the Ishwardi EPZ is 220 kilometres from Dhaka and 484 kilometres from the port in Chittagong. It was established in 2001 with a total land area of 309 acres. The Karnaphuli EPZ on the other hand was set up in 2006 and has a land size of 209 acres. It is also only 6 kilometres from the Chittagong Sea Port, making it one of the most accessible by sea. The last zone, Uttara EPZ, was established in 2001 and spans 217 acres. It is 409 kilometres from the Dhaka Airport and 682 kilometres away from the Chittagong Sea Port, making it the farthest away from the seaport.

From the above, it is obvious that Bangladesh strictly employs the enclave type of EPZ scheme. The aim is to open up the various parts of the country through the process of industrialisation. As of the year 2022, some 1,200 entities were operating under the EPZ scheme in Bangladesh, and out of this number, 58% were foreign-owned, 28% locally-owned with the remaining 14% having joint ownership (BEPZA, 2022).

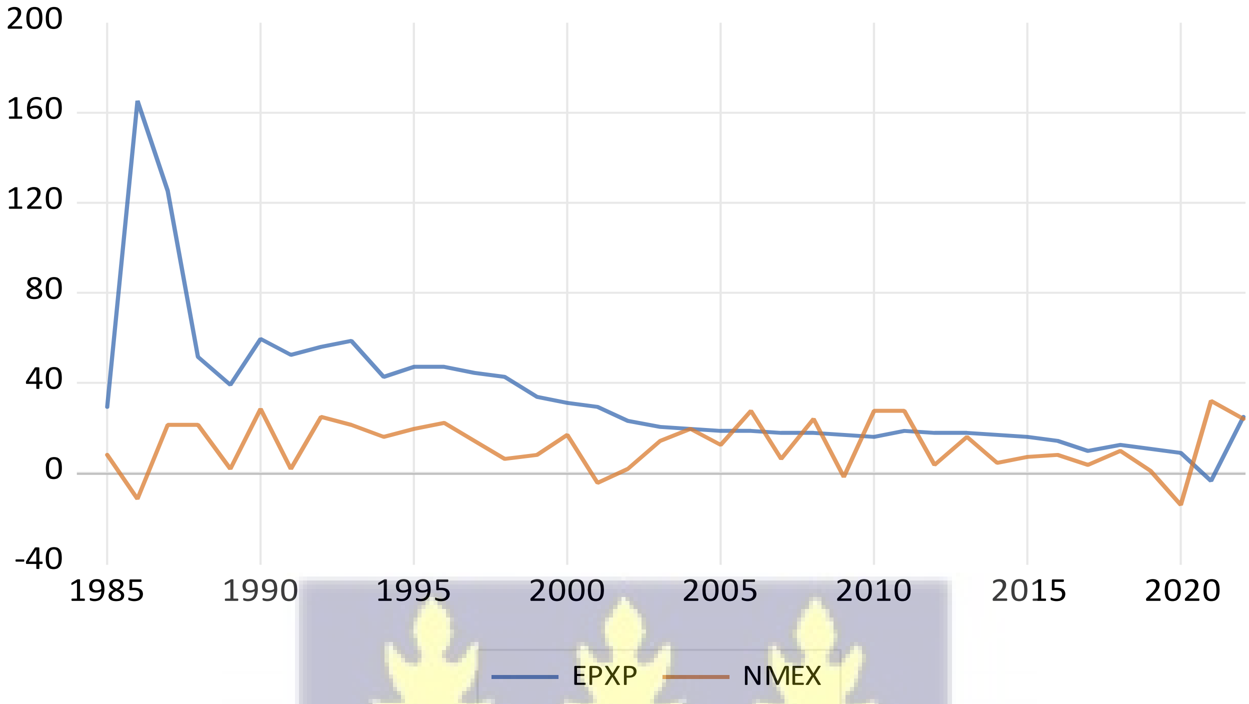
Figure 4. 4 A graph of free zones investments and total foreign direct investment into Bangladesh



Source: WDI (2022) and BEPZA (2022)

Figure 4.4 above is in relation to export processing zones activities in the country of Bangladesh. Specifically, it compares all investments made in that country's eight export processing zones (INV) to the total foreign direct investments (FDI) attracted into the rest of that country. Incidentally, investments in the zones were far more than the rest of the economy combined. A total of $61.50 billion was invested in the zones whilst overall FDI in the rest of the country only amounted to $31.20 billion. This means free zones investment in Bangladesh between 1984 and 2022 accounted for over 66% of all FDI into the country.

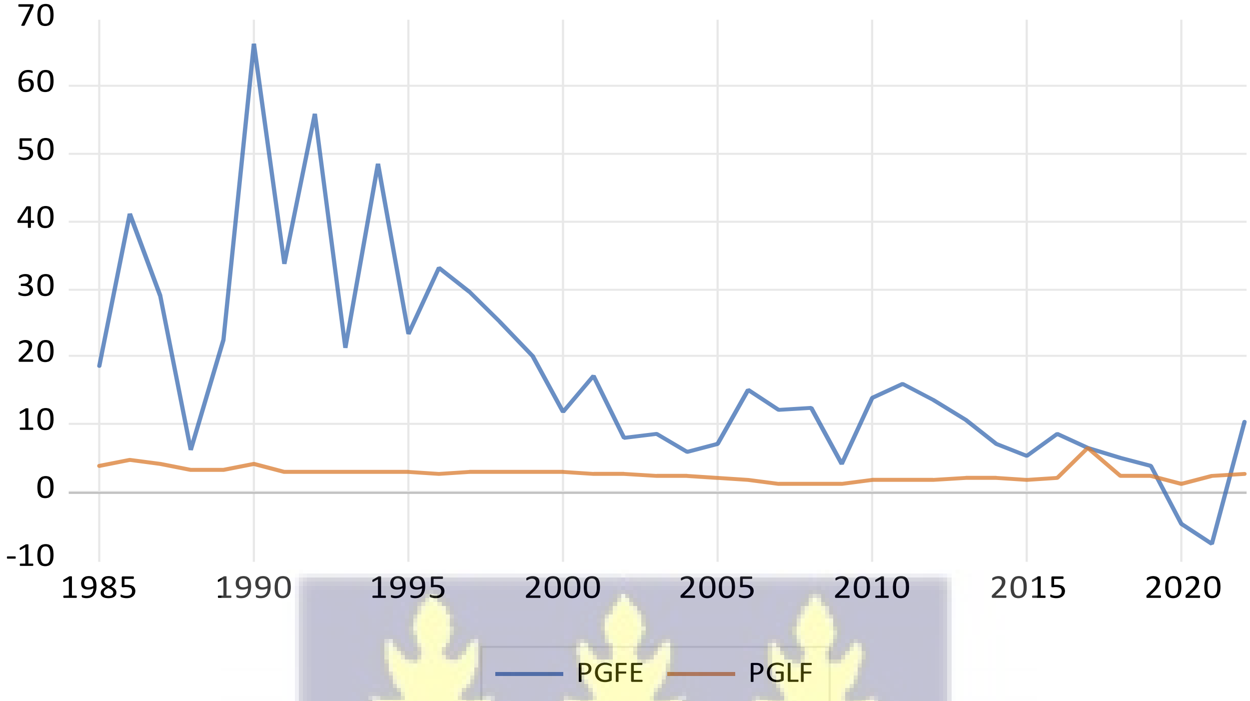
Figure 4. 5 A graph of free zones exports and Bangladesh's total merchandise exports



Source: WDI (2022) and BEPZA (2022)

Figure 4.5 on the other hand is a graph that compares exports from the free zones (EPXP) in Bangladesh to exports from the rest of the economy (NMEX). Again, quite obviously, and not surprisingly, total exports from the zones in Bangladesh were much higher than exports made from the rest of the economy, with the average annual growth rate in free zones exports being 33.50% and that of the national export figure being 11.91% per annum. Altogether, the firms in the various zones made a total export of $824.77 billion, against the $581 billion attributable to the remaining companies in the rest of the economy, giving a full export value of $1,405.77 billion. This means nearly 60% of total national exports emanating from Bangladesh originated from the country's export processing zones between 1984 and 2022. This is also to be expected as the zones largely play host to the country's famous garment sector which annually rakes in more than 80% of export revenue (BEPZA, 2022).

Figure 4. 6 A graph of free zones employment and total labour force in Bangladesh



Source: ILO (2022) and BEPZA (2022)

Similar to Figure 4.3 above, Figure 4.6 shows total employment in the export processing zones (PGFE) in Bangladesh against the country's total labour force (PGLF). The average employment in the Bangladeshi zones has been 188,055, with annual growth rate of 17.50% while the national labour force has averaged 50,206,398, also growing averagely at 2.56%. Thus, free zones in Bangladesh only employed 0.37% of the total labour force in that country including expatriates between the 1984-2022 period. Very curiously, however, this small fraction of the total workforce in Bangladesh is responsible for nearly 60% of all exports emanating from that Asian country.

4.10 Conclusion

Chapter four so far has detailed the context of this study. More specifically, this chapter has highlighted the characteristics of developing economies, with particular emphasis on Ghana and

Bangladesh, drawing attention to the trade liberalisation efforts undertaken by both countries. It has provided a detailed overview of the EPZ schemes implemented in these nations while also offering insights into the global perspective on EPZs and how this policy is addressed within the context of preferential trade and international trade regulations. The next chapter is the methodology of the study.

CHAPTER FIVE

METHODOLOGY

5.1 Introduction

This chapter deals with the broad methodology of the study. The chapter addresses issues related to the specification of appropriate models for each of the study's three objectives. It also covers stationarity tests, lag order selection, and cointegration tests. The chapter also highlights the various sources from which data were taken. It also gives a proper description of the nature and measurement of each of the variables used to achieve the objectives of the study.

5.2 Model specifications

This study seeks to analyse the overall economic impact of the relatively new but very popular trade policy tool of export processing zones on the development of two emerging nations – Ghana and Bangladesh. In line with this broad objective, the paper therefore adopts the vector autoregression model and its various modifications. This is mainly a time series analysis in which the characteristics of the two chosen countries are modelled separately.

Vector autoregression is simply a multivariate time series modeling technique that regresses variables on their lagged values (Sims, 1980). The VAR model dynamically describes the interrelationship among stationary variables allowing feedback between the variables in the model to occur (Sims, 1980). Since its introduction by Sims (1980), VAR has become a famous tool in modelling the characteristics of a series of variables with no such need for the strong constraints usually associated with the identification of underlying structural parameters. With VAR models, all the series are treated as potentially endogenous and they also have a very rich structure, unlike the univariate models where a series' value mainly relies on its past values or a combination of some white noise (Brooks, 2008). Again, VAR models are also preferable in the sense that relative to their out-of-sample forecasts, they are more accurate than the traditional structural models and afford policy implications and good structural inferences to be made.

The general form of a VAR model involving two variables (Y_t and X_t) can be presented as follows:

$$Y_t = \alpha_{10} + \alpha_{11}Y_{t-1} + \cdots + \alpha_{1p}Y_{t-p} + \delta_{11}X_{t-1} + \cdots + \delta_{1p}X_{t-p} + \mu_{1t} \qquad (5.1)$$

$$X_t = \alpha_{20} + \alpha_{21}Y_{t-1} + \cdots + \alpha_{2p}Y_{t-p} + \delta_{21}X_{t-1} + \cdots + \delta_{2p}X_{t-p} + \mu_{2t} \qquad (5.2)$$

where p is the lag order, t is the time dimension, the $\alpha's$ and $\delta's$ are the estimable parameters, and μ_t is the error term.

Before the VAR model is estimated, there is an urgent need to investigate the stationarity or otherwise of the chosen variables. A stationary variable is the one in which for every given lag, the mean, variance and covariance are all constant (Nelson & Plsosser, 1982). In case such a condition exists in which the variable is stationary, it is said to be integrated at level (i.e. I(0)) but where this condition is absent and the series becomes stationary only after first differencing, we say it is integrated of the first order (i.e. I(1)). If the series is stationary at level, we only perform an ordinary least squares regression using the levels data to obtain long-run estimates. However, in the case when the variables are integrated of the first order but are not cointegrated, we difference the series and run an unrestricted VAR to examine mainly short-run dynamics since long-run equilibrium relationship is absent, but if they are cointegrated, then we can either run unrestricted VAR to examine the long-run equilibrium relationship between the variables or an error/equilibrium correction model (ECM) which is a form of restricted VAR to investigate the speed of adjustment to long-run equilibrium. The level of integration and the presence or absence of cointegration are the two key factors that determine the type of VAR model to be used. Therefore, variations to the traditional VAR model include the error correction model, the autoregressive distributed lag, and the nonlinear autoregressive distributed lag.

5.3.1 Objective one: Impact of export processing zones on exchange rates

In the first empirical paper of this thesis, we investigate the effect of export processing zones measured by their investment and export activities on the rate of exchange in Ghana and Bangladesh. Aside there being not even a single study on the relationship between export processing zones and exchange rate, even studies about the relationship between investment/export and exchange rate at the aggregate level have produced mixed conclusions regarding such relationship. In terms of EPZs and exchange rate however, an analysis of that sort is timely because the main rationale for the establishment of the zones is to increase exports, with such exports bringing in foreign exchange to shore up the local currency. Also, the foreign investors in the zones come with foreign currencies which must all have some impact on the domestic currency, and hence the need to find out if such an effect is being realised.

For the first objective of this study, the chosen model is the autoregressive distributed lag. ARDL is a model applied to non-stationary time series and on series with different levels of integration. With this, the target variable is a function of its past values and the independent variables' current and lagged values. ARDL, which is a model suited to small sample sizes, and assumes a linear relationship between/among variables, is a form of unrestricted error correction model run on a combination of I(0) and I(1) series although it can still be applied even if all the variables are I(1) (Pesaran et al., 2001). Again, with the ARDL model, unlike the vector error correction model which carries the error correction term (ECT), the error correction term is replaced in the ARDL model with the same lagged levels of both the dependent and independent variables without restricting their coefficients to among others capture the long-run relationships in the model, allow for more flexibility in the lag structure and to simplify the estimation process by the use of standard regression techniques (Pesaran et al., 2001).

Thus, the ARDL is the preferred model for this paper on the grounds of its many advantages. These include its ability to work on small sample sizes which is a key feature associated with developing economies like our study countries. It is also very much able to account for short and long-run dynamics such as the case for this study which wants to see both the long-run and short-run impact of the free zones on the implementing nations, with the policy having been in existence for some time now. Moreover, ARDL is able to handle multiples of variables whether such variables are all integrated of the same order or they are of different levels of integration, namely I(0) and I(1), and this is very much the case for this study which involves two separate nations and several variables. Lastly, the model is also a relevant one based on its ability to transform into an error correction model after its bounds test of cointrgration which doesn’t call for stationarity test pre-testing. Meanwhile, the error correction transformation helps us to investigate the speed of adjustment after a shock has occurred.

In line with papers such as Arthur and Addai (2022), Dogan (2015) and Rafindadi and Ozturk (2017), the ARDL model is thus fully specified for both Ghana and Bangladesh as follows for objective one, showing the various equations arising from the use of each of the endogenous variables in turns as dependent variable:

$$\Delta LRER_t = \beta_1 + \sum_{i=1}^{p1} \alpha_{1i} \Delta LRER_{t-i} + \sum_{i=0}^{q11} \sigma_{1i} \Delta LINV_{t-i} + \sum_{i=0}^{q12} \delta_{1i} \Delta LEPX_{t-i} + \sum_{i=0}^{q13} \Psi_{1i} \Delta LCPI_{t-i} + \sum_{i=0}^{q14} \lambda_{1i} \Delta LDET_{t-i} + \sum_{i=0}^{q15} \omega_{1i} \Delta LTOT_{t-i} + \varphi_{11} LRER_{t-1} + \varphi_{12} LINV_{t-1} + \varphi_{13} LEPX_{t-1} + \varphi_{14} LCPI_{t-1} + \varphi_{15} LDET_{t-1} + \varphi_{16} LTOT_{t-1} + \mu_{t1} \qquad (5.3)$$

$\Delta LINV_t =$

$\beta_2 + \sum_{i=1}^{p2} \alpha_{2i} \Delta LINV_{t-i} + \sum_{i=0}^{q21} \sigma_{2i} \Delta LRER_{t-i} + \sum_{i=0}^{q22} \delta_{2i} \Delta LEPX_{t-i} + \sum_{i=0}^{q23} \Psi_{2i} \Delta LCPI_{t-i} +$

$\sum_{i=0}^{q24} \lambda_{2i} \Delta LDET_{t-i} + \sum_{i=0}^{q25} \omega_{2i} \Delta LTOT_{t-i} + \varphi_{21} LINV_{t-1} + \varphi_{22} LRER_{t-1} + \varphi_{23} LEPX_{t-1} +$

$\varphi_{24} LCPI_{t-1} + \varphi_{25} LDET_{t-1} + \varphi_{26} LTOT_{t-1} + \mu_{t2}$ (5.4)

$\Delta LEPX_t =$

$\beta_3 + \sum_{i=1}^{p3} \alpha_{3i} \Delta LEPX_{t-i} + \sum_{i=0}^{q31} \sigma_{3i} \Delta LRER_{t-i} + \sum_{i=0}^{q32} \delta_{3i} \Delta LINV_{t-i} + \sum_{i=0}^{q33} \Psi_{3i} \Delta LCPI_{t-i} +$

$\sum_{i=0}^{q34} \lambda_{3i} \Delta LDET_{t-i} + \sum_{i=0}^{q35} \omega_{3i} \Delta LTOT_{t-i} + \varphi_{31} LEPX_{t-1} + \varphi_{32} LRER_{t-1} + \varphi_{33} LINV_{t-1} +$

$\varphi_{34} LCPI_{t-1} + \varphi_{35} LDET_{t-1} + \varphi_{36} LTOT_{t-1} + \mu_{t3}$ (5.5)

$\Delta LCPI_t =$

$\beta_4 + \sum_{i=1}^{p4} \alpha_{4i} \Delta LCPI_{t-i} + \sum_{i=0}^{q41} \sigma_{4i} \Delta LRER_{t-i} + \sum_{i=0}^{q42} \delta_{4i} \Delta LINV_{t-i} + \sum_{i=0}^{q43} \Psi_{4i} \Delta LEPX_{t-i} +$

$\sum_{i=0}^{q44} \lambda_{4i} \Delta LDET_{t-i} + \sum_{i=0}^{q45} \omega_{4i} \Delta LTOT_{t-i} + \varphi_{41} LCPI_{t-1} + \varphi_{42} LRER_{t-1} + \varphi_{43} LINV_{t-1} +$

$\varphi_{44} LEPX_{t-1} + \varphi_{45} LDET_{t-1} + \varphi_{46} LTOT_{t-1} + \mu_{t4}$ (5.6)

$\Delta LDET_t =$

$\beta_5 + \sum_{i=1}^{p5} \alpha_{5i} \Delta LDET_{t-i} + \sum_{i=0}^{q51} \sigma_{5i} \Delta LRER_{t-i} + \sum_{i=0}^{q52} \delta_{5i} \Delta LINV_{t-i} + \sum_{i=0}^{q53} \Psi_{5i} \Delta LEPX_{t-i} +$

$\sum_{i=0}^{q54} \lambda_{5i} \Delta LCPI_{t-i} + \sum_{i=0}^{q45} \omega_{5i} \Delta LTOT_{t-i} + \varphi_{51} LDET_{t-1} + \varphi_{52} LRER_{t-1} + \varphi_{53} LINV_{t-1} +$

$\varphi_{54} LEPX_{t-1} + \varphi_{55} LCPI_{t-1} + \varphi_{56} LTOT_{t-1} + \mu_{t5}$ (5.7)

$\Delta LTOT_t =$

$\beta_6 + \sum_{i=1}^{p6} \alpha_{6i} \Delta LTOT_{t-i} + \sum_{i=0}^{q61} \sigma_{6i} \Delta LRER_{t-i} + \sum_{i=0}^{q62} \delta_{6i} \Delta LINV_{t-i} + \sum_{i=0}^{q63} \Psi_{6i} \Delta LEPX_{t-i} +$

$\sum_{i=0}^{q64} \lambda_{6i} \Delta LCPI_{t-i} + \sum_{i=0}^{q65} \omega_{6i} \Delta LDET_{t-i} + \varphi_{61} LTOT_{t-1} + \varphi_{62} LRER_{t-1} + \varphi_{63} LINV_{t-1} +$

$\varphi_{64} LEPX_{t-1} + \varphi_{65} LCPI_{t-1} + \varphi_{66} LDET_{t-1} + \mu_{t6}$ (5.8) where *RER, INV, EPX, CPI, DET* and *TOT* respectively represent the real effective exchange rate, export processing zones investment, export processing zones export (with both EPZ variables measured in billions of $), consumer price index, debt-to-GDP and terms of trade. It has to be added that the real effective exchange rate has been selected as our dependent variable and not say the exchange rate between the respective local currencies and the U.S. dollar because the use of the real effective exchange rate gives more meaningful and robust results for the two countries in this analysis which requires the same set of variables. The real effective exchange rate here is a measure of a local currency's value against a weighted average of several currencies of other foreign nations usually divided by a price deflator or index of cost, and an increase in this variable means an appreciation of the local currency.

To reduce the proliferation of our variables, we log the series by adopting the symbol L for logarithm while Δ is the change operator to induce stationarity to help avoid spurious regression while focusing on changes in variables to provide a more meaningful interpretation of results. In the above equations, α, σ, δ, Ψ, λ and ω capture the short-run dynamics of the ARDL model whereas the φ's also show the long-run dynamics with the β's representing the constant term. Also, t is the time dimension, μ is the error term, and p and q respectively stand for the lag lengths for the target and input variables.

ARDL uses bounds test to determine if there is any long-run relationship between variables by testing the coefficients of the long-run terms (Pesaran et al., 2001). Therefore, for the ARDL model specified above, the bounds test, which is a joint *F-test* is as follows:

$$H_0: \ \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = 0$$

The Pesaran et al., (2000; 2001) bounds test critical values are used to determine whether F is significant and when we reject the null hypothesis it means that we have a long-run equilibrium relationship among the variables being investigated. Long-run equilibrium relationship from the bounds test is an indication of the presence of cointegration among the variables in which case we reparameterise the ARDL model into an error correction model in order to establish the speed of adjustment to long-run equilibrium. But if there is no cointegration, we only specify the short-run ARDL model.

The ECM in the ARDL framework is specified as follows where the error correction term (Z_{t-1}) replaces the ARDL long-run terms with each endogenous variable being used in turn as dependent variable:

$$\Delta LRER_t = \beta_1 + \sum_{i=1}^{p1} \alpha_{1i} \Delta LRER_{t-i} + \sum_{i=0}^{q11} \sigma_{1i} \Delta LINV_{t-i} + \sum_{i=0}^{q12} \delta_{1i} \Delta LEPX_{t-i} + \sum_{i=0}^{q13} \Psi_{1i} \Delta LCPI_{t-i} + \sum_{i=0}^{q14} \lambda_{1i} \Delta LDET_{t-i} + \sum_{i=0}^{q15} \omega_{1i} \Delta LTOT_{t-i} + \emptyset_1 Z_{t-1} + \mu_{t1} \quad (5.9)$$

$$\Delta LINV_t = \beta_2 + \sum_{i=1}^{p2} \alpha_{2i} \Delta LINV_{t-i} + \sum_{i=0}^{q21} \sigma_{2i} \Delta LRER_{t-i} + \sum_{i=0}^{q22} \delta_{2i} \Delta LEPX_{t-i} + \sum_{i=0}^{q23} \Psi_{2i} \Delta LCPI_{t-i} + \sum_{i=0}^{q24} \lambda_{2i} \Delta LDET_{t-i} + \sum_{i=0}^{q25} \omega_{2i} \Delta LTOT_{t-i} + \emptyset_2 Z_{t-1} + \mu_{t2} \quad (5.10)$$

$$\Delta LEPX_t = \beta_3 + \sum_{i=1}^{p3} \alpha_{3i} \Delta LEPX_{t-i} + \sum_{i=0}^{q31} \sigma_{3i} \Delta LRER_{t-i} + \sum_{i=0}^{q32} \delta_{3i} \Delta LINV_{t-i} + \sum_{i=0}^{q33} \Psi_{3i} \Delta LCPI_{t-i} + \sum_{i=0}^{q34} \lambda_{3i} \Delta LDET_{t-i} + \sum_{i=0}^{q35} \omega_{3i} \Delta LTOT_{t-i} + \emptyset_3 Z_{t-1} + \mu_{t3} \quad (5.11)$$

$$\Delta LCPI_t = \beta_4 + \sum_{i=1}^{p4} \alpha_{4i} \Delta LCPI_{t-i} + \sum_{i=0}^{q41} \sigma_{4i} \Delta LRER_{t-i} + \sum_{i=0}^{q42} \delta_{4i} \Delta LINV_{t-i} + \sum_{i=0}^{q43} \Psi_{4i} \Delta LEPX_{t-i} + \sum_{i=0}^{q44} \lambda_{4i} \Delta LDET_{t-i} + \sum_{i=0}^{q45} \omega_{4i} \Delta LTOT_{t-i} + \emptyset_4 Z_{t-1} + \mu_{t4} \quad (5.12)$$

$\Delta LDET_t =$

$\beta_5 + \sum_{i=1}^{p5} \alpha_{5i} \Delta LDET_{t-i} + \sum_{i=0}^{q51} \sigma_{5i} \Delta LRER_{t-i} + \sum_{i=0}^{q52} \delta_{5i} \Delta LINV_{t-i} + \sum_{i=0}^{q53} \Psi_{5i} \Delta LEPX_{t-i} +$

$\sum_{i=0}^{q54} \lambda_{5i} \Delta LCPI_{t-i} + \sum_{i=0}^{q45} \omega_{5i} \Delta LTOT_{t-i} + \emptyset_5 Z_{t-1} + \mu_{t5}$ (5.13)

$\Delta LTOT_t =$

$\beta_6 + \sum_{i=1}^{p6} \alpha_{6i} \Delta LTOT_{t-i} + \sum_{i=0}^{q61} \sigma_{6i} \Delta LRER_{t-i} + \sum_{i=0}^{q62} \delta_{6i} \Delta LINV_{t-i} + \sum_{i=0}^{q63} \Psi_{6i} \Delta LEPX_{t-i} +$

$\sum_{i=0}^{q64} \lambda_{6i} \Delta LCPI_{t-i} + \sum_{i=0}^{q65} \omega_{6i} \Delta LDET_{t-i} + \emptyset_6 Z_{t-1} + \mu_{t6}$ (5.14)

Aside from determining the adjustment speed and long-run causality by the use of the ECM, short-run causal inferences could also be made based on the *t-statistics* of the short-run coefficients (Pesaran et al., 2001). However, in the absence of cointegration, we can simply estimate the short-run ARDL model to probe short-run Granger causality as mentioned elsewhere.

5.3.2 Objective two: Impact of export processing zones investment on economic growth

In the study's second objective, we seek to analyse the effect of export processing zones, measured by their investment activities on economic growth in Ghana and Bangladesh. An investigation of the impact of free zones investment on the economic growth of the implementing nation is a timely one. This is because the zones are meant to attract mainly foreign investors whose capital help in the expansion of the productive capacity of the local economy, creating employment in the process. Exports from the zones are also supposed to bring in badly needed foreign exchange and these are supposed to help with local economic growth, hence the need to find out if it is truly the case with our two countries of study.

The relatively new nonlinear autoregressive distributed lag model developed by Shin et al. (2014) is used. The NARDL is a further work on the earlier symmetric ARDL model formulated by Pesaran et al. (2001). The NARDL thus carries very much most of the benefits associated with the ARDL model, including allowing for the combination of I(0) and I(1) variables. It however differs from the ARDL model based on its ability to incorporate asymmetries in the relationship between time series variables where the independent variable(s) is/are broken down into positive and negative shocks. And it has to be added that inasmuch as this study is not necessarily a comparative one, the use of the NARDL model is able to account for the differences in the two countries by modeling the shocks separately, and also through the use of their lags, allowing the direction and magnitude of the relationship between the series to vary across different contexts.

The inclusion of asymmetry in our analysis of the relationship between free zones investment and economic growth is in recognition of the fact that, most macroeconomic variables are by nature asymmetric in their dynamic relationships (Shin et al., 2014). Specifically, the chunk of the investments into the various zones is undertaken by foreigners who themselves may be affected by the economic conditions in their home countries. These conditions might bring about fluctuations regarding the capital inflows into the zones and the subsequent exports from the zones, and hence the need to find out whether the increases and decreases in free zones investments have any statistically significant impact on economic growth in the two countries of study. So the argument is that the magnitude of the impact of an increase in EPZ investment on economic growth might not necessarily be the same as the magnitude of a decrease in the independent variable on our target variable.

Also, export processing zones are by their very nature meant to be a temporary measure to initiate the overall process of economic liberalisation and not meant to be an everlasting policy. It is therefore important to know whether the policy is having any short-term as well as long-term impact on the host county in terms of economic growth having been in existence for quite some time now in the two countries. This accounts for our use of the nonlinear autoregressive distributed lag model, which just like its symmetric ARDL counterpart is able to capture both long and short-run dynamics.

Thus, to accomplish our aim, we specify the following linear equation in which we recognise the fact that economic growth is an internally-driven phenomenon caused by several factors (Romer, 1986), where real GDP growth rate (*RGP*) which is our measure of economic growth is regressed on our key free zones variable of investment (*INV*), also measured by its growth rate, along with some other vital determinants of economic growth as follows:

$$RGP_t = f(INV_t, INF_t, RER_t, GCP_t, POG_t) \ldots \ldots \ldots . (5.15)$$

where *INF* is the headline inflation, *RER* is the real effective exchange rate, *GCP* is the annual percentage growth rate of final consumption expenditure of government and *POG* is the population growth rate in percentage terms. The nonlinear form of the above equation which incorporates the positive and negative shocks of our key explanatory variable of *INV* is also specified below:

$$RGP_t = f(INV_t^+, INV_t^-, INF_t, RER_t, GCP_t, POG_t) \ldots \ldots \ldots (5.16)$$

These positive and negative decompositions of *INV* are then added to the equation as separate regressors. Thus in line with papers such as Adabor et al. (2022) and Alam et al. (2022), and based on the original work of Shin et al. (2014), we formulate the NARDL model as follows where just like all other vector autoregression models, all the variables are treated endogenously:

$\Delta RGP_t = \beta_1 + \sum_{i=1}^{p} \alpha_{1i} \Delta RGP_{t-i} + \sum_{i=0}^{q11} \sigma_{1i}^{+} \Delta INV_{t-i}^{+} + \sum_{i=0}^{q12} \sigma_{1i}^{-} \Delta INV_{t-i}^{-} + \sum_{i=0}^{q13} \delta_{1i} \Delta INF_{t-i} +$
$\sum_{i=0}^{q14} \Psi_{1i} \Delta RER_{t-i} + \sum_{i=0}^{q15} \lambda_{1i} \Delta GCP_{t-i} + \sum_{i=0}^{q16} \gamma_{1i} \Delta POG_{t-i} + \rho RGP_{t-1} + \varphi_{11}^{+} INV_{t-1}^{+} +$
$\varphi_{12}^{-} INV_{t-1}^{-} + \varphi_{13} INF_{t-1} + \varphi_{14} RER_{t-1} + \varphi_{15} GCP_{t-1} + \varphi_{16} POG_{t-1} + u_{t1} \dots \dots \dots (5.17)$

where α_i, σ_i^{+}, σ_i^{-}, δ_i, Ψ_i, λ_i, and γ_i are the NARDL short-run coefficients and ρ and the $\varphi's$ are the long-run coefficients. Also, the β is the constant term, t is the time dimension, i is the lag with p being the maximum lag for the dependent variable and q also being the maximum lag length for the independent variables, μ is the error term and Δ is the difference operator. It has to be added here that 1 has been used across the above equation to differentiate it from the subsequent error correction model below which also takes 2 so that for example, $q11$ means the first q in the first equation and $q12$ is the second q in the first equation, etc.

The nonlinear autoregressive distributed lag model is a time series modelling technique used to investigate the long-run and/or short-run equilibrium relationship for variables of different levels of integration where there is the consideration of asymmetry in the dynamic relationship by the use of partial sum decompositions of the regressor(s) (Shin et al., 2014). Although the model is prone to problems of misinterpretation particularly in respect of the negative shocks coupled with the fact that it may not be able to account for more complex relationships apart from long and short-run dynamics, it is very much applicable even if all the variables are integrated of the same order (Shin et al., 2014). The model thus attempts to answer the major question as to whether the degree of impact of the independent variable on the dependent variable is the same when there is an increase in the regressor (X^{+}) as opposed to when there is a decrease (X^{-}). It could be that an increase in the independent variable has a stronger impact on the target variable than when there is a decrease, or maybe vice versa, hence the concept of asymmetry which acknowledges differences in the magnitude of impact. To identify the asymmetric effects in the model, the NARDL decomposes the independent variable(s) into two parts, namely the partial sum of positive change (X^+) and partial sum of negative change (X^-) and both X^+ and X^- are included in the model as separate regressors.

To test for the asymmetric long-run cointegration, the NARDL uses bounds test which is a joint test of all lagged one-period levels of positive shocks and negative shocks as well as all other regressors and the dependent variable (Shin et al., 2014). The null hypothesis of the *F-test* (Pesaran et al., 2001) for our NARDL model is as follows:

$$H_0: \rho = \varphi_1^+ = \varphi_2^- = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = 0$$

If we reject the null of no cointegration when the calculated *F-statistic* is greater than the upper bound critical value, it means the series are cointegrated in the presence of asymmetry, in which case we can go ahead and specify and estimate the asymmetric error correction model as follows:

$$\Delta RGP_t = \beta_2 + \sum_{i=1}^{p} \alpha_{2i} \Delta RGP_{t-i} + \sum_{i=0}^{q21} \sigma_{2i}^+ \Delta INV_{t-i}^+ + \sum_{i=0}^{q22} \sigma_{2i}^- \Delta INV_{t-i}^- + \sum_{i=0}^{q23} \delta_{2i} \Delta INF_{t-i} + \sum_{i=0}^{q24} \Psi_{2i} \Delta RER_{t-i} + \sum_{i=0}^{q25} \lambda_{2i} \Delta GCP_{t-i} + \sum_{i=0}^{q26} \gamma_{2i} \Delta POG_{t-i} + \theta ECT_{t-1} + \mu_{t2} \ldots\ldots\ldots (5.18)$$

where ECT_{t-1} is the error correction term, with its coefficient (θ) being the all-important speed of adjustment.

Also, to compute the NARDL long-run asymmetric coefficients, we divide the *negative* of the coefficient value of each positive shock by the coefficient of the dependent variable (i.e. $\frac{-\varphi_1^+}{\rho}$) and also the *negative* of the coefficient value of each negative shock by the coefficient of the dependent variable (i.e. $\frac{-\varphi_2^-}{\rho}$). Thus, in the presence of long-run relationship based on the bounds test, we move on to do the Wald test to see whether the difference in the asymmetric coefficients is statistically significant as indicated below:

$$H_0: \frac{-\varphi_{11}^{+}}{\rho} = \frac{-\varphi_{12}^{-}}{\rho}$$

$$H_A: \frac{-\varphi_{11}^{+}}{\rho} \neq \frac{-\varphi_{12}^{-}}{\rho}$$

If the above null hypothesis is rejected, it means there is long-run asymmetry, an indication that the extent of the change in the dependent variable when there is an increase (positive shock) in the independent variable is not the same as when there is a decrease (negative shock) in the regressor. Moreover, the Wald test for short-run asymmetric effects (null hypothesis indicated below) follows a similar conclusion (Shin et al., 2014):

$$H_0: \sum_{i=1}^{q} \sigma_i^{+} = \sum_{i=1}^{q} \sigma_i^{-}$$

A key feature of the nonlinear autoregressive distributed lag is the dynamic multiplier graph. This graph shows how the dependent variable adjusts to its new long-run equilibrium path following a shock in the independent variable. The cumulative dynamic multiplier effects of the positive and negative shocks in the independent variable (i.e. free zones investment) on the target variable (economic growth) are evaluated as follows (Shin et al., 2014):

$$DM_h^{+} = \sum_{j=0}^{h} \frac{\partial RGP_{t+j}}{\partial INV_t^{+}},\ DM_h^{-} = \sum_{j=0}^{h} \frac{\partial RGP_{t+j}}{\partial INV_t^{-}},\ \text{for h} = 0, 1, 2, \ldots \quad (5.19)$$

where, if h $\rightarrow \infty$, then $DM_h^{+} \rightarrow \frac{-\varphi_{11}^{+}}{\rho}$ and $DM_h^{-} \rightarrow \frac{-\varphi_{12}^{-}}{\rho}$

The above equation gives an indication as to how the dependent variable travels from the short to the long-term as a result of positive and negative changes in the independent variable. It thus helps to visualise the nature or pattern of adjustments in the dependent variable over time.

5.3.3 Objective three: Effect of export processing zones on inflation

In the study's final objective, we examine the effect of free zones investment and export on inflation in Ghana and Bangladesh. And again, aside there being not even a single study that has investigated such a relationship, this work is a timely one. This is because the foreign direct investments attracted into the various zones come with foreign currencies, and these currencies help in the strengthening/stabilisation of the local currency and it is well established in literature the effect a stable currency has on inflation (Oyadeyi et al., 2024). Also, in order to export, countries are actually expected to keep their inflation at a certain minimum to make their exports such as those from the free zones competitive on the international market. Moreover, a portion of the output from the zones (usually about 30%) is sold on the local market and this is also supposed to have an effect on domestic inflation, and hence the need to investigate the impact of the zones on inflation.

To investigate the effect of Ghana and Bangladesh's export processing zones investment and export on the rate of inflation, this section of the study also makes use of the new nonlinear autoregressive distributed lag model developed by Shin et al. (2014). The NARDL builds on the earlier symmetric/linear autoregressive distributed lag model developed by Pesaran et al. (2001). Although both ARDL and NARDL allow for the combination of I(0) and I(1) series, the key difference between the two lies in the fact that the NARDL can incorporate nonlinearities/asymmetries in the dynamic relationship between time series variables by decomposing the input variable(s) into positive and negative shocks which are then added to the model as separate regressors. This means for our key export processing zones variables of investment (*INV*) and export *(EPX)*, and our three other selected endogenous variables for the achievement of the third objective, analysing their effects on the consumer price index (*CPI*) produces a linear functional equation as:

$$CPI_t = f(INV_t, EPX_t, BML_t, OIL_t, DMW_t) \ldots\ldots\ldots.(5.20)$$

The nonlinear form of equation (5.20) above where the export processing zones variables are separated into positive and negative shocks is thus:

$$CPI_t = f(INV_t^+, INV_t^-, EPX_t^+, EPX_t^-, BML_t, OIL_t, DMW_t) \ldots\ldots\ldots(5.21)$$

Thus, following the original work of Shin et al. (2014) and in line with subsequent studies such as Adabor et al. (2022), Alam et al. (2022) and Saleem et al. (2023), the functional form of the NARDL is arrived at as follows with all the series becoming endogenous as per the nature of vector autoregressive models:

$$\Delta LCPI_t =$$

$$\beta_1 + \sum_{i=1}^{p} \alpha_{1i} \Delta LCPI_{t-i} + \sum_{i=0}^{q11} \sigma_{1i}^+ \Delta LINV_{t-i}^+ + \sum_{i=0}^{q12} \sigma_{1i}^- \Delta LINV_{t-i}^- + \sum_{i=0}^{q13} \delta_{1i}^+ \Delta LEPX_{t-i}^+ +$$

$$\sum_{i=0}^{q14} \delta_{1i}^- \Delta LEPX_{t-i}^- + \sum_{i=0}^{q15} \gamma_{1i} \Delta LBML_{t-i} + \sum_{i=0}^{q16} \Psi_{1i} \Delta LOIL_{t-i} + \sum_{i=0}^{q17} \lambda_{1i} \Delta LDMW_{t-i} +$$

$$\rho LCPI_{t-1} + \varphi_{11}^+ LINV_{t-1}^+ + \varphi_{12}^- LINV_{t-1}^- + \varphi_{13}^+ LEPX_{t-1}^+ + \varphi_{14}^- LEPX_{t-1}^- + \varphi_{15} LBML_{t-1} +$$

$$\varphi_{16} LOIL_{t-1} + \varphi_{17} LDMW_{t-1} + \mu_{t1} \ldots\ldots(5.22)$$

where *CPI* (consumer price index) is the dependent variable for both Ghana and Bangladesh and *INV* and *EPX* are the export processing zones investment and export respectively – our two key independent variables. Aside from these three variables, *BML* is the broad money supply, *OIL* captures the crude oil price and *DMW* represents the daily minimum wage. It must be noted here that the free zones variables are measured in billions of dollars and the money supply is measured in billions of the respective local currencies. α_i, σ_i^+, σ_i^-, δ_i^+, δ_i^-, γ_i, Ψ_i and λ_i are the NARDL short-run coefficients and ρ and the $\varphi's$ are the long-run coefficients. L is also the natural log symbol to suppress time series' proliferative effects, β is the constant term, t is the time dimension, μ is the error term, p and q respectively stand for the lag lengths for the dependent and input variables and Δ is the difference operator. It has to be noted here also that we use 1 across equation 5.22 to distinguish the NARDL equation from the error correction model below which is also assigned 2 so that for example in equation 5.22 above, $q11$ means the first q in the first equation and $q12$ is the second q in the first equation among others.

As a time series modeling technique that can be applied on purely I(1) variables or even series with different levels of integration, NARDL is used to investigate the long-run and/or short-run equilibrium relationship for variables where there is the consideration of asymmetry in the relationship between the input and output variables through the use of partial sum decompositions of the regressors (Shin et al., 2014). Thus the main question at the heart of this model is whether the degree of impact of the input variable on the target variable is the same when there is a positive shock or increase in the regressor (X^+) as opposed to when there is a negative shock or decrease (X^-). Hence there is the acknowledgement of the fact that it is possible that the impact of a positive shock in the independent variable on the dependent variable may be greater than the impact of a decrease in the regressor on the regressand or vice versa. To identify the nonlinearities in the model, the NARDL breaks down the independent variable(s) into partial sum of positive change (X^+) and partial sum of negative change (X^-) and both X^+ and X^- are then included in the model as separate explanatory variables.

NARDL uses bounds test which is a joint test of all lagged one-period levels of positive and negative shocks as well as all other independent variables and the dependent variable to test for the asymmetric long-run cointegration (Shin et al., 2014). The null hypothesis of our NARDL model which is an *F-test* (Pesaran et al., 2001) is indicated as follows:

$$H_0: \rho = \varphi_1^+ = \varphi_2^- = \varphi_3^+ = \varphi_4^- + \varphi_5 = \varphi_6 = \varphi_7 = 0$$

According to Shin et al. (2014) if the computed *F-statistic* is in excess of the upper bound critical value, in that case, the null of no cointegration is rejected in favour of the alternative, meaning that the series are cointegrated in the presence of asymmetry and for this reason we go ahead to estimate the asymmetric error correction model as follows:

$$\Delta LCPI_t =$$

$$\beta_2 + \sum_{i=1}^{p} \alpha_{2i} \Delta LCPI_{t-i} + \sum_{i=0}^{q21} \sigma_{2i}^{+} \Delta LINV_{t-i}^{+} + \sum_{i=0}^{q22} \sigma_{2i}^{-} \Delta LINV_{t-i}^{-} + \sum_{i=0}^{q23} \delta_{2i}^{+} \Delta LEPX_{t-i}^{+} +$$

$$\sum_{i=0}^{q24} \delta_{2i}^{-} \Delta LEPX_{t-i}^{-} + \sum_{i=0}^{q25} \gamma_{2i} \Delta LBML_{t-i} + \sum_{i=0}^{q26} \Psi_{2i} \Delta LOIL_{t-i} + \sum_{i=0}^{q27} \lambda_{2i} \Delta LDMW_{t-i} +$$

$$\emptyset ECT_{t-1} + \mu_{t2} \ldots \ldots (5.23)$$

where ECT_{t-1} is the error correction term whose coefficient ($\emptyset$) is the speed of adjustment.

Again, we compute the NARDL long-run asymmetric coefficients by dividing the *negative* of the coefficient value of each positive shock by the coefficient of the target variable, and also the *negative* of the coefficient value of each negative shock by the coefficient of the dependent variable (Shin et al., 2014). Therefore, when there is cointegration based on the bounds test, we do Wald test to see if the distinction in the nonlinear coefficients is probabilistically significant and this is indicated below (Shin et al., 2014):

$$H_0: \frac{-\varphi_{11}^{+}}{\rho} = \frac{-\varphi_{12}^{-}}{\rho} \text{ or } \frac{-\varphi_{13}^{+}}{\rho} = \frac{-\varphi_{14}^{-}}{\rho}$$

$$H_A: \frac{-\varphi_{11}^{+}}{\rho} \neq \frac{-\varphi_{12}^{-}}{\rho} \text{ or } \frac{-\varphi_{13}^{+}}{\rho} \neq \frac{-\varphi_{14}^{-}}{\rho}$$

There is long-run asymmetry if the above null hypothesis is rejected. This means that the magnitude of the impact of the independent variable on the output variable as a result of positive and negative shocks is not the same. The Wald test for short-run asymmetric effects (Shin et al., 2014) also follows similar conclusion and its null hypothesis is indicated below:

$$H_0: \sum_{i=1}^{q} \sigma_i^+ = \sum_{i=1}^{q} \sigma_i^-$$

$$H_0: \sum_{i=1}^{q} \delta_i^+ = \sum_{i=1}^{q} \delta_i^-$$

The dynamic multiplier graph which indicates how the target variable adjusts to its new equilibrium path due to an increase or decrease in the independent variable is another key feature of the nonlinear autoregressive distributed lag (Shin et al., 2014). The cumulative dynamic multiplier effects of the positive and negative shocks in the regressors on the explained variable are evaluated as follows (Shin et al., 2014):

$$DM_h^+ = \sum_{j=0}^{h} \frac{\partial LCPI_{t+j}}{\partial LINV_t^+}, \; DM_h^- = \sum_{j=0}^{h} \frac{\partial LCPI_{t+j}}{\partial LINV_t^-}, \text{ for h = 0, 1, 2, …} \quad (5.24)$$

where, if h → ∞, then $DM_h^+ \rightarrow \frac{-\varphi_{11}^+}{\rho}$ and $DM_h^- \rightarrow \frac{-\varphi_{12}^-}{\rho}$

$$DM_h^+ = \sum_{j=0}^{h} \frac{\partial LCPI_{t+j}}{\partial LEPX_t^+}, \; DM_h^- = \sum_{j=0}^{h} \frac{\partial LCPI_{t+j}}{\partial LEPX_t^-}, \text{ for h = 0, 1, 2, …} \quad (5.25)$$

where, if h → ∞, then $DM_h^+ \rightarrow \frac{-\varphi_{13}^+}{\rho}$ and $DM_h^- \rightarrow \frac{-\varphi_{14}^-}{\rho}$

The above equation gives an indication as to how the dependent variable traverses from the short to the long-term as a result of a shock in the independent variable. It thus indicates the nature or pattern of adjustments in the dependent variable over time.

5.4.1 Justification of selected variables for objective one

The exchange rate is the price of a currency in respect of another currency. In theory, the rate of exchange between two currencies greatly affects the movement of money and more generally trade between countries (Branson et al., 1977). Alterations in exchange rate can affect the cost of foreign supplies as well as the international demand for domestically-produced goods and services. Considering the great impact changes in the rate of exchange can have on an economy, most governments put in place various measures and policies to ensure that such movements are not erratic. They do this through concerted efforts to grow and develop their respective economies as research has shown that economies that have developed are usually associated with lower interest rates, lower inflation rates, lower unemployment rates, etc. In this regard, export processing zones are just one of such policy tools that have been well-embraced by third world governments to promote growth. There is therefore the hope that the implementation of such a policy will spur the nation on in terms of its growth including helping to stabilise its currency through the attraction of badly needed foreign capital and the exportation of goods and services to attract foreign exchange.

Aside the concept of export processing zones that could actually affect the rate of exchange, exchange rate is also affected by several other factors that usually play out in the economy. These include the rate of inflation, interest rate, economic growth, terms of trade, central government debt, the likelihood of political instability among several others (Meshulam & Sanfey, 2019; Shapiro & Hanouna, 2019). To achieve the first objective of this research work, consumer price index, debt-to-GDP and terms of trade are the key determinants of exchange rate that have been considered along with the EPZ variables of investment and export.

In terms of inflation, it is widely acknowledged that countries with higher rates of inflation usually experience a weakening of their currencies whilst those with lower inflation rates see an appreciation or stabilisation of their domestic currencies relative to foreign currencies (Shapiro & Hanouna, 2019). Higher inflation means prices of domestically-produced goods and services become very much expensive on the global market. This means not much could be sold to generate foreign currencies to shore up the domestic one. With limited availability of foreign currencies, undue pressure is placed on those currencies by the various economic players bringing about an enhancement in the value of the foreign currencies as against the domestic one.

Regarding the inclusion of debt-to-GDP as a variable that determines exchange rate, higher levels of debt naturally lead to higher rates of inflation, ultimately leading to debt servicing with cheaper money (Shapiro & Hanouna, 2019). Again, nations with high levels of debt are usually viewed unfavourably by foreign investors due to the increased risk of default which discourages any such investment by foreigners for fear of losing their money. The effect of all this is limited supply of foreign currencies thereby putting undue pressure on what is available, increasing their values in the process, relative to the domestic currency.

Finally, relative to terms of trade, it is fundamentally a ratio that compares the prices of a country's exports to its imports. It is very much related to a country's current account and balance of payments. If the export prices of any country rise in excess of its import prices, it is indicative of an improvement in the terms of trade which shows a greater demand for that country's exports (Motyovszki, 2023). This leads to an increase in export revenues providing the basis for greater demand for that country's currency thereby enhancing its value.

5.4.2 Justification of selected variables for objective two

Governments of the developing world have historically undertaken various measures to grow their economies (i.e. increase the size of their economies). This they believe that when the economy grows it will invariably lead to increases in the income levels for the citizenry and thus improve people's standard of living (Mohamed et al., 2022). Export processing zones have been regarded by these governments as a means to achieve the primary goal of national economic growth. This is because the significant investment inflows into these zones provide much-needed capital, including plants and machinery, which enhance the productive capacity of the economy.

Modern economists theorise that several factors are responsible for the growth of an economy (Romer, 1986). Some of these factors include quality of state institutions, political stability, the rate of currency exchange, capital, labour among several others. To achieve the purpose of the second objective of this study, aside the export processing zones investment variable, the headline inflation, real effective exchange rate, government's final consumption expenditure and population growth are the other variables selected for inclusion in our chosen model.

First, the headline inflation is a good gauge of general price levels in the economy and it is widely taken into consideration when taking economic decisions including those on investment. So the issue is, if inflation rises above a certain threshold, prices of goods and services usually become expensive, leading to the erosion of people's incomes or purchasing power (Stantcheva, 2024). People therefore slow down in terms of the rate at which they consume and this invariably leads to a shrinking or contraction of the domestic economy. Higher inflation also restricts production by making input prices excessively expensive for businesses.

Secondly, in terms of exchange rate, when the domestic currency is weak, the tendency for domestic investors is to look elsewhere to invest to earn higher returns as they will get more from currency conversion after investment. Thus with this, the amount of local investment will decrease with its attendant detrimental effects on the economy (Fukui et al., 2023). On the other hand, if a country's currency is weak relative to other currencies, it means it is able to benefit more from international trade because, in simple terms, the little it can get from such trade becomes more after conversion into the local currency (Ndou et al., 2024). A currency's effect on the economy therefore could be either positive or negative depending on whether it is strengthening or weakening.

For expenditure by government, when current government spending on goods and services including workers' compensation increases, it tends to make more money available in the economy and thereby boost economic growth (Poku et al., 2022). This is because more people get money which is then invested in the economy to employ a lot more individuals in the population to promote productivity and growth.

Finally, in terms of population growth, an increase in it simply means a surge in demand all things being equal. If the increased demand is to be met with increased supply, the effect is that more people will get employed. Higher demand for goods and services occasioned by an increase in population coupled with more people getting employed invariably causes the economy to expand (Mahtta et al., 2022).

5.4.3 Justification of selected variables for objective three

The issue of inflation is almost a double-edged sword for most countries in the global economy. Too high and it becomes a conduit for the economy to become overheated in which demand outstrips the productive capacity of the economy, and too little and people hold back their spending activities in the hope of further price drops which also slows down the economy (Girdzijauskas et al., 2022). Governments, both rich and poor have historically grappled with the issue of inflation as they constantly seek the optimal level of inflation to promote the growth of their respective economies. As part of the effort by governments especially in the developing world, there has been the full acceptance of the concept of export processing zones since it is believed to generate external inflows to shore up local production to produce goods for the local market and also for export. The hope in all this is that the investment makes more goods available which helps to reduce inflation with the desire also to ensure that inflation is not too high to make the exports uncompetitive.

Aside from the variables related to free zones such as investment and export, and their established impacts on inflation, the rate of inflation is also significantly influenced by other important factors. For this study, we use money supply, crude oil price and the daily minimum wage as our other endogenous variables. Regarding the money supply, an increase in the amount of money in circulation which is not matched by adequate supply of goods and services leads to a situation where there is more money chasing fewer goods thereby causing prices to surge (Madurapperuma, 2023).

Also, for the crude oil price, it is known to be a major driver of inflation especially in the developing world (Yilmazkuday, 2022). This is especially true when the commodity in question is imported and must be paid for with a local currency that is often depreciating. An increase in the price of crude oil, for instance, directly raises transportation costs, which in turn leads to higher prices for goods and services domestically.

Finally, in terms of the daily minimum wage, an increase in this variable leads to inflation in the economy (Hurst et al., 2022). This is because when wages are increased, cost of production also increases. An increase in the production cost will increase the unit price of the output since such costs are passed on to consumers. It could also be that producers will cut down on the quantity of goods and services delivered onto the market thereby making fewer goods available, all leading to an increase in the prices of commodities on the market.

5.5 Unit root tests

In simple terms, unit root test means test for stationarity in the chosen series. This is to detect whether the variables are stationary at levels, i.e. I(0), or are integrated of the first order, i.e. I(1). This test is very critical in time series regression analysis because most time series variables are actually found to be very much unstationary (Brooks, 2008; Nelson & Plsosser, 1982). Running a regression on non-stationary series will produce spurious results where the results may appear right under the standard measures whilst actually they are of no value or are worthless (Wooldridge, 2015). Hence, the assumptions for the analysis will be invalid, meaning the various tests will not adhere to their normal distributions (Brooks, 2008).

A stationary series is the one which has everything in terms of mean, variance and covariance to be stable for each lag (Brooks, 2008). It is crucial in time series regression analysis involving the use of the vector autoregressive models to know the order of integration of each variable to apply the appropriate VAR model. The unit root test for this study is also significant to ensure that no variable is integrated of the second order, i.e. I(2) or higher as a level of integration beyond the first order will not permit the use of the chosen VAR models. In line with this, the current study applies the Augmented-Dickey Fuller (ADF) (Dickey & Fuller, 1979) unit root test, the Phillips-Perron (PP) (Phillips & Perron, 1986) unit root test and the Zivot-Andrews (ZA) (Zivot &

Andrews, 1990) unit root test (with structural breaks) to determine the stationarity or otherwise of each of the variables of study. All three stationarity tests are applied in this study just for purposes of confirmation while at the same time ensuring that the weaknesses in each one are overcome by the others.

5.5.1 Augmented Dickey-Fuller unit root test

The ADF unit root test involves running a regression of the first difference of each variable against the series lagged once, lagged difference terms and possibly a constant and a time trend (Mishra, 2011). The study adopts the ADF stationarity test because of the constancy of its critical values. We therefore display the following ADF unit root test for this study:

$$\Delta X_t = \alpha_0 + \alpha_1 t + \alpha_2 X_{t-1} + \sum_{i=1}^{k} \delta_i \Delta X_{t-i} + \mu_t \qquad (5.26)$$

where ΔX_{t-1} indicates the first difference of the series, k is the lag length, μ_t is the error term and α_0, α_1, α_2 and δ_i are the coefficients to be estimated.

The null hypothesis for the ADF unit root test is that the series is unstationary and it is run on the coefficient of X_{t-1} as indicated below:

$$H_0: \alpha_2 = 0 \text{ and } H_A: \alpha_2 < 0$$

The added lagged terms are to make sure the errors are not correlated. If α_2 is significantly negative, we reject the null and infer that the series has no unit root, which suggests that it is stationary at levels. On the other hand, if the ADF statistic is above the McKinnon critical value, then the null cannot be rejected, an indication that the variable in question is unstationary. Failure to reject the null hypothesis of variable unstationarity means that there is the need for the series to be further differenced to attain stationarity (Dickey & Fuller, 1979).

5.5.2 Phillips-Perron unit root test

The Phillips-Perron unit root test is a further work on the earlier one by Dickey and Fuller in 1979. Their work on unit root (Phillips & Perron, 1986) also challenged the earlier argument by Nelson and Plsosser (1982) that most macroeconomic variables have unit root. Its null hypothesis is that the series is integrated of the first order or is unstationary, and also has trend with a constant slope. Although the PP and the ADF unit root tests are of similar nature in which they both seek to address a key issue regarding the process generating data which is being of higher autocorrelation level than is actually admitted, the PP test of unit root deals with this problem by making a non-parametric correction to the reported *t-statistic* while the ADF on the other hand uses the lags of the series as regressors. The PP test is thus robust regarding both the autocorrelation and heteroscedasticity in the disturbance process of the test equation. It is argued on the whole however by Davidson and MacKinnon (2004) that in terms of finite samples, the Phillips-Perron unit root test performs poorly in comparison to the ADF unit root test.

5.5.3 Zivot-Andrews unit root test

The ZA unit root test on the other hand sought to modify especially the work by Phillips and Perron (Phillips & Perron, 1986) in which there is the consideration of structural breaks in the series with such breaks treated endogenously. A break is an irregular or intermittent shock with permanent effect on a variable, and it is argued by Zivot and Andrews that most unit root tests ignore or mistake such breaks to mean variable unstationarity. A structural break could be an economic, political or any other major event that happens within a time series' time range. So basically the issue here according to ZA is that on the face of it, a variable may be unstationary but once we consider structural breaks, it may actually be stationary, with the ZA test allowing for a single break in the intercept or the trend or both (Zivot & Andrews, 1990). The imposition of the one-time structural break is its main line of criticism as recent studies have contended that not recognising other true structural breaks may lead to an erroneous rejection of the null hypothesis aside the fact that results from the ZA test are actually prone to mistakes based on the method used to obtain the critical values and the selection of the maximum lag (Rahman & Saadi, 2008).

This study incorporates structural breaks as part of the unit root analysis for the obvious reason that, our two countries of study are both developing countries that are prone to and have very much experienced various economic and political events that have impacted their economies in one way or the other with the recent one being the global economic crisis occasioned by the Coronavirus pandemic with its devastating effects on the economies of the world. Structural break analysis helps us to capture such sudden shifts in the economy to make our chosen models more realistic since depending on mainly the ADF and PP tests of unit root may ignore such shocks. This enhances model robustness and forecast accuracy.

5.6 Lag selection

Prior to the running of the specified models for the study, apart from the unit root test, one other exercise that needs to be undertaken is to ascertain the appropriate lag length for the selected models. Verbeek (2008) argues that the choice of the ideal lag length for a time series analysis is purely determined by statistical criteria and this together with the choice as to which variables to include in the model determines the power of the parameter estimates. Theory determines the variables to include, and in the case of VAR models we actually do not have to make any assumptions regarding the lag terms to include. The choice of the appropriate lag length is thus dependent on several factors including the purpose of the model, data frequency, sample size, and theory, and post-estimation diagnostic checks help to validate the choice of a particular lag order.

VAR models fundamentally regress each endogenous variable simultaneously on its own lagged values as well as on current and past values of all other endogenous variables. For this reason, it is important to select the correct lag length that produces reliable and maximum amount of information while ensuring that it does not consume several degrees of freedom. Information criteria including Schwarz Bayesian (SBIC), Hannan-Quin (HQIC), Akaike (AIC) and the Final Prediction Error (FPE) are used here to select the optimal lag structure for each of the chosen VAR models.

Practically, the total lag terms that gives the smallest value of each of the information criteria is what is accepted and the chosen lag is said to be optimal (Tang, 2008). However, if different lags are suggested by the various criteria, it is up to the researcher to choose the lag length recommended by the majority of the criteria or the one they prefer. Such a selection should be right enough to warrant the drawing of standard statistical inferences on the causal relationship between and among the variables under consideration.

5.7 Sample and sources of data

The governments of Ghana and Bangladesh both had a singular aim for the adoption of the concept of export processing zones which was and still is mainly to promote national economic development through the attraction of FDI, diversification and enlargement of the export sector, and generation of employment among others. However, these two governments started their respective programmes at different time periods with Ghana's zone programme starting more than a decade after the introduction of the policy in Bangladesh. The Ghana Free Zones Authority and the Bangladesh Export Processing Zones Authority are the two statutory bodies set up by the two countries to see to the promotion of the EPZ concept in the two countries.

Since the inception of their respective programmes, Ghana has officially established a total of four zones (at least on paper), compared to eight zones set up in Bangladesh. In all, as at the end of the year 2022, Ghana had a total of 495 firms operating in its zones while Bangladesh's figure stood at about 1,200. As part of their mandate, these two implementing agencies are required to collate and retain data on the activities of their EPZ firms. To this end, data for this study are sourced from these bodies in terms of investments in their zones and exports from their zones.

The data on Ghana's free zones were sourced specifically with help from personnel in the IT section of the Ghana Free Zones Authority who are responsible for collating and keeping such data in the GFZA. For Bangladesh, the data came from the painstaking aggregation of various EPZ data obtained from the website of the Bangladesh Export Processing Zones Authority which hosts data on specific EPZ activities in each of the country's zones. Thus we acknowledge that in the case of Ghana the data are not publicly available and hence have not been subjected to public scrutiny, whilst for Bangladesh there could be some fundamental human errors in the calculation of the aggregate data.

These are all secondary data with quarterly frequency. It has to be added here that these data are from both EPZ firms in the respective enclaves and those ones outside the enclaves based on the fact that they have qualified and been afforded the various EPZ incentives especially in the case of Ghana which employs both the single-factory and enclave schemes. Also, these data emanate from both foreign and local firms because with regards to the EPZ concept, all firms are deemed to be 'foreign' relative to the customs area of the implementing nations. To this end, all EPZ firms in the two countries are included in this research, unlike most previous studies that have largely focused on some of the firms in their various countries of study.

Regarding the duration of the data used in this study, the data for Ghana cover the period from 1998 to 2022, while the data for Bangladesh span from 1984 to 2022. Although different zones were set up at different times with respect to Bangladesh, data for the various years of operation of the firms in the zones have been combined to give us unique national dataset for this study. Also, these two timeframes have been chosen for the two study countries purely as a result of the different times their zones were set up.

Moreover, the EPZ data are matched with national data for the two countries on real effective exchange rate, consumer price index, debt-to-GDP, GDP growth rate, terms of trade, headline inflation, government consumption expenditure, population growth, money supply, crude oil price and daily minimum wage. Data on real effective exchange rate, consumer price index, debt-to-GDP, money supply, real GDP growth rate, inflation, terms of trade and government expenditure for the two countries are mainly from the World Development Indicators of the World Bank and the International Monetary Fund database. On the other hand, the International Labour Organisation is the key source of the population growth rate data for both countries. Also, the ministry of employment in the two countries is the primary source of data on the national daily minimum wage while the U.S. Energy Information Administration is the source of data on global crude oil price. These are all publicly-available and credible data sources useful for the conduct of any meaningful research such as the current one although it has to be said that there is usually a lag in the update of such data, making real-time analysis a bit tricky, coupled with the fact that reporting countries may be using different methods in data collection and reporting, equally making cross-country comparisons a challenge.

The following table gives a more detailed description of the various variables used in the study in terms of how they are measured and their specific sources:

Table 5. 1 A brief description of variables used in the study

Variable	Measurement	Description	Source
RER	Real effective exchange rate	This is a measure of a local currency's value against a weighted average of several currencies of other foreign nations usually divided by a price deflator or index of cost.	IMF (2022)
INV	Export processing zones investment	This is the sum of all investments undertaken in all zones of each country.	GFZA (2022) and BEPZA (2022)
EPX	Export processing zones export	It refers to the total value of all exports generated from the various zones in the selected countries.	GFZA (2022) and BEPZA (2022)
CPI	Consumer price index	The CPI measures the change in the prices of a representative basket of consumer goods and services over time.	IMF (2022)
DET	Debt-to-GDP	This is overall central government debt as a percentage of GDP.	IMF (2022)
TOT	Terms of trade	It is a ratio that compares every country's export prices to import prices and it is a good yardstick for determining the demand for a country's exports.	WDI (2022)
RGP	GDP growth rate	This is a measure of economic growth	WDI (2022)

		that evaluates the periodic change in a country's total output.	
INF	Headline inflation	It measures the total inflation in an economy calculated from all commodities including food and energy.	WDI (2022)
GCP	General government final consumption expenditure	This captures consumption by government including employee compensation and current expenses on goods and services.	WDI (2022)
POG	Population growth rate	It is a measure of the annual percentage change in a given population.	ILO (2022)
BML	Broad money	It is the money in circulation in the form of cash and other assets that can easily be converted to cash. This is measured in billions of local currency units.	IMF (2022)
OIL	Crude oil price	This is the price of crude oil measured in dollars per barrel.	U.S. Energy Information Administration (2022)
DMW	Daily minimum wage	This refers to the national minimum wage for the year, measured in the respective local currencies.	Ministry of Employment and Labour

			Relations, Ghana (2022), Employment Ministry, Bangladesh (2022)

5.8 Conclusion

Chapter five so far has explained the relevant approaches used to achieve the stated goals of this research work. It has considered issues such as model specifications, stationarity tests, lag order selection and cointegration tests. The chapter has also highlighted the various data sources coupled with an appropriate description of the variables used to achieve the various objectives of the study. The subsequent chapter presents the results obtained from running the selected model in relation to the first objective of the study, accompanied by an in-depth discussion of the findings.

CHAPTER SIX

DISCUSSION OF RESULTS ON THE IMPACT OF EXPORT PROCESSING ZONES ON EXCHANGE RATES

6.1 Introduction

This chapter deals with the presentation and discussion of the results emanating from the estimation of the selected model in relation to the first objective of this study. It thus features matters such as descriptive statistics, correlation matrix, and graphs of the various variables employed in achieving the first objective of the work. Other issues presented and discussed in this chapter include results on the selection of the appropriate lag length, unit root test, test for cointegration, and the error correction results from the ARDL estimation, not forgetting notes on various post-estimation diagnostic tests conducted.

6.2 Descriptive statistics

Table 6. 1 Results of descriptive statistics

Ghana (1998Q1-2022Q4)						
	Real effective exchange rate (RER)	*EPZ investment (INV)*	*EPZ export (EPX)*	*Consumer price index (CPI)*	*Debt-to-GDP (DET)*	*Terms of trade (TOT)*
Mean	90.27	166m	1.19b	136.42	50.10	155.20
Maximum	129.11	332m	2.36b	497.44	92.09	192.71
Minimum	66.20	33.17m	118m	12.54	16.97	99.33
Std. dev.	15.80	64.82m	723m	115.62	19.35	31.19
Probability	0.06	0.48	0.01	0.00	0.16	0.00
Observations	100	100	100	100	100	100
Bangladesh (1984Q1-2022Q4)						

	Real effective exchange rate (RER)	*EPZ investment (INV)*	*EPZ export (EPX)*	*Consumer price index (CPI)*	*Debt-to-GDP (DET)*	*Terms of trade (TOT)*
Mean	92.96	1.58b	21.10b	83.81	31.86	93.91
Maximum	114.08	6.21b	108b	222.72	39.02	164.21
Minimum	58.38	707,500	-1.05m	21.93	21.40	57.26
Std. dev.	13.45	1.87b	27.60b	56.32	3.61	28.45
Probability	0.01	0.00	0.00	0.00	0.24	0.01
Observations	156	156	156	156	156	156

Source: Authors' calculation from EViews 13, where 'm' and 'b' stand for millions and billions of United States $ respectively.

Table 6.1 deals with the summary statistics of the study relative to the first objective which considers the impact of the free zones concept on the rate of exchange in Ghana and Bangladesh. From the table, over the study period, Ghana's real effective exchange rate, export processing zones investment and export have averaged 90.27, $166 million and $1.19 billion respectively. For Bangladesh, the average figures have been 92.96, $1.58 billion, and $21.10 billion, respectively. For the same variables, the maximum figures for Ghana between 1998 and 2022 have been 129.11, $332 million and $2.36 billion respectively while those of Bangladesh between 1984 and 2022 stood at 114.08, $6.21 billion and $108 billion respectively. Ghana's minimum figures for its selected time period have been 66.20, $33.17 million and $118 million as against the respective Bangladeshi figures of 58.38, $707,500 and -$1.05 million.

For the other endogenous variables serving as our control variables, the consumer price index, the debt-to-GDP and terms of trade have averaged 136.42, 50.10% and 155.20 respectively for Ghana. In the case of Bangladesh, the figures have been 83.81, 31.86% and 93.91 respectively.

Their maximum and minimum values in the case of Ghana are 497.44, 92.09% and 192.71, and 12.54, 16.97% and 99.33. For Bangladesh, the corresponding figures have been 222.72, 39.02% and 164.21, and 21.93, 21.40% and 57.26 respectively.

6.3 Correlation matrix

Table 6. 2 Correlation results

Ghana						
	RER	*INV*	*EPX*	*CPI*	*DET*	*TOT*
RER	1.0000					
INV	-0.0974*	1.0000				
EPX	-0.6070***	0.5945***	1.0000			
CPI	-0.7342***	0.1444*	0.6747***	1.0000		
DET	-0.6279***	-0.4290***	0.0772*	0.5967***	1.0000	
TOT	-0.6442***	0.4637***	0.9097***	0.7999***	0.2099**	1.0000
Bangladesh						
	RER	*INV*	*EPX*	*CPI*	*DET*	*TOT*
RER	1.0000					
INV	0.3683***	1.0000				
EPX	0.3770***	0.9953***	1.0000			
CPI	0.3892***	0.9924***	0.9819***	1.0000		
DET	0.5221***	0.0584*	0.0680*	0.1179*	1.0000	
TOT	-0.3033***	-0.7491***	-0.7088***	-0.8163***	-0.2637***	1.0000

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

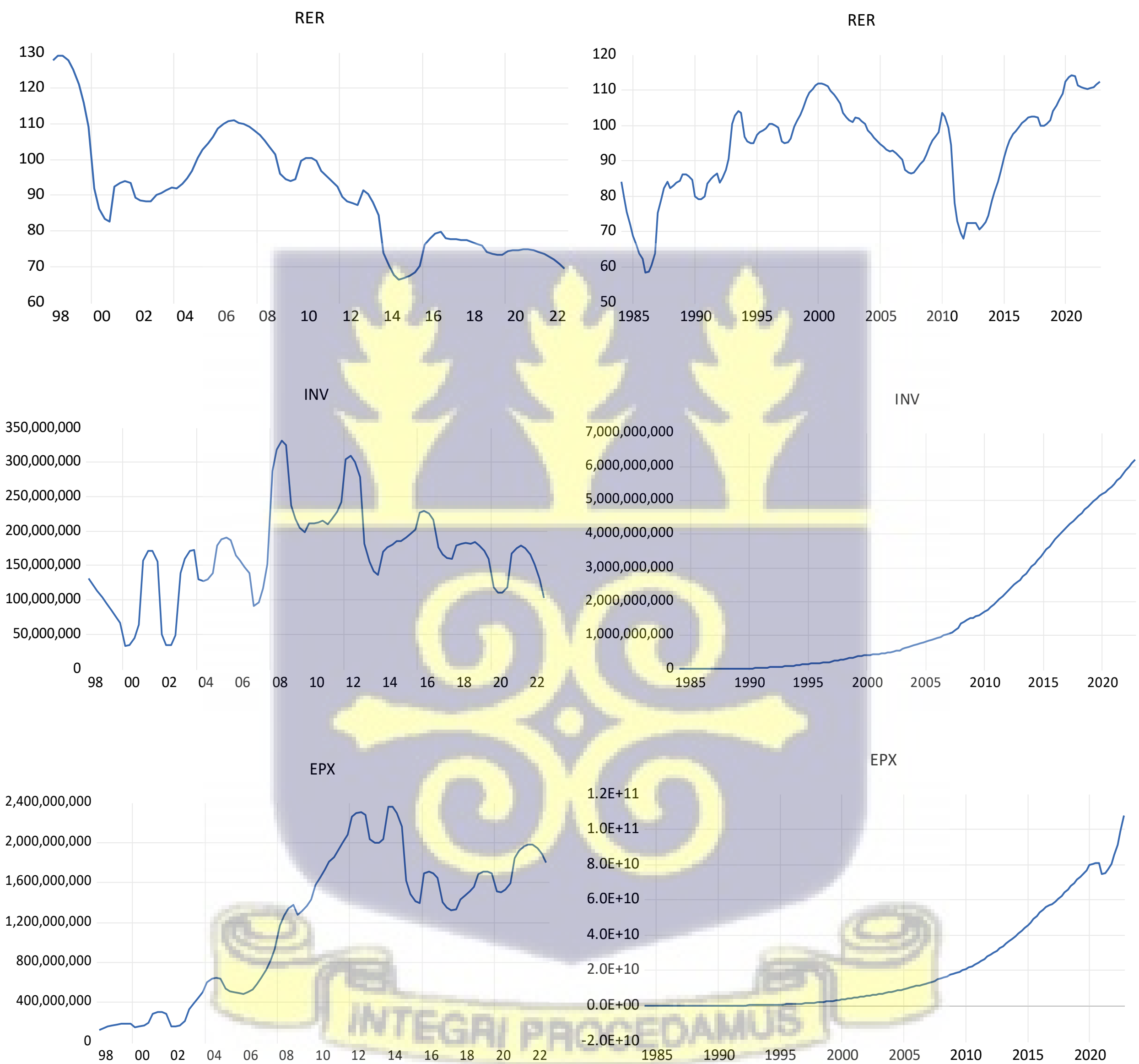
The correlation matrix of the variables investigated in objective one of this study, which considers the impact of export processing zones on exchange rate in Ghana and Bangladesh, is amply displayed in Table 6.2. From the table, it can be observed that there is a negative relationship between each of our explanatory variables and the real effective exchange rate variable for Ghana. For our key regressors of free zones investment and export, this result only goes to buttress the pessimistic view of economists that the policy is welfare-reducing, and this is mainly due to its current treatment as enclaves and also the fact that the chunk of the investment is undertaken by foreign nationals who quickly remit any profits they make to their home countries, thereby making such investments and exports impact the rate of exchange negatively. The negative relationship between Ghana's consumer price index and debt-to-GDP on the one hand, and exchange rate is well established in literature although that of terms of trade runs contrary to expectation but is to be expected taking into consideration the massive reliance of the country's exports on natural resources whose prices are generally unstable and low on the international markets.

In the case of Bangladesh, the opposite relationship is observed between each of our independent variables and the exchange rate variable with the exception of the terms of trade which has a negative association with the dependent variable. The positive association between free zones investment/export and exchange rate is a good one since it shows that more of such investments and exports are needed to strengthen the local currency of that Asian country. For CPI, it is also in line with the observed data under Bangladesh which has actually generally experienced lower levels of inflation over the period compared to Ghana and other developing economies, with such inflation driving growth through increased demand, attracting FDI in the process. Similarly, for debt-to-GDP, if it levels are viewed by investors to be sustainable, they will still bring in their investments which will make more foreign currencies available and hence impacting exchange rate positively.

6.4 Graphical description of study variables

Figure 6. 1 Graphs of study variables (objective one)

Ghana **Bangladesh**



Source: WDI (2022), IMF (2022), GFZA (2022) and BEPZA (2022)

Figure 6.1 shows our variables of interest for each country in graphical form. From the above, it can be quite discerned that the real effective exchange rate for Ghana has been trending generally downwards whilst that of Bangladesh has trended generally upwards, especially in the last few years. This could be attributed to both internal and external factors affecting the individual nations of which in particular, inflation and FDI inflows could be highlighted. Ghana's inflation for the study period for example has hovered around 16.50% on average whilst that of Bangladesh has only been 6.50%, with the high inflation rate noted for causing currency depreciation. Also, total FDI inflows to Ghana for the period stood at less than $2 billion on average whereas the figure for Bangladesh has been in excess of $31 billion. Less foreign capital means less foreign currency which thus places undue pressure on the little that is available leading to a depreciation of the domestic currency.

In terms of our free zones variables, whereas in the case of Ghana, both investment and export have been very much inconsistent, in relation to Bangladesh, the two variables have witnessed very consistent increases over the study period. For its part, the consumer price indices for the two countries have experienced consistent increases over the study period as per the respective graphs. For the debt-to-GDP and terms of trade variables for the two countries, they have generally been trending upwards although an exception could be made for Bangladesh's terms of trade which has rather trended downwards over the period.

6.5 Pre-estimation tests – test of stationarity of selected variables

Table 6. 3 ADF unit root test

	Ghana		Bangladesh	
Variable	**Levels**	**1st difference**	**Levels**	**1st difference**
LRER	-0.7229	-3.1596**	-1.7049	-3.6996***
LINV	-2.4633	-3.8453***	-2.4343	-3.7665***
LEPX	-2.4993	-4.1719***	-1.4263	-10.4168***
LCPI	-1.4717	-4.3379***	0.9590	-5.4163***
LDET	-0.3383	-2.9965**	-1.7982	-2.9611**
LTOT	-1.4245	-4.4532***	-1.2837	-3.9547***

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 6. 4 PP unit root test

	Ghana		Bangladesh	
Variable	**Levels**	**1st difference**	**Levels**	**1st difference**
LRER	-1.8014	-5.3452***	-1.8928	-5.6001***
LINV	-2.6715*	-6.2975***	2.6453	-3.4414***
LEPX	-2.0572	-6.0147***	1.6592	-12.1035***
LCPI	-0.7685	-4.2655***	0.9590	-5.4163***
LDET	-0.9023	-4.8555***	-2.9007	-5.5279***
LTOT	-0.8343	-4.0449***	-0.7712	-6.8634***

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 6. 5 ZA breakpoint unit root test (levels)

	Ghana		Bangladesh	
Variable	**t-statistic**	**Break date**	**t-statistic**	**Break date**
LRER	-4.6261	2013Q1	-3.1351	1986Q3
LINV	-3.3150	2000Q4	-3.7380	2016Q2
LEPX	-2.7040	2006Q1	-3.6280	2013Q3
LCPI	-2.3477	2018Q1	-4.1417	1995Q1
LDET	-3.7686	2005Q1	-3.2660	1989Q1
LTOT	-3.5796	2007Q4	-2.7399	2002Q1

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 6. 6 ZA breakpoint unit root test (first difference)

	Ghana		Bangladesh	
Variable	**t-statistic**	**Break date**	**t-statistic**	**Break date**
LRER	-7.5124***	2000Q1	-7.6084***	1987Q1
LINV	-7.7291***	2001Q1	-4.6658**	1991Q2
LEPX	-6.6987***	2000Q1	-9.8168***	2001Q1
LCPI	-4.9407***	2004Q1	-5.9764***	1987Q1
LDET	-7.3671***	2006Q1	-6.3467***	1987Q1
LTOT	-5.3802***	2012Q1	-7.8023***	1986Q1

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Tables 6.3 to 6.6 show the results of the various unit root tests performed to assure ourselves of the stationarity properties of the study variables. Specifically, Table 6.3 presents the results of the Augmented Dickey-Fuller unit root test, Table 6.4 displays the findings of the Phillips-Perron unit root test, and Tables 6.5 and 6.6 report the results of the Zivot-Andrews unit root test. In simple terms, the Augmented Dickey-Fuller unit root test examines whether the mean of a time series remains constant over time (Dickey & Fuller, 1979). The PP (Phillips-Perron) unit root test, on the other hand, assesses whether the variance of the series is constant over time (Phillips & Perron, 1986). However, both tests often misinterpret structural breaks in the data as the presence of a unit root. The ZA test on the other hand seeks to improve especially on the latter by treating breakpoint endogenously (Zivot & Andrews, 1990).

From both the ADF and PP unit root tests, all our selected variables are unstationary at levels as per their respective *p-values*. However, the unstationary series attain stationarity after first differencing. Again, similar results are reported for the unit root test with structural breaks for the two countries with all the variables being without unit root only after first differencing. The end effect of all these stationarity test results is the fact that crucially, none of the variables is stationary after second differencing thereby allowing us to utilise the selected ARDL model which can be applied on a blend of I(0) and I(1) series or pure I(1) variables.

6.6 Pre-estimation tests – selection of suitable lag length for the ARDL model

Table 6. 7 Lag order selection

Ghana						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	20.0929	NA	3.00e-08	-0.2936	-0.1333	-0.2288
1	988.109	1794.864	1.11e-16	-19.7106	-18.5887	-19.2571
2	1132.712	250.0422*	1.17e-17*	-21.9732*	-19.8896*	-21.1310*
3	1156.199	37.6767	1.55e-17	-21.7125	-18.6673	-20.4816
4	1176.151	29.51316	2.25e-17	-21.3782	-17.3714	-19.7585
Bangladesh						
0	186.485	NA	3.75e-09	-2.3748	-2.2554	-2.3263
1	2146.126	3738.788	3.82e-20	-27.6859	-26.8503	-27.3464
2	2411.724	485.7658*	1.86e-21*	-30.7069*	-29.1552*	-30.0765*
3	2429.286	30.7331	2.39e-21	-30.4643	-28.1964	-29.5430
4	2437.969	14.5100	3.46e-21	-30.1049	-27.1208	-28.8926

Source: Authors' calculation from Eviews 13.

* indicates the lag length selected by a particular criterion

Results based on the various lag order selection criteria for the two countries are displayed in Table 6.7. For both countries, lag 2 was chosen as the optimal lag length for which reason the succeeding analysis is based on the second lag.

6.7 The bounds test for cointegration in an ARDL framework

Table 6. 8 Bounds cointegration test results

Ghana			**Bangladesh**	
Dependent variable	**F-statistic**		**Dependent variable**	**F-statistic**
LRER	5.23***		*LRER*	4.14**
LINV	5.46***		*LINV*	2.08
LEPX	3.65*		*LEPX*	7.49***
LCPI	1.72		*LCPI*	1.11
LDET	1.68		*LDET*	2.20
LTOT	2.32		*LTOT*	1.98
Critical values				
Level of significance	Lower bound I(0)	Upper bound I(1)		
1%	3.41	4.68		
5%	2.62	3.79		
10%	2.26	3.35		

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

In Table 6.8, the cointegration test results based on the bounds technique are well-presented. The null hypothesis of the bounds cointegration test is that there is no cointegration, against the alternative that there is. According to Pesaran et al. (2001), the criterion for rejecting the null hypothesis is based on whether the calculated *F-statistic* exceeds the critical value of the upper bound. If the *F-statistic* is greater than this upper bound, the null hypothesis is rejected. More specifically, when the *F-statistic* is greater than the I(1) upper bound, the null is rejected, if it is less than the I(0) lower bound, we cannot reject the null hypothesis of no cointegration, and the result is indeterminate if *F-statistic* is between the lower bound and the upper bound. The above results are based on case three of the bounds test where there is the unrestricted constant and no trend.

From the table, at the 5% level of significance, the I(1) upper bound critical value is 3.79. Thus, for our two respective countries under study, there are only two cointegrating equations for Ghana and Bangladesh. In specific terms, in the case of Ghana, when real effective exchange rate and export processing zones investment are used in turns as the dependent variable, there is cointegration or long-run relationship among our series. Similarly, with Bangladesh, there is cointegration when real effective exchange rate and export processing zones export are used as the target variables.

6.8 Post-estimation robustness tests

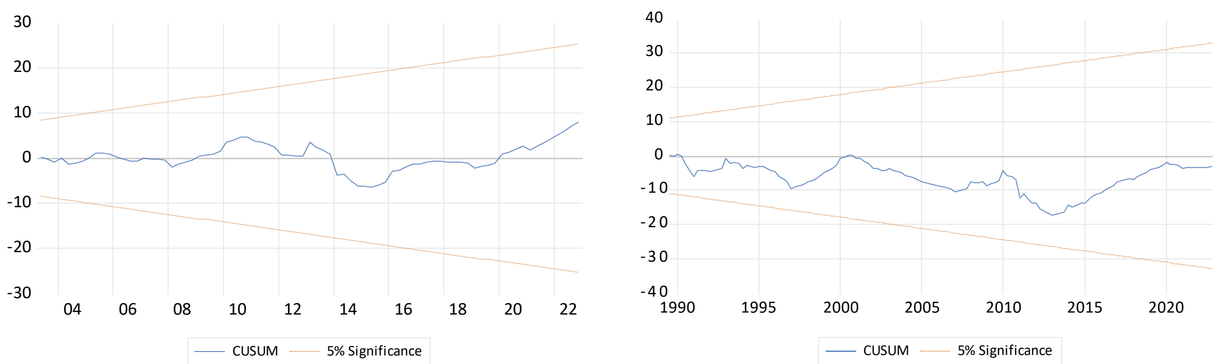
Table 6. 9 Diagnostic checks

Ghana				**Bangladesh**		
Test	**Statistic**	**Probability**		**Test**	**Statistic**	**Probability**
Serial correlation	1.6636	0.4353		Serial correlation	7.1209	0.1284
Heteroscedasticity	13.6622	0.2523		Heteroscedasticity	14.5641	0.3353
Functional form	0.0937	0.9106		Functional form	0.2460	0.7823

Source: Authors' calculation from Eviews 13.

Figure 6. 2 Test of model stability

Ghana **Bangladesh**



Source: Authors' construction from Eviews 13.

Table 6.9 and Figure 6.2 are in respect of the various post-estimation diagnostic checks conducted based on the use of real effective exchange rate as the key dependent variable in our analysis. The table displays the results of the Breusch-Godfrey Serial Correlation LM test, the Breusch-Pagan-Godfrey heteroscedasticity test and the Ramsey reset test. For the serial correlation and the heteroscedasticity tests, the null hypotheses are that there is no serial correlation and the model is homoscedastic respectively. From the table, the *p-values* for the respective test statistics for the two countries are all in excess of the conventional 5% level of significance. We therefore conclude that there is no issue of serial correlation or heteroscedasticity in the selected model when the real effective exchange rate is used as the target variable. For the Ramsey reset test, the null is that the model is correctly specified and with its *p-value* above the 5% threshold for both countries, we cannot reject the null hypothesis.

Also, Figure 6.2 shows the graph of the cumulative sum (CUSUM) test. The graph speaks to the stability of the chosen model. In the two graphs above, the blue line lies within the 5% red boundary for each country. The implication of this is that the selected model, when used with the real effective exchange rate as the dependent variable, is dynamically stable.

6.9 Estimation of the ARDL model

Table 6. 10 Long and short-run estimates with *LRER* as the dependent variable

Ghana					Bangladesh			
Variable	**Coefficient**	**S.E.**	**t-stat**		**Variable**	**Coefficient**	**S.E.**	**t-stat**
Long-run estimates					**Long-run estimates**			
LINV(-1)	0.1793**	0.0821	2.1839		*LINV(-1)*	0.1586*	0.0945	1.6783
LEPX(-1)	-0.1513*	0.0843	-1.7936		*LEPX*	-0.0516	0.0634	-0.8137
LCPI(-1)	0.0223	0.0610	0.3648		*LCPI*	0.1777	0.1208	1.4715
LDET	-0.1585**	0.0602	-2.6320		*LDET(-1)*	0.2590	0.2205	1.1745
LTOT	-0.2053	0.2517	-0.8159		*LTOT(-1)*	0.9349***	0.1840	5.0810
Short-run estimates					**Short-run estimates**			
D(LRER(-1))	0.4455***	0.0775	5.7496		*D(LRER(-1))*	0.6393***	0.0545	11.726
D(LINV)	0.0525***	0.0157	3.3428		*D(LINV)*	0.3050***	0.0768	3.9714
D(LINV(-1))	-0.032***	0.0107	-2.9906		*D(LINV(-1))*	-0.2850***	0.0726	-3.9256
D(LEPX)	0.0324	0.0323	1.0043		*D(LDET)*	-0.5724***	0.1167	-4.9034
D(LCPI)	-0.2506**	0.0981	-2.5537		*D(LDET(-1))*	0.4437***	0.1214	3.6542
C	0.8658***	0.1497	5.7821		*D(LTOT)*	0.5660***	0.0803	7.0471
ECT_{t-1}	-0.1493***	0.0259	-5.7624		*D(LTOT(-1))*	-0.4193***	0.0769	-5.4531
					C	-0.3245***	0.0639	-5.0807
					ECT_{t-1}	-0.0976***	0.0192	-5.0714
Adjusted R^2	0.5563				Adjusted R^2	0.6064		
F-statistic	21.2690				F-statistic	30.4644		
Prob. (F-stat)	0.0000				Prob. (F-stat)	0.0000		

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance. Also, *RER, INV, EPX, CPI, DET* and *TOT* respectively represent the real effective exchange rate, export processing zones investment, export processing zones export (with both EPZ variables measured in billions of $), consumer price index, debt-to-GDP and terms of trade.

With the presence of cointegration, we can go ahead and investigate the speed of adjustment. This can be done with the estimation of the error correction representation in the ARDL framework. In this test, the ECT replaces the ARDL long-run terms. The coefficient of the ECT shows the adjustment speed to long-run equilibrium and has to be negative and statistically significant so that the model is not considered unstable and explosive, meaning a failure of convergence. Table 6.10 therefore shows the results of the ECM when real effective exchange rate is used as the target variable and there is cointegraion for both Ghana and Bangladesh.

The results indicate a speed of adjustment of 0.1493 for Ghana and 0.0976 for Bangladesh. This means that about 15% of departures from short-run equilibrium is corrected each period relative to Ghana, implying that it takes about 6.7 quarters (1.7 years) for any such deviations to be corrected, whilst with regards to Bangladesh just about 10% of such departures is corrected each period, or it takes two and half years to correct any such disequilibrium. Overall, it means investments into the zones and exports from the zones take quite some time to impact the rate of exchange in the two countries. By their significant negative signs however, it can also be inferred that there is long-run Granger causality jointly from the regressors to the dependent variable for both countries. Also, in terms of the adjustment speed, the difference of nearly 5% could be attributed to several factors including regulatory efficiency, political instability, exposure to global trends, level of financial market development, stricter capital controls among others. With

Bangladesh having a relatively longer timespan in terms of the data for this study, it could be that during those early years of the programme in that country, these forces aforementioned were not pointing in the right direction or not in a good place, and an example is the case of the stricter capital controls which were all in place, thereby slowing down the speed of adjustment.

The table above also shows the long and short-run coefficients (with the difference operator). Here, in terms of Ghana, for the long-run results, only free zones investment has a statistically significant positive effect on the real effective exchange rate variable, with a unit increase in free zones investment leading to 0.1793 unit increase in exchange rate. This indicates that increased investment in free zones contributes to the strengthening of the domestic currency in the long-run. This finding aligns with Johansson's (1994) assertion of the welfare-enhancing benefits associated with the policy, as stronger currencies are typically linked to higher levels of economic development. This result finds empirical support in papers such as Bank-Ola (2021), Ezeji et al. (2021) and Iavorschi (2014). In the case of Bangladesh, however, none of the export processing zones variables were found to have a significant impact on the exchange rate in the long-run.

Also, Ghana’s debt-to-GDP has significant negative effect on the exchange rate whilst there is significant long-run positive effect of terms of trade on the real effective exchange rate for Bangladesh. For Ghana, a unit increase in debt-to-GDP leads to 0.1585 unit depreciation in the exchange rate, supporting earlier papers such as Aderemi et al. (2020) and Elhendawy (2022). In terms of Bangladesh’s result, a unit increase in terms of trade appreciates the rate of exchange by 0.9349 units in the long-run, consistent with Sachs (2018) and Schmitt-Grohé and Uribe (2018).

In the short-run analysis, current EPZ investment was found to have a significant positive impact on the exchange rate for both countries. However, the one-period lag value of that variable showed a negative effect on the exchange rate in the short run for both countries. By way of magnitude, if Ghana's free zones investment goes up by a unit in the current term, exchange rate appreciates by 0.0525 units whereas in the case of Bangladesh, a unit increase in such investments leads to a 0.3050 unit appreciation of the exchange rate. The difference in the magnitudes may be as a result of Ghana's generally poor performance over the period in terms of its currency depreciation against other currencies, compared to Bangladesh. These results however support the new growth theory argument of export processing zones, highlighting their key role in national economic development in developing countries (Johansson, 1994) and are empirically supported by Bank-Ola (2021), Ezeji et al. (2021) and Iavorschi (2014). After a period of one lag however, the effect of free zones investment inflows on the rate of currency exchange is negative for the two countries, meaning depreciation. By way of specifics, for Ghana, a unit increase in investment into the zones reduces exchange rate by 0.0320 units after one quarter while that of Bangladesh is one unit to 0.2850 units. These results are detrimental to development all things being equal but buttress the neoclassical theory by Hamada (1974) which argues that EPZs are welfare-reducing. There is however no significant causal impact of free zones exports on the rate of exchange for the two countries.

Again, for Ghana, current consumer price index has significant short-run negative causal effect on exchange rate with an increase in CPI leading to currency depreciation by 0.2506 units, in line with papers such as Egilsson (2020) and Precious (2020). In terms of Bangladesh, both debt-to-GDP and terms of trade affect exchange rate. Specifically, a unit increase in current levels of debt-to-GDP negatively affects the real effective exchange rate by 0.5724 units whilst lag one value of the same variable positively impacts exchange rate by 0.4437 units. Whereas the positive impact of debt-to-GDP on exchange rate goes against conventional literature, the negative result is consistent with the earlier long-run result observed under Ghana. The opposite is however observed for terms of trade where a unit increase in its current value appreciates the exchange rate by 0.5660 units, finding empirical support in earlier studies including Sachs (2018) and Schmitt-Grohé and Uribe (2018) whilst the one period lag value of it has a 0.4193 units negative causal impact on exchange rate.

6.10 Causal analysis

Table 6. 11 Pairwise Granger causality test results

Null hypothesis	Ghana (F-statistic)	Bangladesh (F-statistic)
LINV does not Granger-cause *LRER*	0.38787	1.9926
LRER does not Granger-cause *LINV*	0.79048	5.6063***
LEPX does not Granger-cause *LRER*	1.21661	3.5857**
LRER does not Granger-cause *LEPX*	0.09401	1.1416
LCPI does not Granger-cause *LRER*	1.56186	0.8632
LRER does not Granger-cause *LCPI*	2.85417*	0.98145
LDET does not Granger-cause *LRER*	1.90847	2.9346*
LRER does not Granger-cause *LDET*	0.20397	1.6936
LTOT does not Granger-cause *LRER*	1.82260	1.1532
LRER does not Granger-cause *LTOT*	0.69771	0.4168
LEPX does not Granger-cause *LINV*	4.92614**	3.3012**
LINV does not Granger-cause *LEPX*	5.88040***	31.0135***
LCPI does not Granger-cause *LINV*	2.79578*	3.9999**
LINV does not Granger-cause *LCPI*	9.86208***	0.0085
LDET does not Granger-cause *LINV*	0.89324	1.7513
LINV does not Granger-cause *LDET*	0.20608	0.0106
LTOT does not Granger-cause *LINV*	3.27588**	1.3288
LINV does not Granger-cause *LTOT*	3.52003**	1.9502
LCPI does not Granger-cause *LEPX*	1.13606	4.8906**
LEPX does not Granger-cause *LCPI*	3.08441*	0.6890

LDET does not Granger-cause *LEPX* *LEPX* does not Granger-cause *LDET*	0.48081 0.52361	0.0065 0.0307
LTOT does not Granger-cause *LEPX* *LEPX* does not Granger-cause *LTOT*	2.82564* 5.65219***	4.9841** 4.8964**
LDET does not Granger-cause *LCPI* *LCPI* does not Granger-cause *LDET*	3.18077** 0.65854	0.1622 0.7717
LTOT does not Granger-cause *LCPI* *LCPI* does not Granger-cause *LTOT*	0.07140 6.48555***	2.3452* 1.7702
LTOT does not Granger-cause *LDET* *LDET* does not Granger-cause *LTOT*	1.48286 0.33107	0.4855 0.5493

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 6.11 also presents the results of the pairwise Granger causality test for both Ghana and Bangladesh. From the table, both export processing zones investment and export Granger-cause each other for both Ghana and Bangladesh. More importantly for Bangladesh, export processing zones export Granger-causes real effective exchange rate while real effective exchange rate Granger-causes free zones investment. In terms of Ghana, there is Granger causality from EPZ investment to CPI, from EPZ export to terms of trade, from debt-to-GDP to CPI and from CPI to terms of trade, likewise between terms of trade and free zones investment and vice versa. Granger causality also runs from terms of trade to free zones export and vice versa and separately from CPI to the two export processing zones variables for Bangladesh.

6.11 Conclusion

In chapter six above, we have presented and discussed the ARDL model results as part of our analysis of the impact of export processing zones investment and export on the rate of exchange in Ghana and Bangladesh. With this, various tests were conducted both prior to and after the estimation of the selected model. We have thus highlighted in particular, issues such as descriptive statistics, correlation matrix, graphs of the variables used in achieving our objective, unit root tests, lag order selection, cointegration test and various diagnostic tests. The ARDL model too has been fully estimated and its results discussed in which we have seen the rather limited role of EPZs in stabilising the exchange rates of the countries under study. There is also a discussion on Granger causality test as part of our analysis.

CHAPTER SEVEN

DISCUSSION OF RESULTS ON THE EFFECT OF EXPORT PROCESSING ZONES INVESTMENT ON ECONOMIC GROWTH

7.1 Introduction

Chapter seven presents and discusses the results related to the second objective of the study following the estimation of the selected model. Issues such as descriptive statistics, correlation matrix and graphs of the various variables employed in achieving the stated objective are presented and discussed. Others include results on the selection of the appropriate lag length, unit root test, cointegration test, the NARDL estimates as well as various post-estimation diagnostic tests.

7.2 Descriptive statistics

Table 7. 1 Results of descriptive statistics

Ghana							
	Real GDP growth rate (RGP)	*Positive shocks in EPZ investment* (INV^{+})	*Negative shocks in EPZ investment* (INV^{-})	*Inflation (INF)*	*Real effective exchange rate (RER)*	*Government consumption expenditure (GCP)*	*Population growth (POG)*
Mean	5.58	14.73	-16.03	16.47	90.27	12.79	2.42
Maximum	14.47	305.25	0.00	46.26	129.11	86.56	2.76
Minimum	0.10	0.00	-301.91	6.63	66.20	-25.93	1.91
Std. dev.	2.78	42.94	42.39	9.65	15.80	22.99	0.23
Probability	0.00	0.00	0.00	0.00	0.06	0.00	0.19
Observations	100	100	100	100	100	100	100

Bangladesh							
	Real GDP growth rate (RGP)	*Positive shocks in EPZ investment* (INV^{+})	*Negative shocks in EPZ investment* (INV^{-})	*Inflation (INF)*	*Real effective exchange rate (RER)*	*Government consumption expenditure (GCP)*	*Population growth (POG)*
Mean	5.32	0.98	-2.20	6.54	92.96	5.46	1.62
Maximum	8.45	20.82	0.00	11.78	114.08	14.22	2.74
Minimum	2.30	0.00	-48.66	1.56	58.38	-1.25	0.84
Std. dev.	1.36	2.73	5.47	2.32	13.45	3.49	0.47
Probability	0.18	0.00	0.00	0.65	0.01	0.11	0.03
Observations	156	156	156	156	156	156	156

Source: Authors' calculation from EViews 13.

Table 7.1 amply displays the descriptive statistics of the study's objective two. In respect of the dependent variable, the quarterly figures indicate that Ghana's average real GDP growth rate for the period has been 5.58% while that of Bangladesh stood at 5.32%. For this same variable, the maximum figures for the two countries have been 14.47% and 8.45% whereas the minimum figures have also been 0.10% and 2.30% respectively. Relative to our key explanatory variable (export processing zones investment), segregated into its component shocks, the average quarterly growth rate for Ghana in terms of the positive shocks has been 14.73% and that of Bangladesh has also been 0.98%. The maximum and minimum positive shocks for the two countries during the study period were 305.25% and 0.00 for Ghana, and 20.82% and 0.00 for Bangladesh, respectively. Regarding the negative shocks in free zones investment, the recorded mean for Ghana is -16.03% and Bangladesh's figure has been -2.20%. Whereas 0.00 is the maximum value for these negative shocks for both countries, the minimum for Ghana during the period has been -301.91% and that of Bangladesh is -48.66%.

For the other endogenous variables that serve as control variables, the headline inflation in Ghana has averaged 16.47%, peaking at 46.26%, with a minimum of 6.63%. The respective figures for Bangladesh on the other hand have been 6.54%, 11.78% and 1.56%. In terms of the real effective exchange rate variable, the rate of exchange for Ghana has witnessed a quarterly average of 90.27, a maximum of 129.11, with 66.20 being the lowest over the period. In the case of Bangladesh, the mean has been 92.96, with 114.08 and 58.38 being the highest and lowest figures respectively. On the other hand, concerning the selected final government consumption expenditure variable, the quarterly growth rate has witnessed a mean figure of 12.79%, a maximum of 86.56% and a minimum of -25.93% for Ghana and Bangladesh, the respective figures have been 5.46%, 14.22% and -1.25% during the period. Finally, relative to the population variable, whereas the average growth rate for Ghana has been 2.42%, the average figure has been 1.62% for Bangladesh. Ghana's highest-ever recorded rate in terms of population growth during the study period has been 2.76% with 1.91% being its lowest figure. Bangladesh on the other hand has recorded a maximum growth rate of 2.74% and a minimum of 0.84%.

7.3 Correlation matrix

Table 7. 2 Correlation results

Ghana						
	RGP	*INV*	*INF*	*RER*	*GCP*	*POG*
RGP	1.0000					
INV	0.0871*	1.0000				
INF	-0.3480***	0.4442***	1.0000			
RER	0.3253***	0.1026*	-0.0474*	1.0000		
GCP	0.2933***	0.1382*	0.1617*	0.3139***	1.0000	
POG	0.1519*	0.2752**	0.2116**	0.6645***	0.1414*	1.0000
Bangladesh						
	RGP	*INV*	*INF*	*RER*	*GCP*	*POG*
RGP	1.0000					
INV	-0.4331***	1.0000				
INF	0.0574*	0.3642***	1.0000			
RER	0.1816**	-0.6218***	-0.5322***	1.0000		
GCP	0.4825***	-0.2076**	-0.1757**	0.1824**	1.0000	
POG	-0.7262***	0.6508***	-0.0416*	-0.3061***	-0.3184***	1.0000

Source: Authors' calculation from Eviews 13.

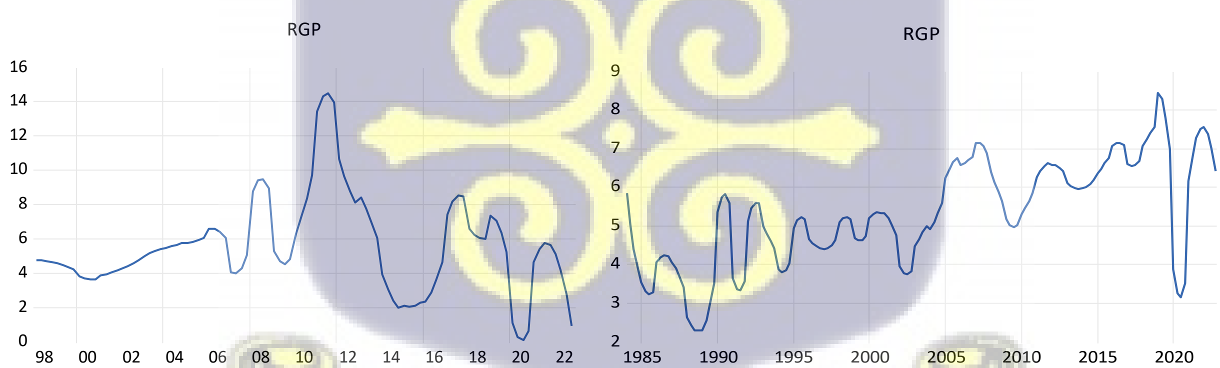
***, ** and * respectively show 1%, 5% and 10% levels of significance.

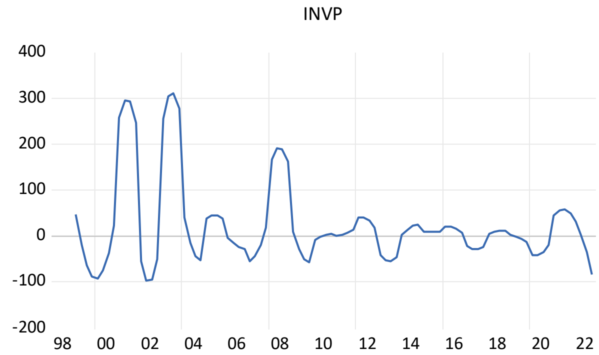
Table 7.2 reports results from the correlation test for the second paper which looks at the effect of free zones investment on economic growth in the two countries of study. The results indicate a weak positive relationship between our key explanatory variable and economic growth for Ghana and a somewhat below average negative association between the two variables in relation to Bangladesh. Regarding the weak and even insignificant as well as negative relationships between our key free zones variable and economic growth for the two countries, neither of them comes as a surprise as it only buttresses the pessimistic view help by economists in line with Hamada's neoclassical theory (Hamada, 1974). This is because of the fact that production largely takes place in specific enclaves especially in the case of Bangladesh, thereby limiting the impact of the policy on the broader economy, coupled with the fact that the production activities are undertaken mostly by foreigners who may end up repatriating all their profits out of the EPZ host country. Also, in line with established literature, inflation is observed to have a weak negative correlation with growth while all the remaining variables have weak positive association with the dependent variable in the case of Ghana. Bangladesh also has fairly weak positive relationship between all its remaining variables and economic growth, with the exception of the population variable which happens to have a strong negative correlation with the target variable.

7.4 Graphical description of study variables

Figure 7. 1 Graphs of study variables (objective two)

Ghana **Bangladesh**




INVP
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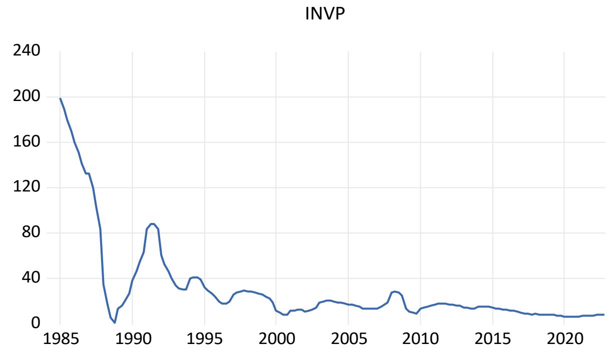
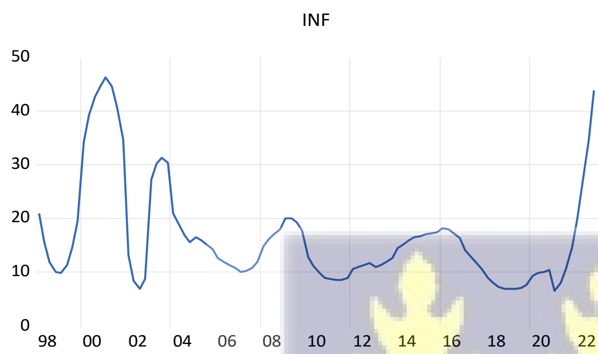
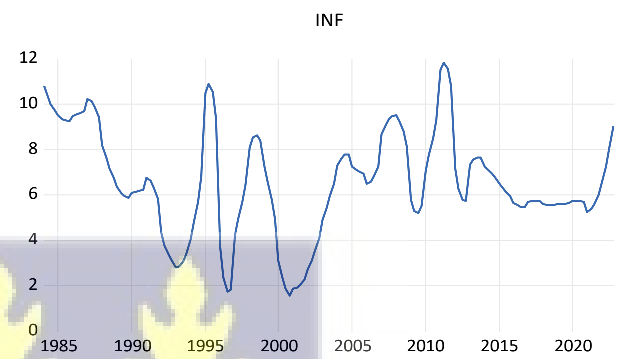
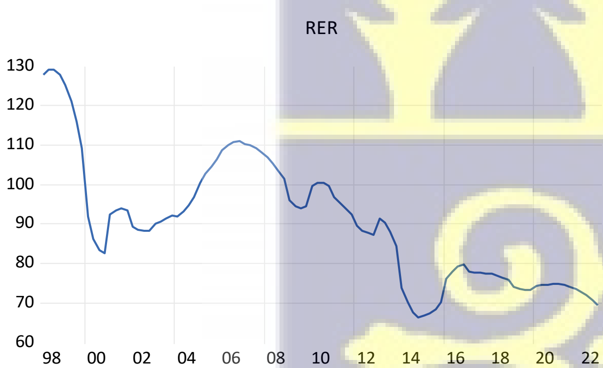
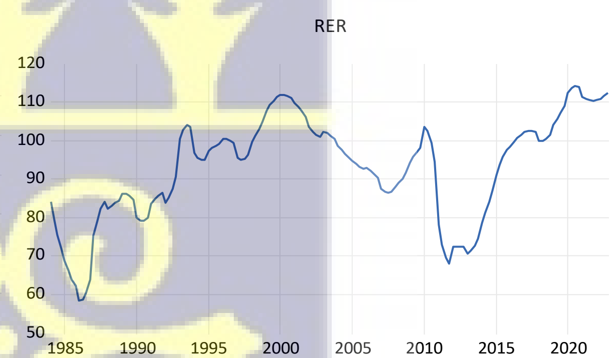
300
200
100
0
-100
-200
98 00 02 04 06 08 10 12 14 16 18 20 22


INVP
240
200
160
120
80
40
0
1985 1990 1995 2000 2005 2010 2015 2020


INF
50
40
30
20
10
0
98 00 02 04 06 08 10 12 14 16 18 20 22


INF
12
10
8
6
4
2
0
1985 1990 1995 2000 2005 2010 2015 2020


RER
130
120
110
100
90
80
70
60
98 00 02 04 06 08 10 12 14 16 18 20 22


RER
120
110
100
90
80
70
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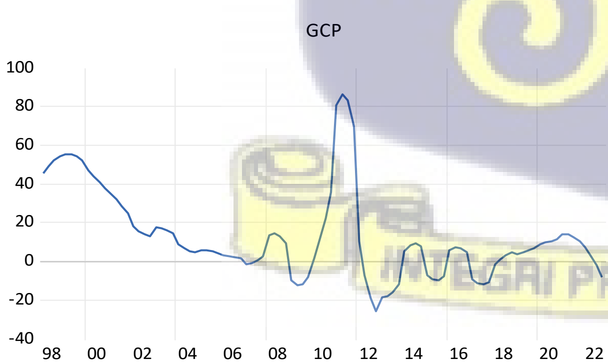
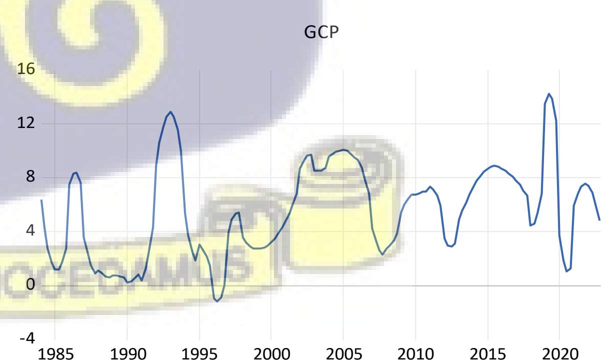
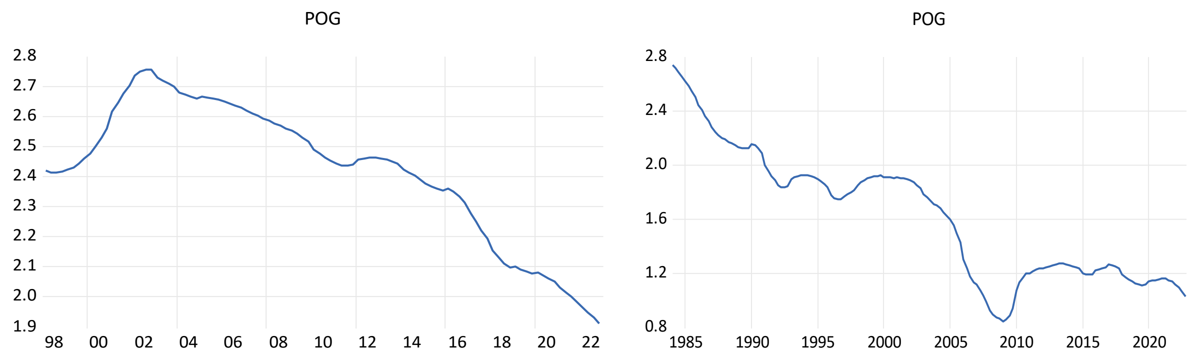
50
1985 1990 1995 2000 2005 2010 2015 2020


GCP
100
80
60
40
20
0
-20
-40
98 00 02 04 06 08 10 12 14 16 18 20 22


GCP
16
12
8
4
0
-4
1985 1990 1995 2000 2005 2010 2015 2020



Source: WDI (2022), ILO (2022), GFZA (2022) and BEPZA (2022)

Figure 7.1 graphically describes the variables selected for the achievement of the second objective of this study. It is pretty clear from the above that both Ghana and Bangladesh have been experiencing what could best be described as inconsistencies in their quarterly real GDP growth rates. Relative to our key explanatory variable which is the growth rate of export processing zones investment, the graphs indicate a lack of consistent growth in the case of Ghana while that of Bangladesh could be said to be stable especially looking at the recent years. For the next three variables – inflation, real effective exchange rate, and government expenditure – the analysis shows varied trends. While the real effective exchange rate has generally been falling for Ghana and rising for Bangladesh in recent times, the overall conclusion drawn from the respective graphs indicates a lack of consistency in these trends. However, for the population growth rate variable, the graphs indicate a downward trend, especially for Ghana.

7.5 Pre-estimation tests – test of stationarity of selected variables

Table 7. 3 ADF unit root test

Ghana			Bangladesh		
Variable	**Levels**	**1st difference**	**Variable**	**Levels**	**1st difference**
RGP	-3.6725**		*RGP*	-4.1980***	
INV	-7.0325***		*INV*	-4.5186***	
INF	-3.6773**		*INF*	-4.9332***	
RER	-2.6329*	-5.2701**	*RER*	-2.7370*	-6.5410***
GCP	-4.3073***		*GCP*	-5.1022***	
POG	-3.3386*	-5.3288***	*POG*	-1.7802	-3.5349**

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 7. 4 PP unit root test

Ghana			Bangladesh		
Variable	**Levels**	**1st difference**	**Variable**	**Levels**	**1st difference**
RGP	-2.6252*	-5.7655***	*RGP*	-2.3067	-9.4916***
INV	-4.0550***		*INV*	-4.7626***	
INF	-2.4330	-5.2807***	*INF*	-3.1219**	
RER	-2.1363	-5.2538***	*RER*	-1.7279	-5.6451***
GCP	-2.9218**		*GCP*	-3.3288**	
POG	-2.1123	-3.5967**	*POG*	-2.0936	-4.4452***

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 7. 5 ZA breakpoint unit root test (levels)

Ghana			Bangladesh		
Variable	**t-statistic**	**Break date**	**Variable**	**t-statistic**	**Break date**
RGP	-4.9695**	2013Q3	*RGP*	-8.0683***	2019Q1
INV	-8.5277***	2000Q4	*INV*	-8.2017***	1987Q1
INF	-5.2231**	2022Q1	*INF*	-5.9454***	2003Q4
RER	-5.0094**	2013Q1	*RER*	-4.0608	2003Q4
GCP	-5.7687***	2011Q1	*GCP*	-5.9626***	2019Q1
POG	-4.7700*	2016Q1	*POG*	-4.2042	2004Q1

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 7. 6 ZA breakpoint unit root test (first difference)

Ghana			Bangladesh		
Variable	**t-statistic**	**Break date**	**Variable**	**t-statistic**	**Break date**
RGP			*RGP*		
INV			*INV*		
INF			*INF*		
RER			*RER*	-8.6516***	2011Q1
GCP			*GCP*		
POG	-5.1216**	2002Q1	*POG*	-4.8772**	2009Q1

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Tables 7.3 – 7.6 all report the *t-test* results from the various unit root tests conducted to ascertain the stationarity properties of the selected variables. Specifically, Table 7.3 deals with the ADF unit root test (Dickey & Fuller, 1979), Table 7.4 considers the PP unit root test (Phillips & Perron, 1986) and Tables 7.5 and 7.6 report the results of the Zivot-Andrews unit root test (Zivot & Andrews, 1990). In simple terms, the ADF unit root test examines whether the mean of a series remains constant over time, while the PP unit root test checks if the variance of the series is constant over time. However, both tests often misinterpret a structural break as a unit root. The ZA test, on the other hand, aims to improve upon this limitation, particularly for the PP test, by treating breakpoints as endogenous.

From the tables, regarding the ADF unit root test, with the exception of the real effective exchange rate and population growth rate for both Ghana and Bangladesh, all the series are stationary at levels. However, in terms of the PP unit root test, for Ghana, while free zones investment and government consumption expenditure are without unit root, the remaining variables are only stationary after first differencing. Bangladesh on the other hand has the free zones variable, government expenditure and inflation to be stationary whereas the three remaining variables only become stationary after first differencing.

Regarding the unit root test with structural breaks also, results from Table 7.5 indicate that relative to Ghana, apart from population growth, all the remaining variables are without unit root while for Bangladesh, both population growth rate and the exchange rate variable are unstationary. All the unstationary variables however attain stationarity after first differencing as seen in Table 7.6. From the foregoing, with NARDL being able to accommodate a mix of I(0) and I(1) variables, or only I(1) series, these results allowed for the application of the selected model to investigate the effect of EPZ investment on the growth of the economies of Ghana and Bangladesh.

7.6 Selection of suitable lag length for the NARDL model

Table 7. 7 Lag order selection

Ghana						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1801.1408	NA	4.64e+09	39.2857	39.4501	39.3521
1	-1110.1236	1276.880	3043.221	25.0462	26.1974	25.5108
2	-981.4418	220.9970*	409.7325*	23.0313*	25.1694*	23.8943*
3	-959.7034	34.4979	572.6530	23.3414	26.4662	24.6026
4	-946.0313	19.9137	976.0595	23.8268	27.9384	25.4863
Bangladesh						
0	-2186.78	NA	298030.8	29.6322	29.7537	29.6816
1	-979.147	2301.037	0.0397	13.7993	14.6499	14.1449
2	-763.968	392.5559*	0.0035*	11.3780*	12.9576*	12.0197*
3	-739.131	43.2984	0.0041	11.5288	13.8375	12.4668
4	-731.01	13.4983	0.0061	11.9055	14.9433	13.1398

Source: Authors' calculation from Eviews 13.

* indicates the lag length selected by a particular criterion

Table 7.7 above reports results of the lag selection test conducted. This is based on the various selection criteria. From the table, lag 2 was selected as the ideal number of lags for both Ghana and Bangladesh. The analysis that follows in this work was therefore undertaken based on lag 2 which happened to produce both meaningful and robust results for the two countries.

7.7 The bounds test for cointegration in an NARDL framework

Table 7. 8 Bounds cointegration test results

Ghana		**Bangladesh**
F-statistic: 3.7388		F-statistic: 5.0065
	Critical values	
Significance level	I(0)	I(1)
1%	3.15	4.43
5%	2.45	3.61
10%	2.12	3.23

Source: Authors' calculation from Eviews 13.

Results from the bounds cointegration test are also displayed in Table 7.8. The null hypothesis of this test is that there is no cointegration. The criterion for accepting or rejecting the null hypothesis is based on the calculated *F-statistic* relative to the I(0) lower bound and I(1) upper bound critical values of the bounds test. When the *F-statistic* exceeds the I(1) upper bound critical value, the null hypothesis is rejected. Therefore, from the above, in the case of both Ghana and Bangladesh, since the calculated *F-statistic* is more than the I(1) critical value at the conventional 5% significance level, we reject the null in favour of the alternative. Rejecting the null hypothesis indicates that the study variables are cointegrated, even in the presence of asymmetry. Cointegration also means there is long-run equilibrium relationship among our series, and this allows for the estimation of the asymmetric ECM in the NARDL framework.

7.8 Post-estimation robustness tests

Table 7. 9 Diagnostic checks

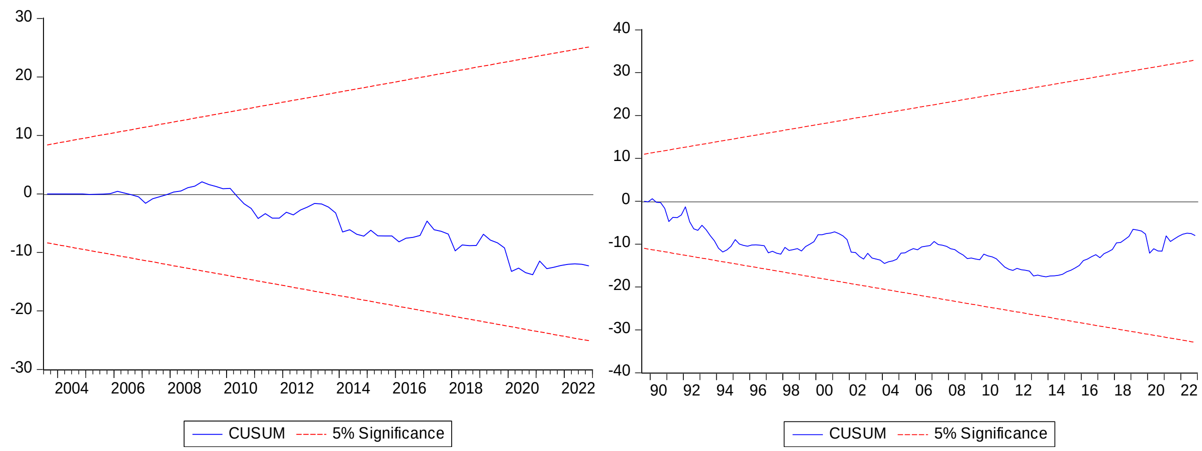
Ghana				Bangladesh		
Test	**Statistic**	**Probability**		**Test**	**Statistic**	**Probability**
Serial correlation	0.5621	0.5723		Serial correlation	5.2925	0.0613
Heteroscedasticity	12.1373	0.5953		Heteroscedasticity	5.4494	0.2014
Functional form	0.0178	0.9823		Functional form	0.5741	0.5646

Source: Authors' calculation from Eviews 13.

Table 7.9 displays the various diagnostic tests conducted after the estimation of the NARDL model. These results pertain to serial correlation test, heteroscedasticity test, and the functional form of the model. With the null hypotheses of both the serial correlation test and the heteroscedasticity test stating that there is neither serial correlation nor heteroscedasticity, we cannot reject the respective nulls for the two countries since the reported *p-values* for both Ghana and Bangladesh are far above the 5% level of significance. Similarly, conclusions could be drawn with respect to the functional form of the model selected for the two countries with the *p-value* greater than 5%. This means that based on the Ramsey reset test, the model is well-specified for both Ghana and Bangladesh.

Figure 7. 2 Test of model stability

Ghana **Bangladesh**



Source: Authors' construction from Eviews 13.

Figure 7.2 also shows the graphs of the cumulative sum (CUSUM) test. The CUSUM graph talks about the stability of the chosen model. In the two graphs above for both countries, the blue line lies within the 5% red boundary. The conclusion therefore is that the selected model is dynamically stable.

7.9 Estimation of the NARDL model

Table 7. 10 Asymmetric error correction model estimates

Ghana				Bangladesh			
Variable	**Coefficient**	**S.E.**	**t-stat**	**Variable**	**Coefficient**	**S.E.**	**t-stat**
Long-run estimates				**Long-run estimates**			
RGP(-1)	-0.1798***	0.0446	-4.0344	*RGP(-1)*	-0.1797***	0.0361	-4.9794
INV^{+}*(-1)*	0.0001	0.0012	0.1007	INV^{+}*(-1)*	-0.0016	0.0025	-0.6388
INV^{-}*(-1)*	-0.0004	0.0013	-0.3183	INV^{-}*(-1)*	-0.0008	0.0014	-0.5231
INF(-1)	0.0031	0.0154	0.1993	*INF*	0.0185	0.0167	1.1068
RER	0.0205*	0.0108	1.8974	*RER(-1)*	-0.0011	0.0032	-0.3544
GCP(-1)	0.0243***	0.0067	3.6541	*GCP(-1)*	0.0190*	0.0104	1.8245
POG(-1)	0.1699	0.7514	0.2261	*POG*	-0.2455	0.1575	-1.5585
Short-run estimates				**Short-run estimates**			
D(RGP(-1))	0.4064***	0.0800	5.0815	*D(RGP(-1))*	0.5389***	0.0653	8.2480
$D(INV^{+})$	0.0058**	0.0021	2.7366	$D(INV^{+})$	-0.029***	0.0100	-2.9238
$D(INV^{-})$	0.0060**	0.0023	2.5993	$D(INV^{-})$	0.0185***	0.0053	3.5027
D(INF)	-0.1137***	0.0257	-4.4198	*D(RER)*	-0.0196*	0.0107	-1.8310
D(GCP)	0.0511***	0.0102	5.0137	*D(GCP)*	0.1949***	0.0211	9.2257
D(GCP(-1))	-0.0384***	0.0113	-3.3856	*D(GCP(-1))*	-0.109***	0.0241	-4.5151
D(POG)	-20.760***	6.4250	-3.2312	*C*	1.2733***	0.2031	6.2691
C	-2.1821***	0.4220	-5.17037	ECT_{t-1}	-0.180***	0.0297	-6.0491
ECT_{t-1}	-0.1798***	0.0339	-5.3065				
Adjusted R^2	0.5578			Adjusted R^2	0.5787		
F-statistic	15.6668			F-statistic	30.2436		
Prob. (F-stat)	0.0000			Prob. (F-stat)	0.0000		

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance. And *RGP* is real GDP growth rate, *INV* is free zones investment growth rate, *INF* is the headline inflation, *RER* is the real effective exchange rate, *GCP* is the annual percentage growth rate of final consumption expenditure of government and *POG* is the population growth rate.

With the identification of a long-run equilibrium relationship among the selected variables in the presence of asymmetry, the nonlinear ECM was estimated and the results are presented in Table 7.10. This is the main output from the NARDL estimation which reports both the long-run and short-run coefficients (with the difference operator) as well as the all-important error correction term (ECT_{t-1}).

From the table, both positive and negative shocks in export processing zones investment affect economic growth positively in the long-term for Ghana although both of them have insignificant *p-values*. However, for Bangladesh, the table shows that positive shocks in EPZ investment have a negative impact on economic growth, while negative shocks positively influence growth. Despite this, both effects are not statistically significant. The insignificant long-term impacts of free zones investment on economic growth for Ghana and Bangladesh do not come as a surprise as the policy is noted for investments which are usually taken up by expatriates who may end up repatriating their profits from the host country, coupled with the fact that production takes place in geographically delineated enclaves, thereby limiting the impact of the policy on the macroeconomy. This goes to support the pessimistic view of the neoclassical theory of EPZs which contends that the policy is welfare-reducing.

In the long-term results, in fact, only Ghana's government final consumption expenditure has a significant *p-value*. The effect of this variable on the growth of the economy is positive, meaning that more expenditure by government spurs economic growth, with a unit increase in government spending causing a 0.0243 unit increase in growth. The positive effect in government consumption expenditure on economic growth is seen in the fact that such expenditures make more money available in the economy, enabling people to spend on consumer goods which also engenders investment, thereby causing the economy to expand in the process. Papers such as Akhmad et al. (2022) and Azam and Khan (2022) are in line with this result although it runs contrary to the conclusion in Onyinye et al. (2017).

Regarding the short-run results our key explanatory variable shows highly significant coefficients for both Ghana and Bangladesh. In terms of Ghana, the positive shocks in export processing zones investment affect economic growth positively and the negative shocks lead to a reduction in growth. By way of magnitude, a unit increase in free zones investment (positive shocks) causes a 0.0058 unit increase in economic growth and a unit reduction in investment (negative shocks) leads to a 0.0060 unit decrease in economic growth. These results for Ghana highlight the crucial role that the export processing zones policy plays in fostering growth in the developing world. This finding aligns with empirical studies by Alam et al. (2022), Erum et al. (2016), Hassan (2023), Hlavacek and Bal-Domanska (2016), Ma et al. (2023), and Mashrur (2025) which have variously emphasised the importance of investments in promoting growth, although it is counter to the conclusions in Assamah and Yuan (2024) and Awolusi and Adeyeye (2016). These empirical results also fully support Johansson's (1994) new growth theory that argues that EPZs are good for growth. This is because investors, many of whom come from outside the host country, typically bring capital to invest in the domestic economy. This influx of capital helps boost employment, productivity, and economic output, contributing to economic growth and other positive externalities associated with investment. Thus on the other hand, a reduction in such investments reduces the pace of economic growth in line with Atakpa et al. (2024) and Mohamed and Abdulle (2023).

For Bangladesh however, whereas the negative shocks lead to a decrease in economic growth, the positive shocks on the other hand also decrease growth. The magnitude of such shocks on economic growth is that, a unit reduction in free zones investment causes a 0.0185 unit reduction in growth while a unit increase in investment also reduces GDP by 0.0290 units,. The negative shocks result is in line with the one observed under Ghana and indicates that free zones investment is essential for economic growth for which reason a reduction in such investments negatively impacts the economy. However, the result in terms of the positive shocks turns out to be counter-intuitive although it is not too surprising since such investments are usually made by foreigners who may have to repatriate any profits they make and hence leading to a lot of the returns from zone investment being siphoned out of the host country. Again, as per the nature of the export processing zones programme in Bangladesh and just like with many other zone programmes across the developing world, the investments are done in enclaves hence limiting their otherwise beneficial effects on the economy, and this gives credence to Hamada's (1974) pessimistic view about EPZs as a trade policy tool to promote growth. This is also empirically supported by other studies such as Quaicoe et al. (2017) and Zeng (2016) that have not found the policy to be a good enough tool to enhance growth.

In terms of the other short-run results, both Ghana’s inflation and population growth are observed to have significant negative effects on economic growth. A unit increase in inflation leads to a 0.1137 unit decrease in GDP and a unit surge in Ghana’s population growth rate causes a 20.76 unit reduction in economic growth. Both results are not surprising and are supported by literature. For the inflation result, Chinoda and Kapingura (2024) and Olamide et al. (2022) have come up with similar findings and the situation is attributed to the fact that an increase in inflation limits production activities by increasing the cost of production while at the same time shrinking demand through a reduction in people's purchasing power. All this results in a situation where output in the economy is reduced thereby inhibiting the growth of the economy. On the other hand, Panzera and Postiglione (2022) and Sadigov (2022) are some of the papers that are in line with the findings on population growth. The argument is that with an increasing population that is not productively engaged as in the case of Ghana where unemployment is a daily phenomenon, the economy takes a hit as individuals are not contributing meaningfully to the growth of the economy. However, this is in contrast to the otherwise strongly-held view that population growth enhances economic growth, with an increasing population leading to the expansion of demand in the economy with such demand also causing an upsurge in production (Jones, 2022).

Apart from these results, government expenditure is another variable with short-term significant impact on economic growth for both Ghana and Bangladesh. Incidentally, for these two countries, the current expenditure of government in the contemporaneous term affects growth positively and the one period lag of it impacts growth negatively. For Ghana, a unit increase in government's expenditure leads to a 0.0511 unit increase in economic growth in the current short-term while it also limits growth by 0.0384 units after a period of one quarter. Similarly, in the case of Bangladesh, an increase in government expenditure by one unit in the short-term leads to a 0.1949-unit increase in economic growth in the current period. However, after one quarter, a unit increase in government expenditure causes GDP to decrease by 0.1090 units. Akhmad et al. (2022) and Azam and Khan (2022) are some of the studies that have found that when government expenditure goes up GDP also increases. However, Onyinye et al. (2017)

concluded that such increases in government spending lead to a reduction in economic growth. Whereas the negative effect of government expenditure after one lag on economic growth may be as a result of the fear that people may generally associate with such expenditures when they are viewed to be unsustainable and are likely to be financed with cheap printed money which may cause inflation for which reason they withhold investment, in terms of the positive short-run effect of government expenditure on growth, such expenditures may be viewed as good spending that goes into people's pockets to enhance demand and increase investment to promote growth.

By way of the ECT, the results indicate a speed of adjustment of 0.1798 for Ghana and 0.1800 for Bangladesh, with both having the expected negative sign. This means that about 18% of departures from short-run equilibrium are corrected each quarter relative to Ghana whilst with regards to Bangladesh, exactly 18% of such departures are corrected in the long-run since they are both statistically significant. Overall, this means that in the long-term, there is Granger causality jointly from all our independent variables to the economic growth variable for the two studied countries. The economic implication of the ECT is that, on average, it takes about 5.6 quarters or 1.4 years to fully correct any deviation from equilibrium for the two countries. This means a shock that pushes economic growth away from its long-run trend with EPZ investment sees 18% of that gap closed in the next quarter which indicates a relatively slow adjustment speed which could mean that investment into the respective zones take time to fully impact economic growth.

7.10 Test of asymmetry

Table 7. 11 Asymmetric test results

Ghana		Bangladesh	
Statistic	**p-value**	**Statistic**	**p-value**
Long-run asymmetry			
8.5482	0.0035	0.0654	0.7981
Short-run asymmetry			
-	-	5.4501	0.0210

Source: Authors' calculation from Eviews 13.

In Table 7.11, we report the results of the test of asymmetry. This is a Wald test in which the long-run statistic is based on *Chi-square* distribution and the short-run is an *F-test*. The null hypothesis for the test (whether long or short-run) is that there is no asymmetry. Based on the results above, it could be said that in the case of the long-run asymmetric test, there is the presence of asymmetry for Ghana. In terms of the short-run results, the *p-values* indicate short-run asymmetry in the case of Bangladesh. This is because, for each country, the accompanying *p-value* for either the *Chi-square* statistic or the *F-test* is less than 5%. This means the relationship between EPZ investment and economic growth is nonlinear in the long-run relative to Ghana while in terms of Bangladesh the asymmetric relationship is observed for the short-term.

An asymmetric effect of EPZ investment on economic growth in the long-run for Ghana means in the long-run, the magnitude of the impact of an increase in free zones investment on economic growth is dissimilar to that of a decrease. Incidentally, in both cases, the effect is positive where in the case of the positive shocks, a 1% increase in investment in the Ghanaian zones is associated with a 0.0001 percentage point increase in economic growth in the long-run, whilst a

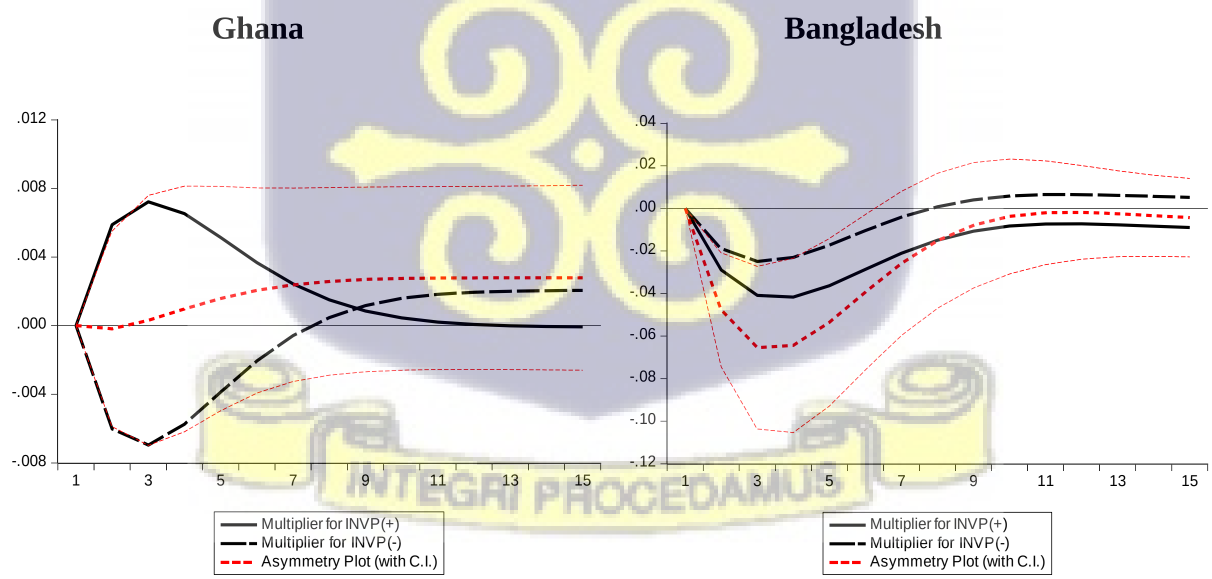
1% decrease in free zones investment also brings about a 0.0004 percentage increase in economic growth on average. Thus, the effect of both increases and decreases in EPZ investment on economic growth is very minute and actually insignificant in the long-run for Ghana, going a long way to buttress the pessimistic view in the literature that the policy is not a good one to spur growth as it is associated with enclave production and investments largely undertaken by foreigners who constantly take their profits from the local economy for which reason a decrease in such investments actually boosts growth more than an increase.

Similarly, for Bangladesh, whose asymmetric effect between EPZ investment and economic growth is observed in the short-term, both increases and decreases in free zones investment impact growth negatively in that country. Precisely, a 1% increase in EPZ investment in Bangladesh leads to 0.0290 percentage decrease in economic growth, and a 1% decrease in free zones investment also decreases growth by a percentage point of 0.0185 averagely, meaning more EPZ investments harm growth more than the reduction in such investments. Whereas the result for the negative shocks ordinarily is a good one, indicating the fact that such investments are good for growth, in line with Johansson (1994), for which reason a decrease in EPZ investment inhibits growth, in the case of the positive shocks result it actually means more investments in the Bangladeshi zones are bad for the economy. This also supports Hamada’s (1974) view that the zones are welfare-reducing and this is mainly because in the case of Bangladesh where about 66% of all FDI into that country is channelled into the country’s zones (BEPZA, 2022), this limits the otherwise good linkages such investments would have had with the rest of the economy, not forgetting the fact that most of these investments are also taken up by foreign nationals who end up taking their profits away.

Overall, with the asymmetric and generally small or insignificant impact of free zones investment on economic growth in Ghana and Bangladesh, it is crucial for policymakers to take into consideration asymmetries when evaluating the effect of EPZ investment on economic growth instead of just relying on the linear evaluations. Thus, there should be concerted effort to limit the fluctuations associated with the foreign inflows into the zones while ensuring that the inflows are directed to more critical sectors such as the production of higher grade manufactures, instead of the current situation where they are mainly attracted to capitalise on local raw materials. Critically, there is the urgent need to ensure the integration of the free zones into the broader economy instead of their current treatment as enclaves which limits their impact on the broader economy. More locals should also be sought to invest in the zones to ensure profit retention in the local economy which will go a long way to stabilise the local currency and inflation while offering more employment to the locals, and all this will help grow the economy.

7.11 The dynamic multiplier graphs

Figure 7. 3 Dynamic multiplier graphs



Source: Authors' construction from Eviews 13.

Figure 7.3 shows the dynamic multiplier graphs for the two countries. The dynamic multiplier graph displays the pattern of adjustment of the regressand to its new long-run equilibrium after a positive or negative shock has occurred in the regressor (Shin et al., 2014). In the figure above, the horizontal axis represents the time period, while the vertical axis displays the positive and negative shocks. In the two graphs, the deep broken red line is the asymmetry plot which lies within the upper and lower bands represented by the two light broken red lines. The asymmetry plot reflects the change or difference between the dynamic multipliers of positive and negative shocks in the regressor and lies within the 95% confidence interval. On the other hand, the continuous black line indicates positive shocks in EPZ investment on economic growth while the broken black line indicates negative shocks in EPZ investment on growth. The two lines effectively show the effect on economic growth due to a 1% positive/negative shock in export processing zones investment activities.

In connection with Ghana, the graph shows that positive shocks in export processing zones investment are associated with an upsurge in economic growth in the short-run although such shocks tend to have almost no impact on growth in the long-run. In terms of the negative shocks however, the graph shows that the effect on growth is negative in the short-run but in the long-term the impact on growth of negative shocks is positive. In contrast, for Bangladesh, increases in EPZ investment negatively impact growth in both the long and short runs. Conversely, decreases in EPZ investment have a negative impact on growth in the short-term but contribute to positive growth in the long-term. Also, the rise of the asymmetry line above the zero line in the long-run for Ghana and its fall below the zero line in the short-run for Bangladesh show that in the long-run the effect of positive shocks in EPZ investment on growth in comparison to negative shocks is not symmetric for Ghana while for Bangladesh, such asymmetric effect happens in the short-term.

7.12 Conclusion

Chapter seven looked at the role of EPZ investment in promoting national economic growth in Ghana and Bangladesh. The nonlinear autoregressive distributed lag methodology which is able to account for asymmetries in the relationship between free zones investment and economic growth was applied. From the NARDL estimation, we have seen the rather contrasting impact of the policy in promoting economic growth in Ghana and Bangladesh. As part of the analysis in the above chapter, we have also considered the issues of summary statistics, correlation matrix, stationarity tests, optimal lag length selection, the bounds test for cointegration and various post-estimation diagnostic tests including serial correlation, functional form of the model, heteroscedasticity and model stability tests. We have also provided notes on testing for asymmetry, utilising both the Wald test and the dynamic multiplier graph.

CHAPTER EIGHT

DISCUSSION OF RESULTS ON THE EFFECT OF EXPORT PROCESSING ZONES ON INFLATION

8.1 Introduction

In this chapter, the effect of export processing zones measured by both their investment and export activities on inflation is analysed for Ghana and Bangladesh. The section begins with a look at various pre-estimation analyses, touching on descriptive statistics, correlation coefficients, plots of graphs of variables and notes on the selection of the optimal lag length. Also, unit root analysis is conducted before the presentation and discussion of results based on the chosen nonlinear autoregressive distributed lag model, and this is accompanied by discussion of results of the various post-estimation diagnostic tests.

8.2 Descriptive statistics

Table 8. 1 Results of descriptive statistics

Ghana								
	Consumer price index (CPI)	*Positive shocks in EPZ investment* (INV^{+})	*Negative shocks in EPZ investment* (INV^{-})	*Positive shocks in EPZ export* (EPX^{+})	*Negative shocks in EPZ export* (EPX^{-})	*Broad money supply (BML)*	*Oil price (OIL)*	*Daily minimum wage (DMW)*
Mean	136.42	8.80m	-9m	41.78m	-25m	38.60b	55.26	47 1
Maximum	497.44	135m	0.00	323m	0.00	216b	104.33	139684
Minimum	12.54	0.00	-110m	0.00	-530m	388m	10.49	1750
Std. dev.	115.62	20.72m	18.66m	62m	70m	51.30b	27.27	42477
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00

Observations	100	100	100	100	100	100	100	100
Bangladesh								
	Consumer price index (CPI)	*Positive shocks in EPZ investment* (INV^{+})	*Negative shocks in EPZ investment* (INV^{-})	*Positive shocks in EPZ export* (EPX^{+})	*Negative shocks in EPZ export* (EPX^{-})	*Broad money supply (BML)*	*Oil price (OIL)*	*Daily minimum wage (DMW)*
Mean	83.12	40m	-3,522	733m	-40m	4.61t	41.52	3786
Maximum	222.72	123m	0	8.92b	0	22t	104.33	9365
Minimum	22	0	-0.46m	0	-5.90b	95.80b	10.42	679.84
Std. dev.	55.83	38m	37,262	1.22b	474m	6.10t	28.75	2578
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	156	156	156	156	156	156	156	156

Source: Authors' calculation from EViews 13, where 'm', 'b' and 't' respectively stand for millions, billions and trillions of U.S. $ or the respective local currency in the case of the money supply.

Table 8.1 shows the descriptive statistics for the third objective of this work. From the table, Ghana's consumer price index has averaged 136.42 with 497.44 and 12.54 being the maximum and the minimum figures respectively during the study period of 1998-2022. Relative to Bangladesh, its CPI has averaged 83.12, with its respective highest and lowest figures being 222.72 and 22 for the period 1984 to 2022. In terms of our key independent variables, we use the respective decomposed positive and negative shocks in the descriptive analysis. Relative to free zones investment, whereas Ghana's positive shocks have averaged $8.80 million, those of Bangladesh have a recorded mean of $40 million. Their respective maximum figures are $135 million for Ghana and $123 million for Bangladesh with zero being the minimum for the two countries. For the negative shocks in investment, the average for the two countries has been -$9 million and -$3,522 respectively with zero being the maximum and -$110 million and -$460,000 the respective lowest figures.

In terms of the export processing zones export variable, Ghana's mean has been $41.78 million, with maximum and minimum figures of $323 million and zero respectively regarding the positive shocks, and in terms of Bangladesh, $733 million, $8.92 billion and zero are the respective average, maximum and minimum values for the positive shocks. Conversely, Ghana has recorded a mean figure of -$25 million, a maximum of zero and a minimum of -$530 million in negative shocks in free zones export while for Bangladesh, the negative shocks have averaged -$40 million with a high of zero and -$5.90 billion being the minimum.

About the other selected explanatory variables, whereas Ghana's broad money supply has registered 38.60 billion, 216 billion and 388 million respectively as the mean, maximum and minimum values with all figures measured in the local Ghanaian cedi, in terms of Bangladesh, its money supply has averaged 4.61 trillion, with a peak figure of 22 trillion and a minimum of 95.80 billion respectively (all figures are measured in taka, the local Bangladeshi currency). For the crude oil price, the average for Ghana from 1998 to 2022 has been $55.26 and during the period the recorded highest price was $104.33 with $10.49 being its lowest price. The respective figures for Bangladesh on the other hand from 1984 to 2022 were $41.52, $104.33 and $10.42. Finally, with respect to the national daily minimum wage, the average, maximum, and minimum values for Ghana during the period have been 47,414, 139,684, and 1,750 Ghana cedis, respectively. The corresponding figures for Bangladesh have also been 3,786, 9,365 and 679.84 respectively (all figures also measured in taka).

8.3 Correlation matrix

Table 8. 2 Correlation results

Ghana						
	CPI	*INV*	*EPX*	*BML*	*OIL*	*DMW*
CPI	1.0000					
INV	0.1444*	1.0000				
EPX	0.6747***	0.5945***	1.0000			
BML	0.9740***	0.0160*	0.5541***	1.0000		
OIL	0.3803***	0.5989***	0.7888***	0.2860***	1.0000	
DMW	0.9878***	0.1593*	0.7015***	0.9482***	0.3541***	1.0000
Bangladesh						
	CPI	*INV*	*EPX*	*BML*	*OIL*	*DMW*
CPI	1.0000					
INV	0.9924***	1.0000				
EPX	0.9819***	0.9953***	1.0000			
BML	0.9732***	0.9903***	0.9948***	1.0000		
OIL	0.6804***	0.6226***	0.5911***	0.5607***	1.0000	
DMW	0.9824***	0.9693***	0.9529***	0.9345***	0.6635***	1.0000

Source: Authors' calculation from Eviews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

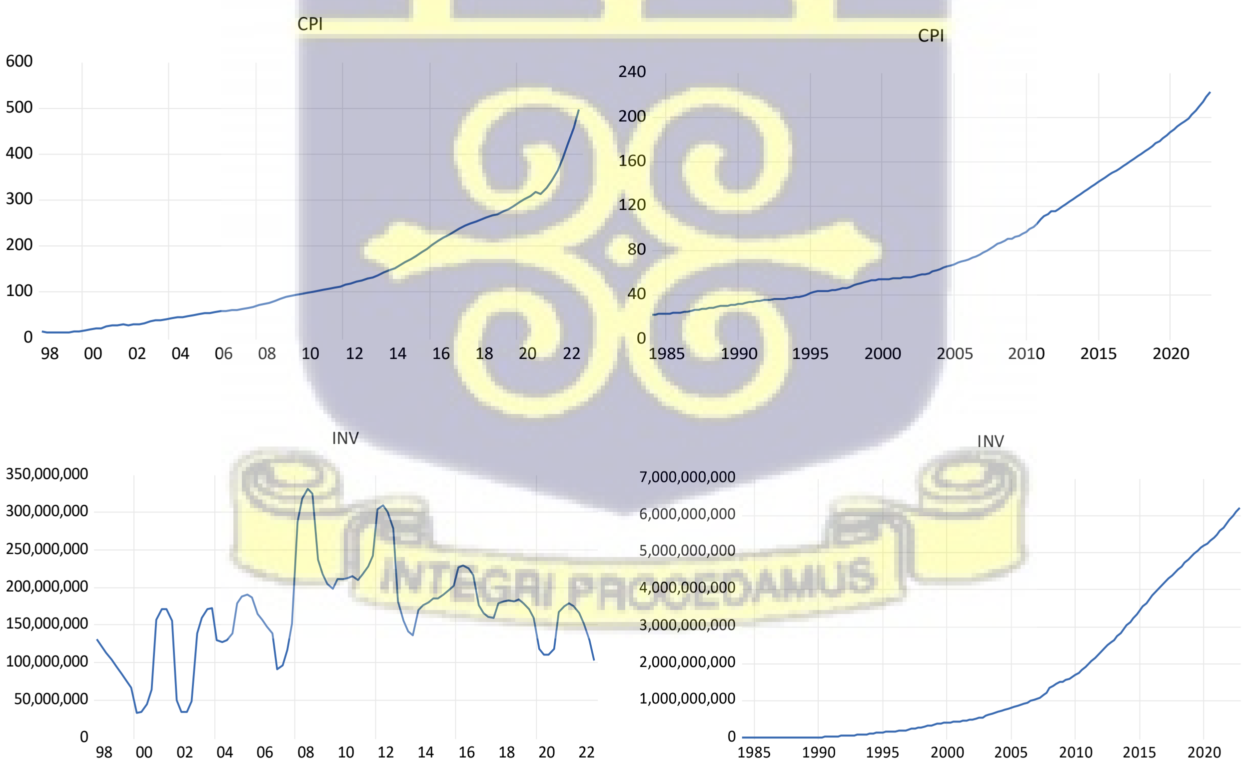
Table 8.2 displays the correlation coefficients for the various variables used in ascertaining the impact of EPZ investment and export on inflation. In terms of Ghana, all the independent variables can be seen to have positive relationship with the consumer price index, our proxy for inflation, with especially money supply and the daily minimum wage having particularly strong relationship with the target variable. A similar observation could also be made for Bangladesh, with all its input variables having a fairly strong positive relationship with CPI.

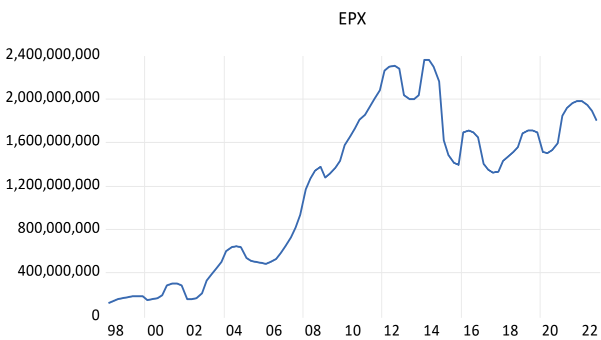
These results are very much intriguing for our key independent variables of free zones investment and export. Again, the outcome could still very much be attributed to the very nature of the EPZ policy which is associated with a lot of imports of semi-finished goods for processing for re-export and this could increase inflation when such imports are sourced from countries experiencing inflationary pressures. However, for the other input variables, their relationships with inflation are very much to be expected as literature fully suggests that each of these variables impacts inflation positively.

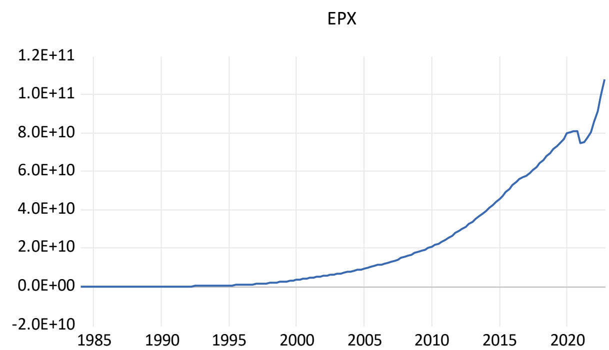
8.4 Graphical description of study variables

Figure 8. 1 Graphs of study variables (objective three)

Ghana **Bangladesh**




EPX
2,400,000,000
2,000,000,000
1,600,000,000
1,200,000,000
800,000,000
400,000,000
0
98 00 02 04 06 08 10 12 14 16 18 20 22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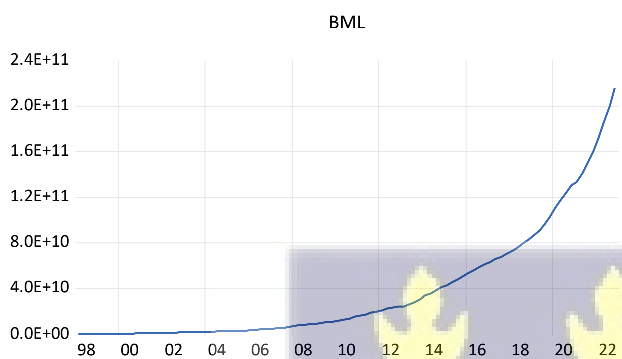
1.0E+11
8.0E+10
6.0E+10
4.0E+10
2.0E+10
0.0E+00
-2.0E+10
1985 1990 1995 2000 2005 2010 2015 2020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4.0E+10
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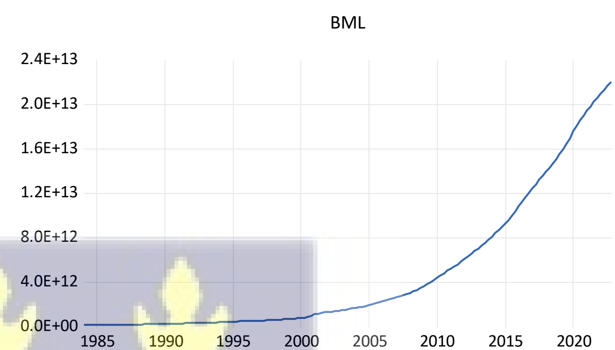
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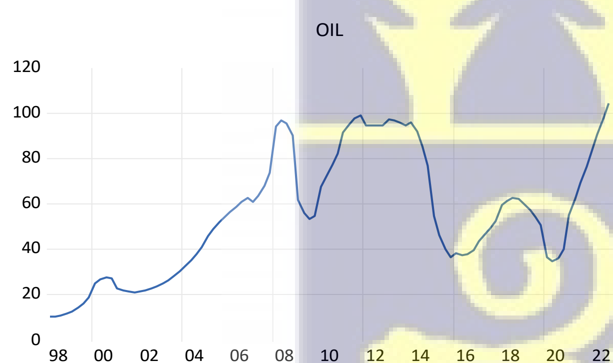
1985 1990 1995 2000 2005 2010 2015 2020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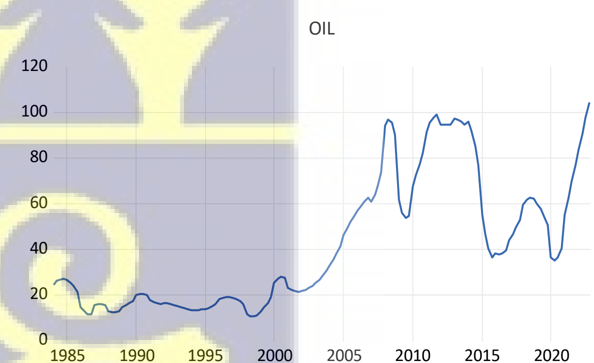
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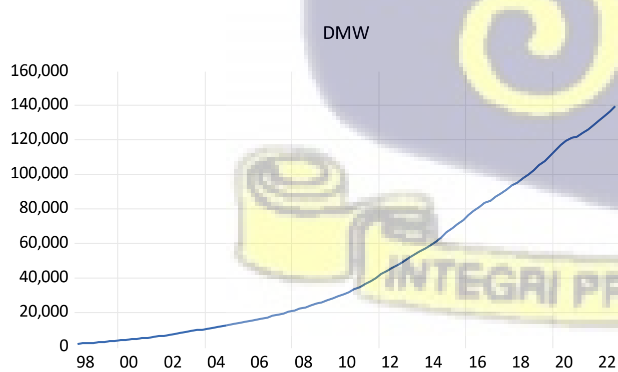
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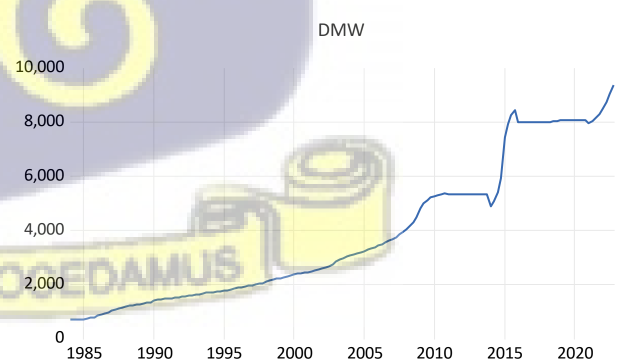
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
98 00 02 04 06 08 10 12 14 16 18 20 22


DMW
10,000
8,000
6,000
4,000
2,000
0
1985 1990 1995 2000 2005 2010 2015 2020

Source: WDI (2022), IMF (2022), GFZA (2022), BEPZA (2022), U.S. Energy Information Administration (2022) and respective employment ministries

Figure 8.1 provides a pictorial representation of the series used to achieve the third objective of this study. For the target variable, the consumer price index (CPI) for both Ghana and Bangladesh has shown a significant upward trend over the study period. Similar conclusions could also be drawn for both free zones investment and export for Bangladesh with the two variables trending largely inconsistently for Ghana. However, for the broad money supply, the graphs indicate an upward surge for both countries, indicating consistent increases in the amount of money in circulation for the two countries. Oil price has also been trending inconsistently for the two countries although there is some discernible increase in crude oil price in the recent years as per the graphs. Finally, the graphs also show that the daily minimum wage overall has been increasing consistently over the period for the two countries.

8.5 Pre-estimation tests – test of stationarity of selected variables

Table 8. 3 ADF unit root test

Ghana			Bangladesh		
Variable	**Levels**	**1st difference**	**Variable**	**Levels**	**1st difference**
LCPI	-1.4717	-4.3379***	*LCPI*	0.9590	-5.4163***
LINV	-2.4633	-3.8453***	*LINV*	-2.4343	-3.7665***
LEPX	-2.4993	-4.1719***	*LEPX*	-1.4263	-10.4168***
LBML	-2.6321*	-4.43557***	*LBML*	-0.8240	-4.6301***
LOIL	-2.5473	4.9722***	*LOIL*	-0.1808	-6.5210***
LDMW	-3.3515**		*LDMW*	-1.4818	-6.4569***

Source: Authors' calculation from EViews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 8. 4 PP unit root test

Ghana			Bangladesh		
Variable	**Levels**	**1st difference**	**Variable**	**Levels**	**1st difference**
LCPI	-0.7685	-4.2655***	*LCPI*	0.9590	-5.4163***
LINV	-2.6715*	-6.2975***	*LINV*	2.6453	-3.4414***
LEPX	-2.0572	-6.0147***	*LEPX*	1.6592	-12.1035***
LBML	-1.8969	-4.6312***	*LBML*	-0.6272	-5.8823***
LOIL	-2.2218	-4.9859***	*LOIL*	-0.9088	-5.7739***
LDMW	-11.786***		*LDMW*	-1.4480	-5.9264***

Source: Authors' calculation from EViews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 8. 5 ZA breakpoint unit root test (levels)

Ghana			Bangladesh		
Variable	**t-statistic**	**Break date**	**Variable**	**t-statistic**	**Break date**
LCPI	-2.3477	2018Q1	*LCPI*	-4.1417	1995Q1
LINV	-3.3150	2000Q4	*LINV*	-3.7380	2016Q2
LEPX	-2.7040	2006Q1	*LEPX*	-3.6280	2013Q3
LBML	-5.2267**	2005Q1	*LBML*	-3.6038	2001Q1
LOIL	-5.2201**	2014Q3	*LOIL*	-4.6721	2003Q4
LDMW	-7.1537***	1998Q4	*LDMW*	-5.2612**	2015Q1

Source: Authors' calculation from EViews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

Table 8. 6 ZA breakpoint unit root test (first difference)

Ghana			Bangladesh		
Variable	**t-statistic**	**Break date**	**Variable**	**t-statistic**	**Break date**
LCPI	-4.9407***	2004Q1	*LCPI*	-5.9764***	1987Q1
LINV	-7.7291***	2001Q1	*LINV*	-4.6658**	1991Q2
LEPX	-6.6987***	2000Q1	*LEPX*	-9.8168***	2001Q1
LBML			*LBML*	-9.5732***	2001Q1
LOIL			*LOIL*	-7.1494***	1986Q1
LDMW			*LDMW*		

Source: Authors' calculation from EViews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance.

To ensure that none of the selected variables is more than I(1), the stationarity tests above were conducted, and per the test statistics of the ADF and PP unit root tests in Tables 8.3 and 8.4, except for Ghana's minimum wage variable, all the remaining variables for the two countries are non-stationary although they become stationary after first differencing.

The Zivot-Andrews unit root test on its part seeks to modify especially the work by Phillips-Perron and it considers structural breaks in the series with such breaks treated endogenously. A break is an irregular shock that has a permanent effect on a variable. Zivot and Andrews argue that most unit root tests overlook or misinterpret such breaks, often mistaking them as evidence of variable non-stationarity. The issue here according to ZA is that on the face of it, a variable may be unstationary but once we consider structural breaks, it may actually be stationary, with the ZA test allowing for a single break in the intercept or the trend or both. Relative to the ZA unit root test (Tables 8.5 and 8.6), the daily minimum wage variable for both countries along with Ghana's money supply and crude oil price are without unit root whilst all the remaining variables are only of I(1) integration.

8.6 Selection of suitable lag length for the NARDL model

Table 8. 7 Lag order selection

Ghana						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1139.855	NA	938.9040	23.87197	24.03224	23.93676
1	49.8946	2205.993	3.42e-08	-0.164471	0.957431	0.289020
2	189.9135	242.1160*	3.95e-09*	-2.33153*	-0.2480*	-1.48933*
3	209.8869	32.04059	5.64e-09	-1.997643	1.047520	-0.766738
4	221.3458	16.94965	9.81e-09	-1.486371	2.520424	0.133241
Bangladesh						
0	-15.53091	NA	5.35e-08	0.283302	0.402665	0.331791
1	1958.174	3765.621	4.52e-19	-25.21281	-24.37727	-24.87338
2	2232.920	502.4968*	1.96e-20*	-28.3542*	-26.8025*	-27.7239*
3	2251.765	32.97845	2.47e-20	-28.12849	-25.86058	-27.20718
4	2260.918	15.29550	3.55e-20	-27.77524	-24.79115	-26.56300

Source: Authors' calculation from EViews 13.

* indicates the lag length selected by a particular criterion

As part of the NARDL estimation process, it is actually crucial to ascertain the optimal lag length for the model. Table 8.7 therefore presents the results from the lag selection. The results indicate lag 2 as the suitable lag length selected by the various criteria for the two countries. With the selected lag 2 as the maximum lag, for both Ghana and Bangladesh, lag 2 was thus applied as the appropriate lag length for the dependent variable whilst lag 1 was used for the independent variables with such combination producing more robust diagnostic results.

8.7 The bounds test for cointegration in an NARDL framework

Table 8. 8 NARDL bounds cointegration test

Ghana	Bangladesh	
F-statistic: 4.8654	F-statistic: 3.6237	
Critical values		
Significance level	I(0)	I(1)
1%	2.96	4.26
5%	2.32	3.50
10%	2.03	3.13

Source: Authors' calculation from EViews 13.

NARDL is based on bounds test for cointegration whose results are fully displayed in Table 8.8. The null hypothesis for this test is that there is no long-run relationship or cointegration. This test is based on *F-statistics*, and the null is rejected when the *F-statistic* is greater than the I(1) upper bound critical value. From the above table, and based on the 5% significance level, it is obvious that the reported *F-statistic* for each of the two countries is greater than the I(1) critical value. This allows us to reject the null and thus conclude that there is cointegration among our series in the presence of asymmetry. With this result, we are also able to go ahead to particularly determine the speed of adjustment through the estimation of the asymmetric ECM which also reports the long and short-run dynamics of the NARDL model.

8.8 Post-estimation robustness tests

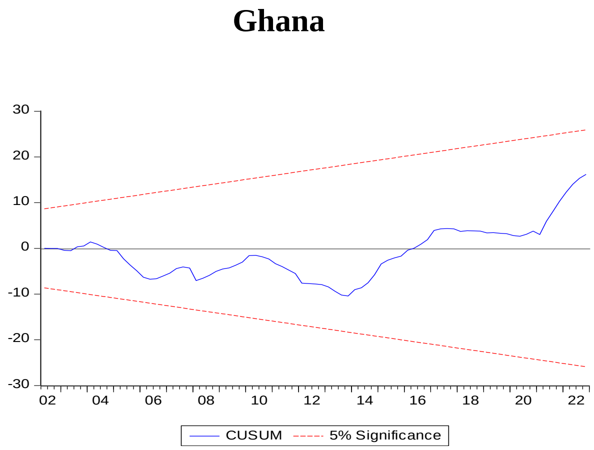
Table 8. 9 Diagnostic checks

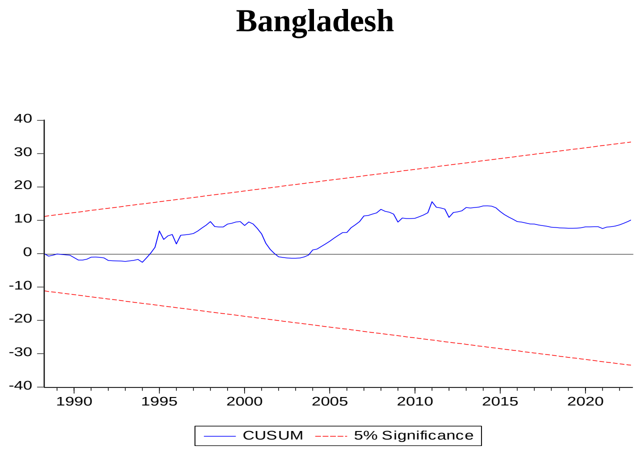
Ghana				Bangladesh		
Test	**Statistic**	**Probability**		**Test**	**Statistic**	**Probability**
Serial correlation	0.8201	0.4440		Serial correlation	2.1202	0.1239
Heteroscedasticity	1.6964	0.0986		Heteroscedasticity	13.9410	0.3045
Functional form	2.4230	0.2233		Functional form	0.9417	0.3335

Source: Authors' calculation from EViews 13.

In Table 8.9, we display the results of the various post-estimation diagnostic tests conducted as part of this analysis. The results are with respect to the Breusch-Godfrey Serial Correlation LM test, the Breusch-Pagan-Godfrey heteroscedasticity test, and the Ramsey functional form. Both the serial correlation and heteroscedasticity tests argue in their null that there is no serial correlation or heteroscedasticity, and we cannot reject the respective null hypotheses in each case for the two countries since the respective *p-values* are in excess of the 5% significance level. Similarly, it can be safely concluded that the selected model for the two countries is well-specified since the *p-value* of the Ramsey functional form is also more than 5%.

Figure 8. 2 Test of model stability





Source: Authors' construction from EViews 13.

Figure 8.2 shows the model stability test result represented by the cumulative sum graphs for the two countries. Here, so far as the blue line lies within the 5% red boundary for each country, the selected model can be said to be dynamically stable.

8.9 Estimation of the NARDL model

Table 8. 10 Asymmetric error correction model estimates

Ghana				Bangladesh			
Variable	**Coefficient**	**S.E.**	**t-stat**	**Variable**	**Coefficient**	**S.E.**	**t-stat**
Long-run estimates				**Long-run estimates**			
LCPI(-1)	-0.0019	0.0422	-0.0437	*LCPI(-1)*	-0.0203**	0.0080	-2.5269
$LINV^{+}$*(-1)*	-0.0004	0.0110	-0.0344	$LINV^{+}$*(-1)*	-0.0008	0.0019	-0.4254
$LINV^{-}$	-0.0171**	0.0076	-2.2477	$LINV^{-}$	0.0024	0.0379	0.0631
$LEPX^{+}$*(-1)*	-0.0128	0.0182	-0.7006	$LEPX^{+}$	0.0007	0.0012	0.5620
$LEPX^{-}$*(-1)*	-0.0269	0.0176	-1.5228	$LEPX^{-}$*(-1)*	-0.0202***	0.0066	-3.0368
LBML	0.0201	0.0207	0.9755	*LBML(-1)*	0.0081**	0.0040	1.9935
LOIL(-1)	0.0129**	0.0059	2.1904	*LOIL*	0.0004	0.0011	0.3545
LDMW(-1)	-0.0384	0.0251	-1.5280	*LDMW*	0.0020	0.0054	0.3664
Short-run estimates				**Short-run estimates**			
D(LCPI(-1))	-0.0019***	0.0003	-6.4966	*D(LCPI(-1))*	0.5676***	0.0580	9.7906
$D(LINV^{+})$	0.6280***	0.0537	11.6838	$D(LINV^{+})$	0.0524***	0.0097	5.3774
$D(LEPX^{+})$	0.0723**	0.0168	4.3160	$D(LEPX^{-})$	0.0118	0.0096	1.2377
$D(LEPX^{-})$	-0.0887***	0.0367	-2.4152	*D(LBML)*	-0.0400*	0.0239	-1.6761
D(LOIL)	0.0937	0.0219	4.2776	*C*	-0.168***	0.0315	-5.3352
D(LDMW)	-0.0125***	0.0136	-0.9213	ECT_{t-1}	-0.020***	0.0037	-5.5162
C	1.1020***	0.1509	7.3028				
ECT_{t-1}	-0.2081***	0.0332	-6.2620				
Adjusted R^2	0.7371			Adjusted R^2	0.5399		
F-statistic	39.8511			F-statistic	14.6494		
Prob. (F-stat)	0.0000			Prob. (F-stat)	0.0000		

Source: Authors' calculation from EViews 13.

***, ** and * respectively show 1%, 5% and 10% levels of significance, where *CPI* is consumer price index, *INV* and *EPX* are the export processing zones investment and export respectively (both measured in billions of dollars), *BML* is the broad money supply (measured in billions of the respective local currencies), *OIL* captures the crude oil price and *DMW* represents the daily minimum wage.

After confirming the presence of cointegration for both Ghana and Bangladesh under conditions of asymmetry, Table 8.10 presents the results of the nonlinear ECM. This table provides the main output of the NARDL model, detailing three key elements: the error correction term, the long-run dynamics, and the short-run dynamics, with the short-run results incorporating the difference operator.

First of all, regarding the speed of adjustment represented by the error correction term (ECT_{t-1}), it carries the correct negative sign for both Ghana and Bangladesh and both are statistically significant, an indication of the fact that there is long-run convergence towards equilibrium after a shock has occurred in the short-term. More specifically, for Ghana, the ECT indicates a speed of adjustment of 0.2081, which means that 20.81% of such departures from short-run equilibrium are corrected in the long-run. However, in the case of Bangladesh, only 0.020 or 2% of such departures are corrected each period. The significant ECT results also indicate that all our independent variables jointly Granger-cause inflation in the long-term.

For the long-term estimates, only negative shocks in the free zones variables are observed to have any significant impact on inflation. In more specific terms, negative shocks in Ghana's free zones investment have positive effect on the country's consumer price index. In the same vein, for Bangladesh, negative shocks in the country's EPZ export impact CPI positively. In numerical terms, a unit decrease in free zones investment leads to 0.0171 unit increase in Ghana's CPI.

This result is intuitive as an increase in investment is usually associated with a reduction in inflation all things being equal, and hence a decrease in investment leading to a surge in inflation. This is supported by studies such as Mustafa (2019) and Quinonez et al. (2018) which contend that foreign direct investment leads to a reduction in inflation although it runs counter to the key findings in Azim and Hassan (2021), Oyinlola and Ajayi (2020) and Rahman (2015) which concluded that FDI affects inflation positively. The foregoing gives credence to the perceived critical role played by free zones in Ghana as the foreign investors especially come with badly needed capital to shore up production in the local economy, and hence a reduction in such investment curtailing production and its associated beneficial effects whilst making less goods available for sale even from the allotted 30% allowed on the domestic market, thereby making prices on the local market go up.

Regarding the result for Bangladesh, a unit decrease in free zones export is also observed to lead to a 0.0202 unit increase in the CPI in that Asian country. This result is in line with Azim et al. (2019) but contrasts the findings in Roncaglia de Carvalho et al. (2018) and Sahoo and Sethi (2018) who found in their respective papers that increased exports rather lead to inflation. It is however not a surprising result as the general consensus in the literature points to the fact that for an exporting country's goods to be competitive on the global market its inflation has to be maintained at a minimum (Forbes, 2019). On the other hand, less export means inflation is not required at all cost to be kept low all things being equal. Another explanation for this result, where a decrease in free zones export is associated with an increase in the CPI, could be that more output from the zones is being sold on the domestic market. However, if these goods are of low quality – since much of the output from the zones often involves only simple value addition to raw materials – the local population may not be drawn to them. As a result, they may continue to demand foreign goods, which could contribute to inflation.

Apart from the two export processing zones variables, the only other variables with a significant long-term impact on inflation are Ghana's crude oil price and broad money supply for Bangladesh with the expected positive effect on the consumer price index. For these two variables, whereas a unit increase in the price of crude oil leads to a 0.0129 unit increase in inflation, in terms of Bangladesh, when the money supply is increased by one unit, CPI goes up by 0.0081 units. The positive impact/relationship between crude oil price and inflation is well documented in the literature and papers such as Bala and Chin (2018), Choi et al. (2018) and Sultan et al. (2020) have all supported this general knowledge that when the price of oil goes up it leads to inflation. The positive impact of money supply on inflation also finds empirical support in papers such as Doan Van (2020) and Sean et al. (2019).

Turning to the short-run coefficients, similar results were obtained for both Ghana and Bangladesh in terms of the positive shocks in the export processing zones investment variable. That is, increases in free zones investment in the current term affect the inflation variable in a significant positive way for the two studied countries in the short-term with a unit increase in investment into the Ghanaian zones causing a 0.6280 unit increase in inflation and a one unit increase in investment into the zones in Bangladesh leading to a 0.0524 unit increase in the CPI in that country. This result is supported by Azim and Hassan (2021) and Oyinlola and Ajayi (2020) and corroborates the pessimistic view held by economists regarding such investments since they occur in enclaves with minimal effect on the broader economy (Engman et al., 2007). Again, the situation can also be attributed to the issue of imported inflation. This is because free zones investments are by nature associated with a lot of import of inputs including semi-finished goods to process for re-export. These huge imports may therefore cause an increase in inflation especially if they are sourced from countries experiencing inflation. Also, they will have to be purchased with foreign currency and the direct linkage between a depreciating local currency caused by increased pressure on international currencies and inflation is well established in the literature (Vernengo & Perry, 2018), and these factors may account for the difference in magnitude of this variable where the coefficient for Ghana is bigger than that of Bangladesh, with Ghana’s practice of both the enclave scheme and single-factory location model allowing more of such foreign inflation to impact domestic prices more.

Still on the short-run results, positive shocks in Ghana’s free zones export are seen to be having significant appreciating effect on consumer price index and also, negative shocks in the same variable impact inflation also in a positive way for the same country. By way of the specific numbers, a unit uptake in free zones export leads to a 0.0723 unit increase in inflation and a unit reduction in export causes a 0.0887 unit increase in CPI. In terms of the positive shocks result, it can be explained by the fact that more exports means fewer goods on the domestic market and hence the output from the zones doing very little to curtail inflation in the local economy, and this is in sharp contrast to studies such as Roncaglia de Carvalho et al. (2018) and Sahoo and Sethi (2018) which all agree that exports generally reduce inflation. On the other hand, the short-run negative shocks result buttresses the long-run one observed for Bangladesh which again may be chiefly caused by more or less quality output becoming available on the market which does not attract domestic consumers to affect inflation, or the fact that there is little being exported and hence no greater desire to keep inflation at a certain minimum to make such exports internationally competitive.

Finally, the daily minimum wage is the only non-EPZ variable with a significant effect on CPI for Ghana. The observed impact, however, is negative, with a unit increase in workers' wages resulting in a 0.0125-unit reduction in inflation. This result is also counter-intuitive and opposite to papers like Bernanke and Blanchard (2023) and Dube (2019) but not too surprising as such wages are actually not weighty enough and in the case of Ghana only enjoyed by a small segment of the population – those in the formal sector. The effect suggests that although money is flowing into people's hands, the amount is relatively small and benefits only a limited number of individuals, leading to the unusual negative effect on the CPI.

8.10 Test of asymmetry

Table 8. 11 Asymmetric test results

Ghana		**Bangladesh**	
Long-run asymmetry		**Long-run asymmetry**	
LINV	0.0105	*LINV*	0.0692
LEPX	0.0119	*LEPX*	4.4231**
Short-run asymmetry		**Short-run asymmetry**	
LINV	-	*LINV*	-
LEPX	8.8078***	*LEPX*	-

Source: Authors' calculation from EViews 13.

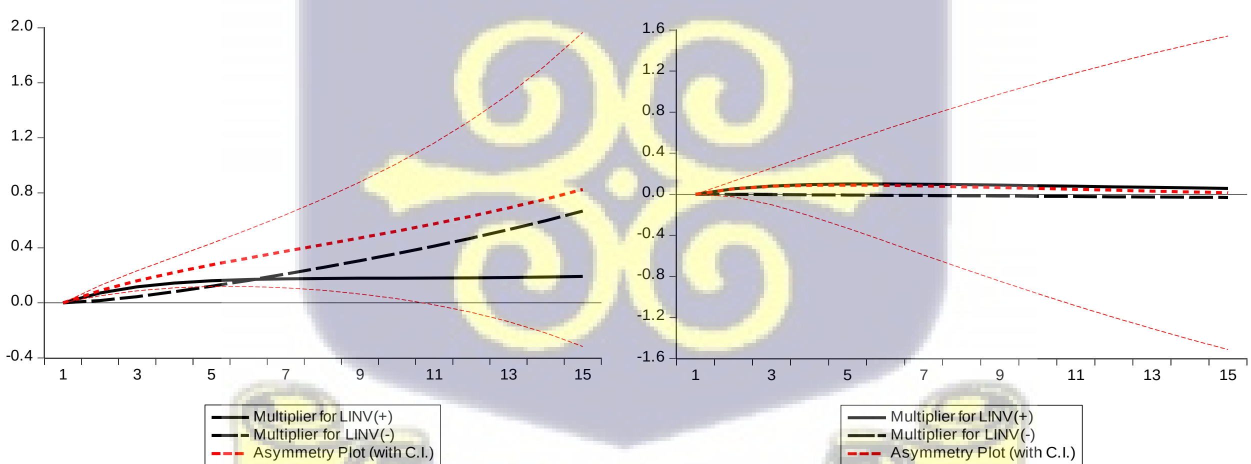
Results in Table 8.11 pertain to the long-run and short-run asymmetric tests conducted in respect of Ghana and Bangladesh. The long-run results are evaluated using the *Chi-square* distribution, with the null hypothesis stating that there is no long-run asymmetry. The decision on whether to reject the null hypothesis or not is based on the *p-value*. The results show that for both Ghana and Bangladesh, there is a long-run asymmetric effect only in the case of free zones export for Bangladesh as its *p-value* is less than the conventional 5% level of significance. This means that the magnitude of positive and negative shocks in the export processing zones export variable on the consumer price index is not the same or linear.

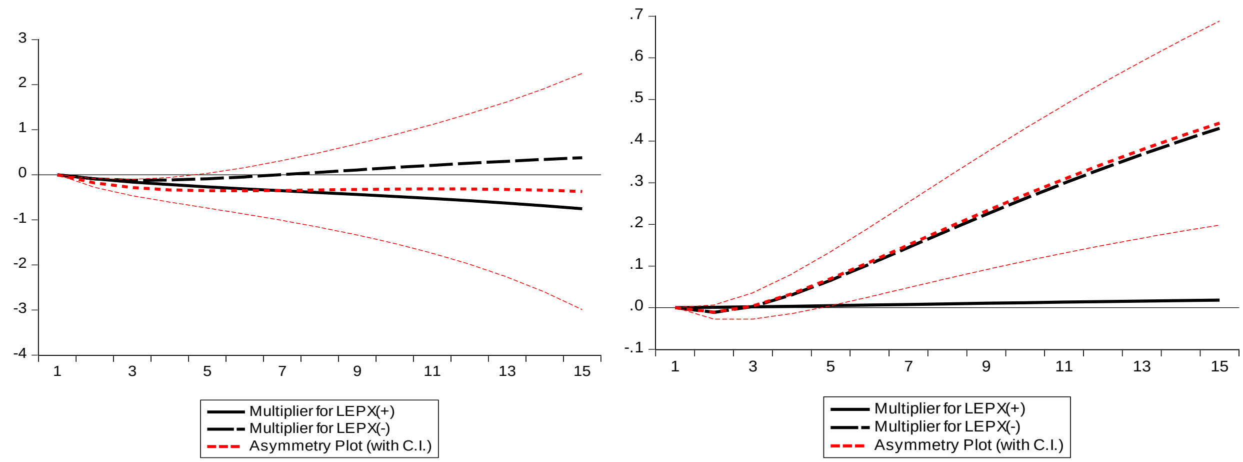
Also, for the short-run test of asymmetry based on *F-statistics*, only Ghana's free zones export variable produces significant result with the rest not even producing more than one coefficient based on the applied stepwise regression using the additive sum approach suggested by Shin et al. (2014). Thus all in all, it is only in the case of the free zones export variable that there is the presence of asymmetry for Ghana and Bangladesh whilst for investment, there is no presence of asymmetry. This shows that there is the need for asymmetric effects to be taken into consideration by policymakers when making policy decisions regarding the impact of the free zones export on the key macroeconomic variable of inflation.

8.11 The dynamic multiplier graphs

Figure 8. 3 Dynamic multiplier graphs

Ghana **Bangladesh**





Source: Authors' construction from EViews 13.

Figure 8.3 shows the dynamic multiplier graphs for both investment and export, our two key export processing zones variables for this analysis. According to Shin et al. (2014), the dynamic multiplier graph basically indicates how the target variable adjusts to its new long-run equilibrium position following a positive or negative shock in the input variable. On the horizontal axis of this graph, there is the time dimension while the vertical axis shows the various shocks (both positive and negative) attributable to the various variables. In the dynamic multiplier graph, the deep broken red line is the asymmetry plot which reflects the difference or change in the dynamic multipliers of positive and negative shocks in the independent variable and lies within the 95% confidence interval represented by the upper and lower bands of the light broken red lines. Also, the continuous black line indicates positive shocks whereas the broken black line shows negative shocks in the regressor.

From the two sets of graphs for free zones investment and export respectively, in terms of Ghana, it is obvious that generally, both increases and decreases in investment cause a surge in CPI although the positive shocks weigh more on inflation than the negative shocks in the short-run while in the long-run, the negative shocks weigh more than the positive shocks. For

Bangladesh, positive shocks in free zones investment have slight positive effect on the consumer price index and negative shocks have virtually no effect on CPI. Also, relative to the free zones export variable, both increases (positive shocks) and decreases (negative shocks) are observed to have negative impact on inflation in the short-run for Ghana although the negative changes impact CPI positively in the long-term while the positive shocks affect inflation negatively with the positive shocks having the greater long-term impact. In terms of Bangladesh, the positive shocks have almost no effect on the CPI whilst negative shocks lead to an increase in CPI.

8.12 Conclusion

In the penultimate chapter of this work, we have considered the effect of export processing zones measured by their investment and export activities in dealing with the issue of inflation. Aside from the various tests which were done before the estimation of the selected NARDL model such as descriptive statistics, correlation matrix, unit root tests, cointegration test, lag selection and a graphical presentation of the variables used in achieving our objective, we have also discussed various post-estimation diagnostic tests including heteroscedasticity, serial correlation, Ramsey functional form and the CUSUM test which ascertains the stability of the model. The NARDL model results presented and discussed again offer a differing perspective on the supposed impact of the Ghanaian and Bangladeshi zones in dealing with inflation.

CHAPTER NINE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This is the study's final chapter. In this chapter, the work is summarised and conclusions are drawn. The study's contributions are also highlighted and its limitations frankly stated. Also, to make the work meaningful and suitable for application by various actors, we make various recommendations to policymakers and free zones practitioners and offer suggestions regarding future research directions.

9.2 Summary of research findings

A lot of effort has been made to help in the economic liberalisation of the global south since independence. In light of this, many programmes and policies have been introduced and implemented in many developing countries with export processing zones being one such popular trade policy tool. This policy is championed by governments across the developing world, driven by the belief that producing for the vast global market will benefit the EPZ host country. This is based on the widely held assumption that exports stimulate economic growth and development. In attracting the mainly foreign investors to operate in the zones, implementing nations grant very generous trade subsidies to investors to make the cost of conducting business less exorbitant. They do this by experimenting with the zones and using them as a launchpad to liberalise the broader economy.

Notwithstanding the popularity of export processing zones, however, the policy is bereft of robust quantitative analyses to determine its economic impact on the economies of the implementing nations. A lot of reasons are responsible for this with the lack of readily available data on the global zones and the rather pessimistic stance of economists who view the policy as not being a potent force to apply to develop nations due to the generous incentives afforded zone practitioners and also the fact that production occurs in enclaves thereby limiting the otherwise beneficial linkages it would have had with the broader economy, being two key factors. The limited literature in existence too is dominated by descriptive case studies with the few quantitative papers relying on dummies to represent various zone activities. In specific terms, no studies as far as we know have been conducted to look at the effect of EPZs on exchange rates and inflation. Several papers have been written to investigate the impact of free zones on economic growth. However, these studies have generally assumed a symmetric relationship between these variables.

In this study therefore, we set out to examine the direct effect of export processing zones measured by all the investments into the zones and all exports from the zones, on exchange rates, economic growth and inflation using Ghana and Bangladesh as our two countries of interest. Ghana and Bangladesh are two key emerging nations grappling with various economic issues including the three critical macroeconomic variables of exchange rate, economic growth and inflation as part of their quest to develop economically. They are two key implementers of EPZs on which the authors could access data at the aggregate level aside the several similarities in their respective economies and their EPZ programmes.

Data were obtained from the Ghana Free Zones Authority and the Bangladesh Export Processing Zones Authority. Whereas Ghana's data covered the period 1998Q1 to 2022Q4, data on Bangladesh were for the period 1984Q1 to 2022Q4 with the difference in timeframes mainly due to the respective times the two zone programmes were started. Other data on various national economic variables also came from the World Bank, the IMF, the ILO, the U.S. Energy Information Administration and the employment ministry of the two countries. In objective one of the study, autoregressive distributed lag technique was used to analyse the effect of export processing zones on exchange rates. In the second and third objectives also, the nonlinear autoregressive distributed lag model was applied in examining the impact of free zones on economic growth and inflation respectively for the two countries.

In terms of our empirical results for objective one, the bounds cointegration test only produced two sets of cointegrating equations for each of the two countries. The first and the most important one was our key dependent variable which is the real effective exchange rate which had a long-run equilibrium relationship for both Ghana and Bangladesh alongside export processing zones investment for Ghana and export processing zones export for Bangladesh. The results from the main equation indicate that free zones investment has a long-term positive effect on the exchange rate while exports from the zones have a negative impact on the target variable. However, in both cases, it is only Ghana's investment that is statistically significant. For Ghana, it means investment in the zones contributes to the strengthening of the local currency as it brings in badly needed foreign exchange to support the domestic currency, thereby making it strong. In the long-run, debt-to-GDP was also found to impact exchange rate negatively relative to Ghana while for Bangladesh, terms of trade was observed to strengthen the currency.

For the short-run results also, only current export processing zones investment has a significant positive impact on the exchange rate for the two countries although the lag of that variable rather affects the real effective exchange rate negatively whilst free zones export does not affect the target variable. Apart from the EPZ variables, for Ghana, the consumer price index also has a negative effect on exchange rate while in the case of Bangladesh, current debt-to-GDP and lag one of terms of trade impact exchange rate negatively, and current terms of trade and lag one of debt-to-GDP affect real effective exchange rate positively. On the whole, however, through the vector error correction analysis, all the independent variables were found to jointly Granger-cause exchange rate in the long-run in the case of both Ghana and Bangladesh.

Relative to our second objective, results from the bounds test of cointegration indicate the presence of long-run equilibrium relationship among the selected variables in the presence of asymmetry. In terms of the long-run effects, the study's empirical results point to an insignificant effect of both positive and negative shocks in free zones investment on economic growth for Ghana and Bangladesh. In fact, only Ghana's government expenditure variable has a significant long-term positive effect on economic growth.

For the short-term results, whereas positive shocks in Ghana's free zones investment impact economic growth positively, those of Bangladesh have a negative effect on GDP. The negative shocks for both countries on the other hand restrict growth. Also, both inflation and population growth were observed to affect economic growth negatively in the case of Ghana while government's current expenditure for both countries affects growth contemporaneously in a positive manner although after a period of one quarter, the effect turns negative.

Crucially, the asymmetric test results point to the fact that there is long-run asymmetry between export processing zones investment and economic growth for Ghana while for Bangladesh, the asymmetric effect occurs in the short-term. The results of Wald tests of asymmetry were buttressed by the dynamic multiplier graphs for the two countries. In all, all the independent variables were found to Granger-cause economic growth for both Ghana and Bangladesh.

When it comes to the results relative to the third and final objective of this study, the asymmetric test of cointegration based on bounds test indicates the presence of long-run equilibrium relationship among our selected variables for both Ghana and Bangladesh, thus allowing for the estimation of the error correction model in the NARDL framework. The ECT with its negative and statistically significant coefficient also shows that there is long-run convergence towards equilibrium after a shock in the short-term, an indication also of the fact that there is Granger causality running from all the independent variables to the dependent variable for the two countries. Crucially, the asymmetry tests for both countries showed that there is long-run asymmetry for Bangladesh's free zones export and short-term asymmetry for Ghana's export.

Regarding the specifics, the long-term estimates indicate that for our key export processing zones variables, negative shocks in free zones investment lead to an increase in Ghana's CPI and for Bangladesh, negative shocks in the export variable lead to an increase in the consumer price index. Also, in line with established literature, Ghana's crude oil price and Bangladesh's money supply are observed to affect inflation positively in the long-run.

The short-term results also show that for both Ghana and Bangladesh, increases in investment (positive shocks) affect CPI positively and the same outcome is reported for both positive and negative shocks in Ghana's free zones export variable. Aside from the free zones variables, in the case of Ghana, its national daily minimum wage is found to lead to a reduction in CPI.

9.3 The study's conclusion

The existing empirical literature on the efficacy of export processing zones as a tool for economic development has produced mixed results. This is very much in consonance with the theoretical foundations upon which such studies have been conducted. Insightfully, one school of thought argues that the policy is good for promoting the welfare of nations while another contends otherwise. Any meaningful study on the concept of export processing zones will therefore inevitably support one of these theories or the other.

Not surprisingly, therefore, the current study has produced varied results in terms of the evaluation of the perceived impact of EPZs on the selected macroeconomic variables for both Ghana and Bangladesh. For the first objective of the study, based on the study's findings, it could be concluded that only free zones investment is helping to strengthen the domestic currencies of Ghana and Bangladesh, especially in the short-run with no evidence of EPZ export affecting the exchange rate. This is quite an intriguing result as one key goal for setting up the zones is to ensure the expansion of the export sector while increasing non-traditional exports. These exports are thus to help with the generation of foreign exchange to stabilise the domestic currency. The major challenge, however, lies in ensuring that the foreign exchange generated, particularly from export activities, returns to the host country. This is especially difficult given that a significant portion of the investment in these zones is made by foreign entities.

However, in terms of the empirical results from our second objective, there is an indication of the fact that export processing zones in Ghana play a very significant role in the country's economic growth effort in the short-term with positive shocks in such investments bringing about economic growth. Also, with the negative shocks or decreases in free zones investment impacting growth negatively for both countries, it could actually be said to be a good thing as less investment means less economic growth. Whereas Ghana's short-term results are in line with the aspirations of zone implementation to promote the growth of the host nation, the overall effect of free zones investment especially in the long-run is muted for the studied countries. This could be a result of the fact that such investments are undertaken in specific enclaves especially in the case of Bangladesh thereby limiting their impact on the broader economy, not forgetting the fact that a lot of generous incentives are first offered to the investors at the expense of the public good which may not be beneficial after all.

For the third objective, the study's findings indicate that a reduction in Ghana's free zones investment leads to a surge in inflation in the long-run. This outcome aligns with the understanding that increased investment typically contributes to a reduction in inflation by boosting productivity and economic stability. For Bangladesh, negative shocks in exports from the zones rather increase inflation in the long-term for which reason more exports means more inflation which is counterintuitive. In the short-term also, increases in EPZ investment affect inflation positively for Ghana and Bangladesh while both positive and negative shocks in Ghana's free zones export cause inflation in the short-term. These contrasting results are surprising but in terms of export for example could yet be attributed to the fact that there is no greater urgency to keep inflation down to make the exports competitive since not much is exported. It may also be due to the fact that when output from the zones is made available on the domestic market (with reduction in export), those products do not attract consumers to affect the CPI because they may not be of the required quality while the investments in the zones are also associated with huge imports of semi-finished goods for processing for re-export which may all end up causing inflation. Overall, the general inference is that the effect of the policy of export processing zones in curbing inflation is missing for the two countries. This is because positive shocks or increases in the free zones variables of investment and export rather cause inflation. This means that the zones are not having the desired impact of helping deal with the issue of inflation in the two countries.

In general, the study's empirical results point to a rather limited impact of EPZs in helping the studied countries deal with the issues regarding their exchange rate, growth of the economy and inflation especially over the long-term. This is particularly the case for Bangladesh which employs the traditional enclave scheme of export processing zones where production is mainly done in specific geographically delineated areas thereby limiting the expected impact of the policy. It is therefore necessary for the two countries to take a second look at their respective zone programmes and fully integrate them into the broader economy to make them more beneficial since the zones are mainly meant to be used to initiate the process of overall economic liberalisation. Hence, having been implemented for quite some time now, the next step is for those two countries to go ahead to liberalise the entire economy by providing similar business-friendly incentives including quality infrastructure for overall productivity to be enhanced.

9.4 The study's contributions

All in all, this work contributes greatly to the existing body of literature on export processing zones by bringing new insights to bear on the role of the policy in facilitating national economic development of emerging nations. Firstly, this study differs from existing literature by focusing specifically on two key implementing nations of the EPZ policy: Ghana and Bangladesh. This is because the existing studies have largely concentrated on individual firms or individual zones or single countries with studies cutting across multiple countries not easy to come by due to the lack of readily available aggregate data on EPZs.

In line with the data issue and the lack of it, the current work considered two key benefits associated with the free zones policy (i.e. investment and export). This is in contrast to what is available in the literature where the focus has usually been on one benefit at a time. The consideration of investment and export too is essential as nations largely implement EPZs to attract more inflows from foreign lands with improvement in both the quantity and quality of exports being a major yardstick for a successful EPZ programme.

Similarly, the current study makes use of real data on export processing zones in terms of their investment and export activities to determine the true impact of the policy on the implementing economy. This also differs from the practice in the literature where researchers have usually relied on the use of dummies to ascertain the impact of the policy. The use of dummies occasioned by lack of real data does not bring to light the actual impact of EPZs not forgetting the very many challenges that come with the use of dummies.

Also, unlike the existing literature on EPZs, the current study makes use of robust econometric techniques to investigate the effect of the free zones policy on the host economy. In other words, it is a complete econometric/quantitative analysis of the role of EPZs in promoting national economic development, in contrast to the vast majority of the papers in existence that have involved mainly qualitative/descriptive examination of the policy.

Moreover, a look at extant literature mainly shows the dominant focus on the social/environmental impact assessment of the EPZ policy. The current work however concentrated directly on assessing the economic impact of the zones. In so doing, three important macroeconomic variables (namely exchange rate, economic growth and inflation) have been looked at simultaneously to determine how they are impacted by the free zones policy in the developing world.

Regarding the selected economic variables, this is the first study dedicated to examining how export processing zones impact key economic factors such as the exchange rate and inflation. Thus, to the best of our knowledge, this is the first study that has solely looked at how free zones affect exchange rate and inflation with no evidence of previous work that has investigated those two variables in terms of how they are affected by EPZ investment and export. Since the zones are meant to contribute to overall economic development of the host countries, an investigation into how they have impacted these two critical economic variables alongside economic growth has been timely.

Again, this study also contributes to theoretical literature by being the first to make extensive use of varied economic theories to analyse the impact of EPZs on implementing nations. Specifically, popular theories such as purchasing power parity theory, balance of payments theory, the monetary theory, classical growth theory, neoclassical growth theory, endogenous growth theory, demand-pull inflation, cost-push inflation and the structural theory of inflation have been taken from the broad fields of economics/finance to analyse the effect of export processing zones on exchange rate, economic growth and inflation in Ghana and Bangladesh.

Finally, for the first time, we considered the issue of asymmetric effects in evaluating the relationship between export processing zones and the chosen economic variables. Specifically, although some papers have looked at how free zones impact the growth of the economy of the implementing nation, they have all assumed any such relationship to be linear. As far as we are aware, this is the first paper to incorporate the issue of asymmetries when assessing the impact of export processing zones not only on economic growth, but also on inflation.

9.5 Limitations of the study

While the export processing zones (EPZ) literature broadly categorises the benefits of the policy into dynamic and static rewards, our study primarily focused on the static aspects. These include the short-term advantages of implementing the EPZ trade policy tool, which are easier to quantify, such as employment generation, an increase in FDI, and the expansion and diversification of the export sector. The dynamic benefits are of long-term nature and they are not easy to quantify and accessing data on them is a matter of considerable challenge. The study's focus on mainly free zones investment and export is therefore due to the fact that we could easily access data on those two principal activities associated with the zones. However, one could not actually look at the impact of any meaningful zone programme without considering the foreign direct investment into the zones and exports from the zones since the concept is premised on the idea of producing for the export market. The timeframe for this research is not long enough to measure all the benefits associated with the policy needless to add that data on even the short-term effects are not available for a lot of implementing nations let alone those of the long-term rewards. This accounts for the focus on Ghana and Bangladesh, two countries on which the researchers could access data.

Relative to the two chosen nations for this study, the available time series data are of relatively short span. Data on Ghana are from 1998Q1 to 2022Q4 and that of Bangladesh are from 1984Q1 to 2022Q4. This is a result of the fact that the programmes in the two respective countries started in 1996 and 1983 for which reason the available data cover the above timeframes. These short timeframes necessitated the use of the ARDL and NARDL models which work well on small datasets but other equally sophisticated techniques could have been employed with longer timeframes.

Moreover, in investigating the specific impact of export processing zones on the exchange rate in Ghana and Bangladesh, this study did not take into account the different exchange rate regimes in the two countries. Given that these countries may be practising different exchange rate regimes, these regimes could influence the effectiveness of the free zones programme in stabilising their currencies.

Again, economic growth is influenced by a variety of factors, many of which can either promote or inhibit it. These factors are often specific to individual countries, and their impacts can vary significantly from one country to another. However, this study did not examine these country-specific effects on growth. Instead, it focused on a uniform set of variables to facilitate comparability across the countries studied.

Similarly, in relation to inflation, every country has its peculiar set of measures to deal with it. In other words it would have been great if we considered the specific monetary policies in the respective zone implementing nations to ascertain the effect of such policies in determining how EPZs help in combating inflation.

Lastly, apart from the macroeconomy, the respective zone programmes implemented in Ghana and Bangladesh might be having some few areas of divergence notwithstanding the fact that most of their zone activities are very similar. Due to time constraints and data limitations, we were unable to consider the detailed intricacies of the zones in the two countries that might differentiate them from one another.

9.6 Recommendations for policymakers

With the generally limited impact of the free zones concept on the various economic variables determined from the study's analysis, it is crucial for implementing nations which still hold EPZs in high esteem to make some few adjustments to reap the intended benefits fully.

First of all, governments of the two countries should monitor their respective free zones programmes and make changes especially regarding the investment aspect of the policy since most of the foreign exchange generated from the exportation of the EPZ products may not be coming back to the host country. This is because most of the investments in the zones are done by foreigners who will eventually repatriate any profits they make. This recommendation stems from the fact that exports from the zones in both countries are not found to significantly impact the rate of exchange in neither the long nor short-terms. Government should therefore encourage more local investment in the zones to enhance revenue retention in the domestic economy although we concede that the foreign investors are still very much needed to shore up the local currencies in the EPZ host countries since the expatriates come with foreign currencies.

Secondly, government should also take a second look at the export aspect of the policy. Specifically, the rule that requires zone operators to export about 70% of their output to benefit from the incentive scheme should be relooked since at least in the case of Ghana, the study has found that increases in such exports in the short-term increase inflation. This is because there could be local demand for such goods and services which may go a long way to especially bring down prices in the local economy to promote economic growth. This however has the potential to discourage many investors especially those of foreign nationality since they know that they cannot export to benefit from higher prices elsewhere, not forgetting the fact that it could alter the very nature of export processing zones which are meant to be export-oriented.

Also, government should encourage the diversification of zone operations which are usually characterised by only value addition to simple consumables imported into the country instead of the widespread manufacturing that occurs in zones elsewhere. That is, instead of the current practice where the zones are noted for the importation of semi-finished goods for processing for re-export, governments should ensure that their zones go into the manufacture of highly specialised goods that will attract higher prices on the global market to limit the negative tendencies associated with such imports especially the issue of imported inflation. Higher quality goods attracting higher prices on the international market will also bring in more foreign exchange to stabilise the local currency to make the policy more beneficial. It has to be stated here however that government cannot actually force producers on what to produce and what not to produce aside the fact that a lot of time will be needed to train workers to acquire advanced skills to produce such goods.

Again, there is a need for government to encourage the use of more local raw materials. While facilitating the opening up of the localities where these raw materials are cited, it will actually also limit the phenomenon stated above regarding import of semi-finished goods. Limited foreign currencies available to the government will not be used on such imports and this will help stabilise the domestic currency, although this also has the potential to encourage more production in geographically delineated enclaves thereby limiting the positive linkages with the broader economy.

It is also recommended for governments of the two countries to undertake a proper audit of their export processing zones programmes in terms of the subsidies they offer investors. This will help government to know whether offering such incentives to only a select group of investors is beneficial. In other words, it is crucial to know the social cost of such generous incentives *vis-ὰ-vis* the rewards emanating from the zones in order to make the relevant alterations. To this end, we also suggest the urgent need for nations that host EPZs to freely make data on their zone programmes readily available to permit more expansive evaluations.

The zones should also be fully integrated into the rest of the domestic economy instead of their current treatment as enclaves to reap more economic benefits from the policy. This is critical because, with the enclave type of EPZ, there are limited linkages of the policy with the rest of the economy thereby inhibiting its overall effect on the macroeconomy. This is also one key reason why economists are sceptical about the efficacy of the policy. Fortunately for Ghana, it has succeeded in implementing the enclave type of the EPZ policy along with the single-factory scheme which permits firms to set up anywhere in the country, unlike what pertains in Bangladesh. This situation may actually be accounting for the rather strange finding regarding Bangladesh where increases in free zones investment rather inhibit economic growth. Overall however, only a few investors take advantage of this arrangement hence the need for both governments to make deliberate efforts to fully liberalise their economies for maximum reward instead of treating the zones as an economy within an economy.

Lastly, we highly recommend that the government not only look at the usual symmetric assessments associated with free zones activities and to rather look at the asymmetries associated with the various zone activities in order to know the impact of the fluctuations on the economic variables. Thus, to attain the full benefits envisaged from the implementation of the policy particularly in the long-run, it is very important for policymakers and other assessors of the efficacy of the policy to take into consideration the asymmetric effects of export processing zones to come up with relevant courses of action to reduce fluctuations in free zones operations while ensuring the attraction of more diverse inflows into the zones. This is in line with the general observation from the study where we have found that the various positive and negative shocks in free zones investment and export impact the economic variables differently.

9.7 Recommendations for industry players

This work on free zones activities on the economy of implementing nations has shown that indeed the zones are not benefiting those countries the way they should. Operators in the various zones should therefore make relevant adjustments in the way they operate to make them beneficial. For example, there is the need for investors to make an effort to ensure regular training of their workforce particularly the indigenes to help them gain skills to contribute substantially to growth. That is, there is the need for companies in the various zones to shift from the practice of offering highly skilled jobs to foreigners while the locals are engaged in repetitive jobs that largely make use of the hand.

Secondly, in view of the generous incentives afforded investors, they should also make a conscious effort to upgrade their operations into more sophisticated products that will command higher prices on the international market to justify their continuing enjoyment of the subsidies. Thus, to continue to enjoy the subsidies, investors in the zones should ensure that they engage in the production of high-quality goods that will command higher prices globally so that the host country benefits from it.

Also, zones in the developing world are noted for the infringement of the rights of workers. This is the case due to the different labour laws that exist in the zones relative to what is in existence elsewhere. All forms of human rights abuses are therefore experienced by employees in the zones especially the locals which limit their work potential. To ensure that these workers contribute more meaningfully to zone operations, their rights should be well respected despite the lax labour standards in the zones while offering them good conditions of service to give off their best.

Moreover, free zones companies should take full advantage of existing multilateral trade agreements like AGOA and MFA which regularly get re-authorised to export to more advanced countries like the United States of America. This will ensure that they produce more quality goods which will go a long way to bring in more export revenue. Standards will therefore improve in the zones while learning from best operational practices elsewhere since most of these agreements are conditioned on the observance of certain protocols.

Furthermore, investors should look elsewhere to other parts of the host country to undertake their investment activities. They should thus take full advantage of the various raw materials in the domestic economy to set up in those places to open up such areas. This will make their operations greatly felt by the citizenry to receive greater support from them for their operations. This is because the situation in which the firms mainly take advantage of the generous trade incentives to operate in the zones is only a recipe for the breeding of eventual discontent hence the need for such operations to be felt and seen by the masses.

Lastly, there is the need for investors to make a concerted effort to reduce the heavy imports associated with their operations. This is also in line with the taking of advantage to utilise the local raw materials, but also there is the need for the engagement of more labourers from the local economy. The goal in all of this is to limit the need to use more foreign currencies to bring in those imports while paying the local workers with the local currency with limited repatriation of revenue all aimed at stabilising the local currency. Investors should therefore make a conscious effort to ensure that, all in all, their host countries are seen to be benefiting in some ways from their operations for them to genuinely continue to operate.

9.8 Suggestions relating to future research directions

Future studies in line with this should consider the effect of the various exchange rate regimes in analysing the impact of the free zones programme on the rate of exchange in the host country. This will bring to light the moderating role of those regimes in understanding the impact of free zones activities in stabilising the rate of exchange.

There is also the need for future researchers on the world's export processing zones to consider the specific individual country characteristics that most likely affect economic growth. That is, inasmuch as it is important to have a similar set of variables for various countries to allow for comparison, it is equally urgent for each country to be critically observed in terms of the peculiar factors prevalent in the national economy that might affect growth.

Also, since various countries employ various monetary policies to tackle inflation, future studies should consider the different policies in determining the impact of free zones on inflation. This will clearly bring to light the various forces that inhibit or enhance the use of EPZs in dealing with inflation.

Again, with more countries hopefully making data on their export processing zones available, future EPZ researchers should consider more countries to find out how their zones are affecting their economies. This will make more literature on more countries available to draw better comparative conclusions on the impact of the zones.

It is also suggested to future researchers to consider segregating free zones output into 'domestic' and international exports to know the direct effect of such exports on the different macroeconomic variables while ascertaining the proportion of the inputs used to undertake the various investments that come from outside the host country for only processing for re-export.

Future investigations into the role of EPZs on the economy should also incorporate the various incentives offered to attract investors. That is, with the help of greater data availability, researchers should find out if the zones help promote economic development while factoring in the issue of generous subsidies. As part of this, they should account for the specificities of the zones in the various countries to determine what accounts for their different levels of success.

Finally, data and time permitting, future researchers should consider some more benefits associated with zone implementation other than merely the investment and export aspects to discover the EPZ policy's overall impact on the host economy.

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