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# The impact of China, the EU and the US on Africa's economic growth through trade linkages.

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**Abstract:**

China, the EU and the US are the top 3 destinations for exports from Africa. The implication for this relationship is that economic growth in these economic giants will have an effect on the aggregate demand of African economies through trade. Additionally, the emergence of China as an economic power has enabled it to increase its influence on the global stage on various fronts. African countries appear to be among the major beneficiaries of the industrialisation and growth of the Chinese economy as trade between China and Africa has increased significantly during the past years. This has enabled Africa to decrease its dependence on the EU and the US as its traditional markets for its exports - a factor which could have enabled the impressive economic performance during the great recession, while many other countries were paying a high price. To investigate how Africa's key trade partners affect its growth, an autoregressive model is estimated using fixed effects annual panel data for the period 2000-2012 based on 35 Sub-Saharan Africa countries. The model is estimated by Generalized Methods of Moments. The estimated results reveal that the EU has the biggest impact on Africa's economic growth in absolute terms followed by the US and China respectively. The data also fails to support the hypothesis that Africa's impressive economic performance during the recent crisis is credited to improved trade ties with China over the years.

***Key words:*** Africa, China, Economic Growth, GMM, EU, Great recession, US, Trade.

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# 1. Introduction

The recent global economic crisis which has been termed by some scholars as the great recession is said to be the most severe since the great depression. Due to the inter-linkages of the global economy, a trend that has drastically improved over the years, the crisis which was a result of the bursting of the US housing bubble was felt by almost every economy in one way or the other.

For the case of African countries<sup>1</sup>, the extent of the effect of the crisis is a hugely debated topic. Although it is acknowledged that the region's Gross Domestic Product (GDP) fell, many pundits have indicated that the continent's economy was more resilient this time compared to the previous periods. The basis for this study is that textbook trade theory tells us that shocks in major economies have a higher potential to spill over to smaller economies than vice versa. It would therefore be expected that recession in the US and the EU, two major economies severely affected during the crisis, would have major consequences for Africa's growth.

Additionally, the majority of African countries are former European colonies with most of them having been either under the French or British influence until the early 1960s when they became independent. Many studies that have considered an empirical approach and applied the gravity model of trade tend to conclude that countries with such strong historical ties tend to also have strong trade ties.

However, despite the fact that the EU and the US are still facing the impacts of the most severe crisis since the late 1920s, Africa's economy managed to be resilient, which arouses curiosity about this possibility. Many assumptions could be drawn in an attempt to explain Africa's recent economic performance, especially as evidenced by its strong performance during the recent crisis and any attempt to explain this outcome could take any course. Independent of whatever reasons have been given, my curiosity directs me towards the role of China. My assumption, which is supported by some scholars that have studied the Africa – China trade relations, is that the emergence of China as an economic power on the global scene has offered Africa's economies a counterbalance during the past couple of years, which

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<sup>1</sup> The notation Africa appears several times in this study but in this paper, it is mainly phrased to refer to Sub-Saharan Africa including the empirical part which takes into consideration only Sub-Saharan Africa countries.

could have enabled it to diversify its exports away from its historically most important trading partners: the EU and the US.

The key idea is that the rapid growth of China's economy, which has been fuelled by a large manufacturing base, could have offered Africa market options for its mainly primary good exports needed to sustain China's industrial machine and the over 1.5 billion strong population.

The goal for this thesis is, therefore, to analyse the magnitude of the impact the EU, China and the US who are the 3 top economies and also Africa's main export markets have on Africa's economic growth. Additionally, the importance of China is also explored in an attempt to explain the recent robust performance of Africa's economy especially as noticed during the recent global slump. In order to be able to draw some conclusions, an autoregressive model estimated using Generalized Methods of Moments is applied. The model is constructed using GDP, trade and trade openness data for the period 2000-2012.

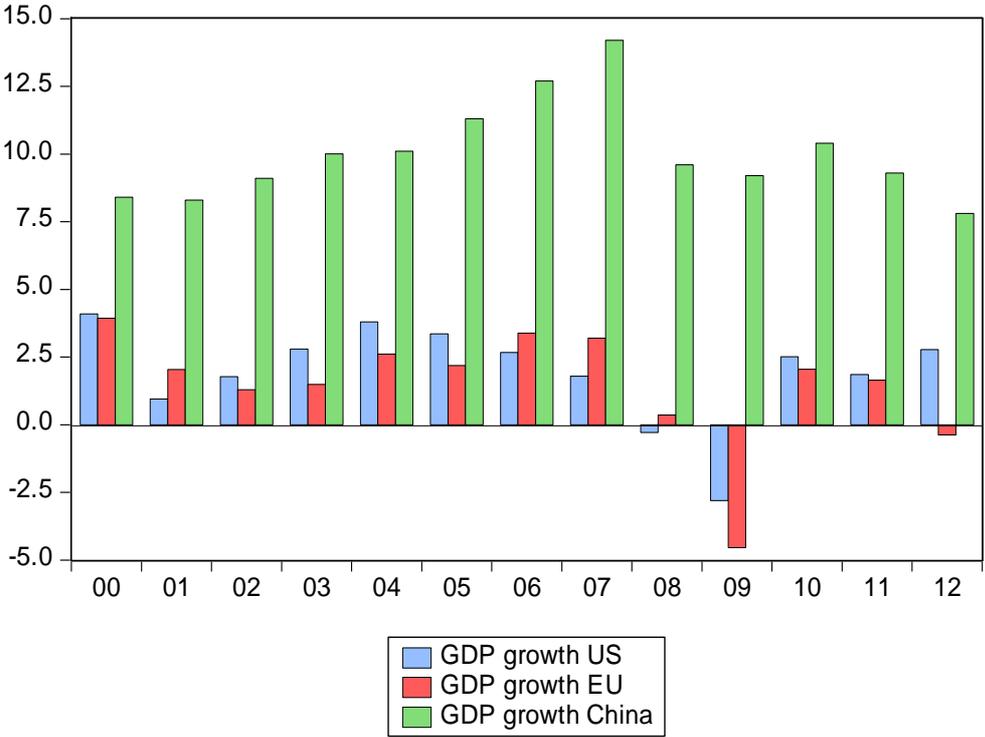
I find that very little literature has laid emphasis on the impact that Africa's three main trading partners have on its growth. Additionally, as far as I am concerned, there is no study that has taken into consideration the simultaneous impact of the EU, US and China on Africa's growth. By taking into consideration this simultaneous impact through using the most recent data, I regard this study a key input in the academic field and hopefully it will open more interest for related studies in the near future.

## **2. Background: The Great Recession and Africa**

The onset of the most recent global recession is said to be the financial crisis whose origin is blamed on the bursting of the US housing market which was booming prior to the crisis. Due to the hugely globalised economy, the US financial crisis transmitted to other advanced economies not sparing the emerging markets and developing economies (Arief, 2010). For the case of Africa, Geis and Chauvin (2011) assert that except for South Africa, the continent did not initially feel the implications of the financial crisis due to its weak integration into the global financial markets. However, the consequences of the financial crisis were mainly felt when it transmitted into the real economy. It is argued that one of the many ways through which Africa was affected was through trade shocks. The intuition is that as the global economy finds itself in a recession, especially Africa's key trading partners, these countries cut back on their demand for Africa's exports.

**Figure 1.**

The figure depicts growth rate for the EU, China and US for 2000-2012



Note: years on the horizontal axis and growth rate on the vertical axis.

Source: Author’s calculations using data from the World Bank Development Indicators.

Figure 1 above shows variation in GDP growth of Africa’s 3 main trading partners. It can be seen that China recorded impressive growth during 2000-2012 even during the crisis despite some decline. The EU and the US on the other hand recorded weaker growth as compared to China during the entire period for the data. From the same figure, one can also observe that the US recorded negative growth in both 2008 and 2009 with the shock to its GDP being much stronger in 2009. The EU on the other hand recorded very weak growth in 2008 which worsened significantly in 2009 as the growth rate was almost negative 4.

In order to highlight how Africa’s exports are sensitive to the macroeconomic evolutions of its trading partners, Drummond et al. (2009) for instance argue that Africa’s integration into the global trading system has significantly improved during the recent years with the USA, the EU and China being the main destinations for Africa’s exports. There is therefore a basis

for a strong argument that trade is one of the many means through which a global recession or to be more specific a recession in Africa's most influential trading partners would affect its growth.

However, quite surprising is an assertion by Lui and Drummond (2013) that Africa's economy was not severely affected during the recent crisis and besides that, the economy recovered rapidly despite the huge economic turmoil in the advanced economies. This argument is supported by figure 2 in the appendix which shows that Africa was initially not affected by the crisis. Additionally, although GDP growth was negatively affected in 2009, it rebounded stronger in the subsequent year. Verdu (2012:19) additionally claims that Europe's GDP contraction had a limited impact on most of Sub-Saharan African countries.

Aside from referring to Africa's economy as a whole, the individual economies were also affected differently by the crisis. For instance; countries such as Uganda, Namibia and Gabon are said to have actually reported an increase in exports whereas some countries are said to have experienced higher exports in 2009 after the crisis than in 2007 before the crisis started. Some countries however felt the wrath of the crisis, including those close to South Africa, major oil exporters and textile producers such as Lesotho, Madagascar and Mauritius (Geis & Chauvin, 2011). Additionally, by comparing the GDP growth of the period 2008 and 2009 to that of 2000 to 2007, Geis and Chauvin argue that of the 32 countries considered in their study, even if most of them had experienced a slowdown by 2009, a fall in economic performance of more than 1 standard deviation could only be found in 21 cases. Furthermore, by focusing on growth trends for 28 sample economies from 2008 and 2009 only, the authors argue that growth fell by more than 1 per cent points but 6 of the economies actually experienced growth in economic activities.

In order to build a link between Africa's growth and the role of trade, it is argued that Africa's GDP grew by 6.5 percent on average prior to the crisis. Besides that; exports are said to have contributed significantly to its GDP (Arief, 2010, Geis & Chauvin, 2011). Among the many reasons behind this impressive performance of Africa's economy is the surge in demand for its primary commodities such as oil and minerals due to the steady growth in industrialized economies as well as emerging economies such as China and India (Arief, 2010). According to Geis and Chauvin, the US, the EU and China account for as much as 70 percent of Africa's exports today which makes Africa's economic growth hugely exposed to the macroeconomic events in these economic powers through macroeconomic interlinks such as trade. Additionally, Oluwole (2009) argues that Africa's exports to the EU and the US are estimated

at as much as 60 per cent. Thus, given the fact that they are the two major economies that were severely affected during the crisis; we would expect major consequences for Africa's growth. It is therefore not surprising that Africa's exports to the US fell

by 63 percent during the first half of 2009, the midst of the crisis (Geis & Chauvin, 2011). On the other hand, there is also a strong sentiment that Africa's recent economic performance has been boosted by commodity exports to China. It is for instance argued that China was the destination for over 13 percent of Africa's exports in 2007 (Geis & Chauvin, 2011), a trend which implies that China has become increasingly crucial for Africa's growth performance. Lui and Drummond (2013) support this view through asserting that Africa's impressive performance during the great recession is credited to the region's improved trade ties with China which has helped insulate it from export volatility.

### **3. An overview of Africa's exports to the three major economies**

#### **i. Case I. Exports to the EU**

According to Wilhelmsson and Persson (2007:29), the EU has under many years been committed to giving developing countries trade preferences. This partnership can be traced back as far as 1957 under the treaty of Rome which entitled colonies of EU members to free trade with the EU.

For the case of Africa, almost all of the African countries are former European colonies, and many have maintained strong political and economic ties during post-independence. Besides that, various studies with a focus on bilateral trade that apply the gravity model of trade also usually find strong evidence that countries with such historical ties tend to have stronger bilateral trade ties (see for example Nilsson, 2007:59 who finds positive and significant EU imports from former colonies). Apart from the Treaty of Rome, the EU has over the years offered a number of trade preferences to African countries through various bilateral trade agreements, a policy which among other reasons is intended to encourage these countries' exports and economic growth (Bordet et al. 2007).

Among the various trade agreements between the EU and developing countries is the Lomé Convention of 1975 which offered former European colonies duty free market access to the EU for a broad range of products. Various Lomé Conventions followed suit including the 1979, 1984, 1989 and 1995 conventions which maintained the pattern of the first Lomé Convention (European Commission, 2010). The Lomé Conventions were replaced by the

Cotonou Agreement which was signed in 2000 and is described as “the most comprehensive partnership between developing countries and the EU” (European Commission, 2010). The treaty enables various products from 79 African, Caribbean and Pacific (ACP) countries of which 45,<sup>2</sup> are African countries to be exported to the EU (European Commission, 2010).

A similar deal to the Cotonou Agreement is the Everything But Arms (EBA) arrangement which was signed in 2001 and benefits the least developed 49 countries as defined by the United Nations. Of the 49 least developed countries privileged under the EBA deal, 33 are African countries.<sup>3</sup> Under this arrangement, those countries that are classified as the least developed are able to export all their goods except for arms and armaments to the EU without being levied and quota free. Some of the key benefits developing countries gain from the EU preferential offers include increase in their exports, exports diversification as well as the possibility for them to charge higher prices on their merchandise (Nilsson, 2007).

Apart from preferential trade agreements that benefit a wider range of countries, the EU also extends various preferences to individual countries as well as regional economic blocs in Africa. One example is the Trade, Development and Cooperation Agreement with South Africa which has been in operation since January 2000. The agreement entitles both parties to access each other’s markets tariff free. As a result, the EU is regarded as South Africa’s major trading partner and on the other hand, South Africa is the EU’s main trading partner in Sub-Saharan Africa (Pettersson, 2007:102).

Given these broad trade agreements with a number of African countries, it is therefore not striking that the EU is often cited as Africa’s main trading partner and also the most important trading partner of developing countries in general. Bourdet et al. (2007) for instance regard the EU as the main trading partner of developing countries and as one of the most important export markets for growing economies. In a similar line, Geis and Chauvin (2011) as well as Drummond and Ramirez (2009) regard Europe as Africa’s main trading partner, especially the Sub-Saharan Africa region. According to the Drummond and Ramirez, exports from the sub-Saharan Africa to Europe mounted to as much as 30 per cent between 2000 and 2010.

However despite broad trade deals with many African countries, Bourdet et al. (2007) caution that Africa’s exports to the EU markets have been declining. This is also supported by the figure in appendix.5 which indicates that although Africa trades more with the EU than with

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<sup>2</sup> See appendix2. for African countries benefiting from the Cotonou agreement

<sup>3</sup> See appendix3. for the names of these countries

any other entity, this trade has never exponentially taken off and has in certain circumstances either stagnated or even declined

**i. Case II. Exports to the US**

One of the most known broad preferential trade agreements the US extends to developing countries is the African Growth and Opportunity Act (AGOA). It was enacted in 2000 under the umbrella of the Trade and Development Act and enables 39 SSA,<sup>4</sup> and other developing countries to export their goods to the US without tariff barriers on certain products between 2000 and 2015 (Schiere et al. 2011). Countries that qualify to benefit from the AGOA deal are for instance able to export eligible apparel articles quota free and without being levied.

However, in order to be eligible, potential AGOA countries have to fulfil certain pre-conditions including; “promoting market based economies, rule of law and multiparty politics, elimination of barriers to U.S. trade and investment, protection of intellectual property, efforts to combat corruption, policies to reduce poverty, increasing access to health care and educational opportunities, protection of human rights and worker rights and elimination of certain child labour practices” (US. Department of Commerce). Many of the African countries have passed these criteria according to the US government and as such, as many as 39 out of 49 African countries reap the benefits of the AGOA agreement.

The intended purpose of the AGOA program is to enhance trade as well as encouraging development in those countries that fulfil the pre-set conditions. The incentive is that by removing trade barriers on certain goods from African countries, their exports would be more competitive which would spur economic growth and development in these countries. As a result, the AGOA agreement is said to have been a key instrument in boosting America’s trade ties with Africa. The impact of the AGOA is echoed by Bourdet et al. (2007), who argue that the US together with the EU lead in offering preferential market access to developing economies and hence are the largest importers of goods from these countries. Figure 1 in the appendix also indicates that US is the next biggest importer of products from Africa after the EU. The US being second to the EU in terms of accommodating imports from Africa is not indeed surprising. It is argued and also as demonstrated in the case of Africa’s exports to the EU that the scope of offers from the two major economies varies both in depth and coverage. In addition to that, Bourdet et al. argue that the preferences provided by the EU are far more beneficial compared to what the US offers.

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<sup>4</sup> See appendix4. for countries benefiting from AGOA as of 2013

Countries that have benefited most under the AGOA program include; Nigeria, Angola, South Africa, Chad, Gabon, Lesotho, Kenya, Mauritius, Cameroon and the Republic of Congo. It is also estimated that as much as 6,800 goods from Africa to the US enjoy tariff free status under the AGOA deal. Additionally, it is estimated that as a result of the AGOA agreement, exports of African countries to the US have more than doubled since the year 2000. Figure.1 for instance indicates that US imports from AGOA eligible countries grew exponentially since the early 2000s. This trend however faced a major decline after the onset of the financial crisis and although they did rebound after 2010, they have never reached their pre-crisis peak but rather experienced a further collapse after 2011. It is however not known how much of the proportion of these exports are from Africa. The figure in appendix.5 however indicates that Africa’s exports to the US were steadily growing prior to the crisis but this trend was interrupted after the outbreak of the crisis. Kebonang (2007) however downplays the impact of AGOA on Africa’s exports to the US as he argues that few African countries have taken advantage of the preferential market access offered by the US. The argument put forward by Kebonang is that the US preferential status is limited to textiles and apparels while many African countries are known to lack established manufacturing sectors especially due to the Dutch disease as a result of heavy reliance on natural resources. In addition, the AGOA deal does not extend to other areas of the economy such as agricultural and mining products. Additionally, some countries are excluded from the benefits of AGOA due to their failure to comply with the pre-set conditions. One of the notable but not surprising exclusions from AGOA beneficiary is Zimbabwe which has had strained relations especially with the EU and the US for reasons related to human rights.

**Figure.1**

The figure depicts the growth of U.S. Trade with developing countries due to the AGOA



Source: Schaefer et al. (2013:2)

Lastly, the original AGOA agreement has been amended several times such as in 2002 which offered African countries more preferential access and again in 2004 under what was termed as the AGOA acceleration which gave certain African countries preferential markets access to the US market until the end of September 2015 (Schaefer et al. 2013).

## **ii. Case III. Exports to China**

Bilateral trade relations between Africa and China can be traced back as early as the 15<sup>th</sup> century when the first batch of Chinese traders came into contact with the East African coast. Stronger ties between China and Africa however only grew during the post-independence era due to what China viewed as an act of solidarity to other developing countries. Economic ties between China and Africa improved even further in 1978, an event that was reinforced by China's gradual integration with the world. Other notable factors include the set off of China's industrialisation as well as the rapid improvement in the living standards of its huge population. These developments meant that China's demand for raw materials and energy grew rapidly which consequently brought it closer to Africa especially as a source of oil and mineral imports (Schiere et al. 2011). However, according to Wang (2007), the real acceleration of China's trade with Africa was in the early 2000s and since then, China's role in Africa's economy has become increasingly influential over the past years especially in areas such as trade (Drummond et al. 2013). The growth of bilateral trade ties between China and Africa is for instance highlighted through the significant expansion of Africa's exports as a ratio of GDP to China. Trade relations between Africa and China have been improved for instance by means of China entering into free trade with a number of African countries. These ties according Schiere et al. (2011) have been mainly driven by China's rapid growth and industrialization which has increased its quest for Africa's exports that are mainly natural resources. As a result, Africa's exports destined for China are estimated to have grown at a rate of 40 percent between 2001 and 2006. 85 per cent of trade between China and Africa trade is said to be with the SSA. The figure in appendix.5 clearly shows that although China is only third behind the EU and the US as a destination for Africa's exports, China's role has been growing exponentially over the previous years and this trend seems to have been uninterrupted even in the midst of the great recession which is the first support for my hypothesis in relation to this study. Important to note is that although Africa's trade with

China has improved over the last years especially prior to 2007<sup>5</sup>, the EU and the US still remained the key contributors to Africa's export growth although China was catching up first. In a more recent study, Drummond and Lui (2013) indeed indicate that taking into consideration total trade, China's trade with Africa has exceeded that of the US and the EU who are usually seen as Africa's traditional trading partners. Their statistics for instance indicate that China accounted for over 30 per cent of Africa's total export growth between 2005 and 2012. Such improved trade ties not only imply that Africa can diversify its exports among the US, the EU and China but also Africa's economic growth is exposed to macroeconomic events in China. Arief (2010) for instance argues that the recent growth of Africa's GDP has been due to massive commodity exports to China which makes the region directly vulnerable to fluctuations in the Chinese economic growth. However, although China's economic importance for Africa has been on the rise during the last couple of years, it has not been proportional. It is for instance argued that over 70 per cent of Africa's exports to China originate from Angola, the Democratic Republic of Congo, and Sudan whereas many other African countries have no direct bilateral trade ties with China (Schiere et al. 2011).

Additionally, China's relations with African countries vary from those the EU and the US have with African countries. The EU and the US often place tough pre-conditions on developing countries and often use their economic influence as a foreign policy tool. The US foreign policy has for example resulted in a number of sanctions including economic sanctions targeting various African countries for instance due to what the US regards as violations of human rights. Some of these policies are for instance clearly stipulated in the AGOA accords as a pre-condition in order for a country to be eligible. Additionally, an annual review on AGOA countries is done in order to assess which countries are eligible to further benefit from AGOA. China on the other hand has been criticised especially in Western circles for undermining their efforts as it has often described its dealings with African countries as entirely commercially motivated. Therefore, China's unconditional commercial dealings in Africa could be the major source of its increased influence on the African continent during the previous years.

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<sup>5</sup> This date relates to the year the paper was written and not to the period before the crisis.

## 4. Economic theory

A starting point to analysing how the EU, China and the US would influence Africa's growth would be by having a glance at the Aggregate Demand-Aggregate Supply model which in economic literature is usually abbreviated as the AD-AS model. It is a simple model that offers a less complex alternative to analysing the macroeconomic interdependence of countries. The AD/AS model itself is derived from the IS-LM model and its analysis involves the intersection of both curves in order to determine current price level and total output of the economy at a given point in time (Barro, 1994). For the purpose of this paper, the attention is focused on the AD curve since it portrays the national income of the country. Aggregate demand and GDP can be used interchangeably as they depict the same thing. The identity of the aggregate demand function is given as follows;  $AD = C_0 + C_y(Y - T) + I^P + G + NX$ , where the variable of most interest is that of net exports ( $NX$ ).

Textbook economics tells indicates that an increase or decrease in any of these components shifts the AD curve to the left and the right respectively. As a result, considering a two-country model, we would expect that if aggregate demand for a trading partner falls for instance due to a slump in the economy of the trading partner, growth in the domestic economy will consequently contract. Such an analysis is common in what is known as the small open economy model in international trade theory. According to the model, events in a small economy cannot influence events in a major economy since the small economy acts as a price taker on the global market and vice versa for big economies. In this regard, the EU, China and the US being seen as big economies can have an impact on the global economy. According to Chudik et al. (2010), the USA alone accounts for over 30 per cent of the total global output. Additionally, China has in the recent years overtaken Japan as the second biggest economy and recent predictions indicate that it is likely overtake the USA as the number one economy within a few years. The EU on the other hand although it consists of a mixture of both small open and big independent economies, as a customs union, all member countries impose a common external tariff and through the EU, all countries pursue a common foreign policy at a certain extent. The EU is therefore often regarded as a single entity and with regard to this status; its aggregated GDP is often produced by various sources. Hence, taking into consideration the aggregated GDP, the EU ranks first above the US and China.

A study conducted by Collier and Gunning (1999) indicates that many of Africa's economies previously imposed stringent trade restrictions through measures such as tariffs and exports quotas. Africa was as a result regarded as the least open entity until the 1980s. This has however changed over the past years with many indicators showing an increased integration of Africa's economies into the global trading system. According to Geis and Chauvin (2011), Africa's increased trade openness over the past years has been credited to a surge in demand for its exports especially from emerging economies such as China. It could therefore be argued that the fact that Africa has become more involved in international trade during the past years has also made the continent increasingly exposed to turbulences in the global economy (Kose & Riezman, 2001). The main concept according to Kose and Riezman is that international trade can result in macroeconomic fluctuations in a small open economy through shocks to trade in goods and services as well as trade in financial assets. In the same context; Africa faces an even bigger challenge, according to Kose and Riezman due to its hugely undiversified structure of economy which makes it highly vulnerable to trade shocks. There is for instance a common consensus that Africa's exports are heavily dominated by primary goods. Another major problem arises since these countries act as price takers as they cannot influence global commodity prices. This disadvantaged position therefore makes them highly susceptible to fluctuations in global prices of primary commodity goods which can have major consequences for these economies given that their national incomes are hugely comprised of revenues from natural resource related exports (Arief, 2010). Lastly, Chudik et al. (2010) argue that it is hugely acknowledged in small open economy literature that a rise in a country's trade openness makes it increasingly exposed to foreign shocks. However, according the authors, trade openness alone is not the key ingredient for macroeconomic interdependence but rather the ability of a country to diversify both exports and imports.

## **5. Literature review:**

There are some studies that have been interested in how Africa's economy is affected and responds to external shocks. Whereas some have taken an empirical approach, others have taken a theoretical approach. Studies that have taken an empirical approach include Drummond and Ramirez (2009) who studied the effect of a global recession on Africa. They base their study on 44 Sub-Saharan African countries using data from 1982 to 2009 and through GMM estimation of various dynamic panel regressions, their results indicate that a 1percent slump in the global growth results in a growth decline of 0.4 to 0.5 in Africa.

Drummond and Lui (2013) on the other hand studied how China influences Africa's economic growth and trade through a series of fixed effects panel regressions using data from 1995 to 2012. Their main interest lies in the impact of fixed assets investments in China on Sub-Saharan Africa export growth. The results of this study indicate a positive and significant effect of China's fixed assets investment on imports from Sub-Saharan Africa. More specifically, their results indicate that a 1 percent increase in domestic investment in China results in a 0.64 percent increase in exports from Sub-Saharan Africa.

Similarly, Vilorio et al. (2009) studied the impact of China's economic growth on Africa's agricultural exports. Their study focuses on countries in the southern part of Africa and through using multiple panels of the gravity model; they find little evidence of a direct effect of China's economic growth on the agricultural exports of the studied countries. The authors however acknowledge that China is such a big economy today and hence its pressure on global agricultural prices would benefit these countries whether or not they trade directly with China.

One of the most recent studies has been conducted by Sugimoto et al. (2013) and their analysis focuses attention to the spillover effects of the financial crisis on Africa's stock market. They use the forecast error variance decomposition from a generalized impulse response function and their key results indicate that spillovers from the EU outweighed those from the US. Additionally, the impact varied depending on how much the individual African economies are exposed to the global economy. The authors argue that African economies such as South Africa and Nigeria that are more exposed to the global financial markets were remarkably more affected whereas those that are less integrated were more immune.

On the theoretical front, Verdu (2012) argues that the extent of exposure of the Sub-Saharan Africa to European growth dynamics through trade has declined. The reason given is that the region has managed to diversify its exports towards other markets as well as increased interregional trade. Verdu for instance indicates that exports from Sub-Saharan Africa to Europe fell from 33 per cent during 1995-2004 to 26 per cent during 2005-2010 an indication that Europe's impact on the region's GDP growth has minimized during that period.

## 6. Empirical analysis

### i) The model and method of estimation

In order to address the question of how the EU, China and the US affect Africa's growth, the following basic autoregressive model is applied;

$$\Delta GDP'_{Africa,t} = \beta_0 \Delta GDP_{Africa,t-1} + \beta_1 \Delta GDP_{EU,t} + \beta_2 \Delta GDP_{China,t} + \beta_3 \Delta GDP_{US,t} + \beta_4 Dummy * \Delta GDP_{China,t} + \beta_5 trade\ openness_{Africa,t} + \varepsilon_t$$

$$\Delta GDP'_t \neq \Delta GDP_t^6 \quad (1.1)$$

Where;  $\Delta GDP_{Africa,t}$  is the dependent variable,  $\beta_{i,t} = 0 \dots n$  are the coefficients to be estimated and  $\varepsilon_t$  is the unobserved error which ceteris paribus is the unexplained part of the model part of the model. The variable  $Dummy * \Delta GDP_{China,t}$  is an important aspect for this study as it forms the hypothesis about the role of China for Africa's economic performance as evidenced during the great recession. The dummy alone takes the value of zero before 2007 and the value of 1 after 2007. Similar variables for the EU and the US are considered in various regressions in order to be able to draw legitimate conclusions especially for the period after the onset of the crisis.

Applying an autoregressive model helps overcome various problems usually encountered in econometric studies such as the possibility of the variables being autocorrelated. However, Brooks (2008) is more conscious about using dynamic models as a possible remedy for autocorrelation as he argues that the model could still result in biased coefficients despite being consistent. This problem according to Brooks arises especially if the researcher is using small data samples. This problem is however not considered serious in this study since the sample is regarded as big enough. Another advantage that comes with applying dynamic models according to Gujarati and Porter (2010) is that they help to determine both short run and long run impacts of the explanatory variables. Hence; the  $\beta$  coefficients on the static variables determine the short run impact of the explanatory variables on the depend variable whereas the long run impact is determined as follows;

$$\frac{\beta_{1..n,t}}{1 - B_{0,t-1}} \quad t \neq 0 \quad (1.2)$$

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<sup>6</sup> See next sub-section for the difference in the series

However, calculations and analysis for the long run impact will not be provided in this paper as they neither affect the sign of the coefficients nor improve the quality of the analysis.

The empirical model is estimated using balanced panel data with fixed effects using the method of Generalized Method of Moments (GMM). Using the GMM approach also carries certain advantages as compared to for example OLS estimation. It for instance helps to overcome various endogeneity problems that are usually encountered in econometric applications which helps to encounter various biasness problems. On the advantages of using GMM, Verbeek (2012:169) adds that GMM estimation relaxes the normality assumption and also tolerates some level heteroskedasticity.

As it can be observed in (1.1), the constant has been excluded from the model in order to avoid what is referred to as the dummy variable trap in econometric literature. According to Brooks (2012: 491), including both the intercept term and the dummy poses the risk of the model facing perfect multicollinearity between the dummy variables and the intercept. Lastly, fixed effects estimation has been preferred to other available methods due to the presence dummies in the model which are of key interest for the study.

## **ii) The Data and the variables.**

The data used to estimate the model addressed in the sub-section above is limited to the period 2000-2012. The study is limited to this period mainly due to data availability. For instance, official bilateral trade data for the EU and the various African countries considered in this study is hugely lacking before the year 2000.<sup>7</sup> Additionally, bilateral trade data between China and various African countries is hugely missing before the year 2000 and to avoid many missing observations, it has been preferred to consider the year 2000 and beyond due to data availability. Given that not more than 3 data observations are missing for a given country, an average of the available data has been taken to avoid eliminating the entire data for that specific country.

The data that has been used to construct the model includes; GDP series, bilateral trade data and trade openness. GDP data as well trade openness data is extracted from the World Development indicators (WDI) released by the World Bank. The GDP data for all the variables is extracted as annual percentage GDP growth ( $\Delta$ GDP) whereas trade openness is given as the share of trade in every country's GDP. Bilateral trade data on the other hand is

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<sup>7</sup> (see appendix.1 for the African countries included in the panel)

extracted from the World Integrated Trade Solution (WITS) and is valued in US dollars. The trade data is extracted on a bilateral basis from WITS. It is for example given as EU imports or exports from or to Africa, China's imports or exports from or to Africa and USA's imports and exports from and to Africa. Bilateral trade data is then used to construct total trade through summing imports and exports as well as constructing trade weights, through taking the ratio of exports to total trade in each given year, for every African country and its trading partner. A simplification of the calculation is demonstrated in the identity (1.3) below.

$$\text{Trade weights}_{i,t} = \frac{\text{exports}_{i,t}}{\text{total trade}_{i,t}}$$

Where;  $\text{total trade}_{i,t} = \text{imports}_{i,t} + \text{exports}_{i,t} \quad i, t \neq 0 \quad (1.3)$

In order to capture the impact through which the trading partner affects Africa's economic growth, the weight of trade with each trading partner is multiplied by the trading partner's GDP growth which generates new variables of GDP growth variable for the EU, China and the US weighted by trade with the various African countries. The trade weighted GDP growth variables for the EU, China and the US are therefore generated as follows;

$$\Delta GDP_{i,t} = \text{trade weight}_{i,t} \times \Delta GDP'_{i,t} \quad i, t \neq 0, \quad \Delta GDP_{i,t} \neq \Delta GDP'_{i,t} \quad (1.4)$$

Last but not least, the trade openness variable is transformed into log terms in order to match with the GDP series which are given in terms of growth rate. Also given that time series data is known to be non-stationary, the data was tested for unit root to ensure the model is parsimonious. The unit root tests are in given in appendix 7 and the results indicate that the data is stationary. The GDP data is shown to be highly significantly stationary even without applying the usual remedies for non-stationary data such as first differencing. This is not surprising since the GDP series are given in growth rate or in delta terms a similar technique used to convert non-stationary data into stationary data when first differencing.

**Table.1**

Summar statistics of the data

Variable	Mean	Max	Min	Std. Dev.	Obs.
ΔGDP_China	10.031	4.200	7.800	1.738	442
ΔGDP_EU	1.482	3.931	-4.539	2.078	442
ΔGDP_Africa	5.109	63.379	-32.832	6.350	442
ΔGDP_USA	1.943	4.091	-2.802	1.775	442
Exports_China to Africa	673,061.1	15,323,312	283.181	163,028	442
Exports_EU to Africa	1,758,589	34,207,565	15339.08	4,327,724	442
Exports_US to Africa	362,988.8	7,553,309	1672.197	962,909.4	442
Imports_China fro Africa	867,106.6	44,653,737	0.096000	3,878,117	442
Imports_EU from Africa	1,953,516	42,372,072	18,512.5	4,902,643	442
Imports_US from Africa	1,438,784	39,217,292	297.2	4,557,640	442
Bilateral Total trade_EU_Africa	37,12,105	62,455,077	58683.34	9,036,662	442
Bilateral Total trade_US_Africa	1,801,773	43,319,277	2503.906	5,250,648	442
Bilateral Total trade_CHI_Africa	15,40,168	59,977,049	293.9970	5,056,698	442
Trade weight_China	0.340	0.993	5.78E-06	0.313562	442
Trade weight_EU	0.479	0.897	0.023983	0.202645	442
Trade weight_USA	0.502	0.989	0.000646	0.307555	442
Trade openness_Africa	80.748	202.849	20.964	35.840	442
Dummy	0.385	1.000	0.000000	0.487	442

Note:<sup>8</sup>

A quick look at the summary statistics is presented in table 2. By focusing on the variables of most interest, table 2 shows that China recorded an impressive GDP growth rate between 2000 and 2012 compared to the Africa, the EU and the US. The average GDP growth was 10 percent with the minimum being 7 percent which is non-comparable to the growth rate of neither the EU nor the US. The EU and the US on the other hand recorded much weaker growth whose average is less than 2 percent. The maximum GDP growth recorded by the EU and the US during this period is 3.9 percent and 4 percent respectively which is much weaker than the minimum GDP growth recorded by China at 7 percent. The EU and the US also recorded negative GDP growth figures with the EU recording more weaker GDP growth at negative 4 percent compared to the 2 percent recorded by the US. Hence, although the gap between the highest GDP growth recorded by the EU and the US is almost non-existent, the EU recorded much lower growth rate than the US during one of the periods between 2000 and 2012. Additionally, the average monetary value of EU imports from Africa is the highest whereas the average monetary value of US imports from Africa outpaces that of China.

<sup>8</sup> i) All values have been rounded off to 3 decimals where necessary

ii) The magnitude of the trade related variables except the trade weights is larger since it is valued in monetary terms

iii) The GDP series here are not trade weighted

**Table.2**

Summary of the variables

Variable	Definition
$\Delta GDP_{Africa,t}$	dependent variable
$\Delta GDP_{Africa,t-1}$	independent variable
$\Delta GDP_{EU}$	independent variable
$\Delta GDP_{China}$	independent variable
$\Delta GDP_{US}$	independent variable
<i>Dummy</i> * $GDP_{China,t}$	independent variable
<i>log Trade openness</i>	control variable

## 7. Empirical results and discussion

Table.3

Summary of regression results estimating Africa's GDP growth ( $\Delta GDP$ ) during 2000-2012.

Variable	Model 1 $\beta$	Model 2 $\beta$	Model 3 $\beta$	Model 4 $\beta$
$\Delta GDP_{Africa}(-1)$	0.212** (0.032)	0.112** (0.005)	0.127** (0.008)	0.127** (0.008)
$\Delta GDP_{EU}$	-3.836 (2.252)	1.199** (0.061)	2.069** (0.230)	2.105** (0.546)
$\Delta GDP_{China}$	0.789** (0.789)	0.069* (0.031)	0.140 (0.076)	0.143 (0.068)
$\Delta GDP_{US}$	1.972* (1.005)	-0.291** (0.082)	-0.744** (0.133)	-0.716* (0.340)
<i>Trade openness</i>	-7.531** (2.242)	-11.046** (0.298)	-11.178** (0.609)	-11.189** (0.614)
<i>Dummy</i> * $\Delta GDP_{China}$		-0.126** (0.020)	-0.076 (0.047)	-0.071 (0.069)
<i>Dummy</i> * $\Delta GDP_{EU}$			-0.536 (0.676)	-0.578 (0.936)
<i>Dummy</i> * $\Delta GDP_{US}$			-0.121 (0.999)	-0.189 (1.359)
$\Delta GDP_{EU}$ * $\Delta GDP_{US}$				-0.023 (0.296)

Note: \*p&lt;0.05. \*\*P&lt;0.01, (...) are the standard errors and N=374 for each model

Based on the estimates by the 4 models presented in table 3 above, the general consensus is that the EU has the largest impact on Africa's growth in absolute terms. The same conclusion holds whether we consider the entire time frame for the data or only limit the impact to the period beyond 2007. It can also be observed that the impact of the US is greater than that of China in absolute terms in all instances whether we consider the entire period for the data or only consider the impact beyond 2007.

A deeper analysis of the results is based on the diagnostic testing using the Wald tests which have been performed on the individual coefficients being zero or all coefficients together being equal to zero.<sup>9</sup> The idea is that coefficients that are not statistically different from zero do not add value to the model. Thus, based on the F-test using the Wald test, the null is rejected which implies that some variables have explanatory power. However, only model 2 rejects the null of every individual coefficient being equal to zero. Additionally, only model 2 has all coefficients significant at either 1 percent or 5 percent level. Hence, given, the fore mentioned robustness tests; a deeper analysis is based only on results provided by model 2.

Reading from the estimations from model 2, it can be seen that Africa's economic growth is positively and significantly explained by its lagged growth of one period. Additionally, the short run impact of China's economic growth as well as that of the EU on Africa's growth can be seen to be positive. However, quite unexpected is that US short run impact on Africa's growth is negative. On the other hand, as has been anticipated, the results indicate that the EU and the US have the greatest impact on Africa's growth in absolute terms as compared to China. The difference in the short run impact of the EU and the US is partially explained by Nilsson, (2007) who argues that *ceteris paribus*; the EU trade policy towards developing countries is expected to have a bigger impact on these countries' exports than US trade policy since the EU's trade policy towards these countries is broader than what the US offers. Nilsson also provides empirical evidence through estimating a gravity model whose estimated results indicate significant evidence that the EU trade policy towards developing countries indeed has a greater impact compared to that of the US.

Apart from the unexpected negative impact of the US, on Africa's growth, which is supported by 3 of the 4 estimated models, the estimates from model 3 fail to implicate China has the reason for Africa's often cited sound performance during the great recession, a clear

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<sup>9</sup> The hypotheses for the Wald tests for the individual coefficients being equal to zero are set as follows;  $H_0: \beta_{i..n} = 0, H_1: \beta_{i..n} \neq 0$ , rejecting the null implies whereas the  $H_0: B_0=B_1 \dots B_n = 0, H_1: B_0 = B_2 \dots B_n \neq 0$  for all coefficients being equal to zero, reject the null implies at least one of the coefficients is not equal to zero.

contradiction to this paper's hypothesis. According to the estimates, China instead has a negative impact on Africa's growth based on data beyond 2007. The fact that China had a negative impact on Africa's growth arouses two areas of interest. One is trying to understand how China has a negative impact on Africa's growth and the other is to try to find possible reasons explaining Africa's performance in the midst of the crisis.

A starting point could be by having some focus on the dynamic variable  $\Delta GDP_{Africa,t-1}$  which is both positive and statistically significant in all the 4 models. Can one as a result make an argument that Africa's performance could have been helped by increased intra-trade? There are a number of regional trade blocs that have been created throughout Africa over the previous years which could have triggered intra-regional trade resulting in trade creation or possibly increased trade within Africa. Increased trade within Africa could have been enabled by the relative political stability on the continent which has improved over the last years as well as the improving infrastructure. In support of increased trade within Africa is Verdu (2012), who argues that there has been a growth in intra Africa trade over the previous years which has partially enabled to shield Africa from its heavy reliance on Europe's markets.

Secondly, there is need for an attempt to explain the negative impact China has on Africa's growth as has been exposed by the data from 2007 and beyond. One possible explanation is given by Zafar (2007) who argues that China's economic boom has been perceived by Africa with mixed results. According to Zafar, on one hand, China's economic boom has had a positive influence on Africa's growth through its impact on the commodity boom such as oil and metals that are exported by many African countries as well as triggering deeper trade China ties between China and Africa. But on the other hand, China has also had a negative impact on Africa's growth since its exports compete with Africa's exports on the global market due to its lower costs of production and superior technology. Zafar also adds that Chinese competition is believed to have affected the textile sectors in a number of African countries such as Botswana, Kenya, Lesotho, Madagascar, Mauritius, South Africa and Swaziland. So, should one claim that China's effect on Africa's textile industries in being counterproductive to USA's AGOA project, and hence a possible explanation for USA's negative impact on Africa's growth? Such a conclusion will not be directly drawn by this paper as the argument requires further analysis.

Finally, the impact of China may not explain Africa's sound economic performance during the crisis since as was pointed out earlier; China's imports from Africa are hugely skewed. It is for instance well documented that China's imports from Africa are mainly concentrated in

only a few countries, especially oil and mineral rich countries whereas in a number of African countries, agricultural products still dominate their GDPs, which possibly minimizes the influence of China on the whole Sub-Saharan African region.<sup>10</sup>

## 8. Conclusion

This paper has looked at an area that has so far not gained so much attention in the academic field. The fact that the EU, China and the US are the three major markets for Africa's exports as well as the three major economies is vital for Africa's growth. This paper has therefore estimated the impact of growth in these countries on Africa. The main results are not surprising as they indicate that the main impact in descending order is from the EU, US and China, determined by the magnitude of trade these countries have with Africa. The empirical estimates however fail to implicate China as the key factor behind Africa's impressive performance during the aftermath of great recession whose impact is still being felt by some countries globally. Indeed, the estimates indicate that, the EU, China and the US all had a negative impact on Africa's growth during the post-crisis.

If this is the case, what then are the possible reasons for Africa's so often cited resilient performance? In the results and discussion section, the issue of possible improved intra-Africa trade is pointed out as one possible explanation. Additionally, this paper has focused on explaining Africa's performance through trade linkages which the econometric estimates fail to support. Can one then claim that Africa's integration into the global trading system has not yet matured enough? Failure to explain Africa's resilience therefore opens the door for future studies in case they do not exist yet, with the intention to find non-trade linked explanations. Such studies could for instance focus on possible lessons learnt from previous crises and if they resulted in institutions that are effective enough to limit the impact of external shocks on Africa's economy.

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<sup>10</sup> It was noted earlier that I would use the notation Africa to refer to the Sub-Saharan Africa region rather than the whole of Africa.

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## 9. Appendices

- **Appendix.1**

**Included countries in the empirical analysis in alphabetical order (35 in total).**

Angola, Benin, Burundi, Cameroon, Central Africa Republic, Chad, DR. Congo, Congo, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Kenya, Liberia, Madagascar, Mali, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leon, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

- **Appendix.2**

**African countries benefiting from the EU's Cotonou agreement**

Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, DR.Congo, Congo, Cote d'Ivoire, Djibouti, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

**Source:** European Commission, 2010

- **Appendix.3**

**African countries covered by the EU's Everything But Arms countries**

Angola, Benin, Burkina Faso, Burundi, Central African republic, Chad, Comoros, Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sao Tome & Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zambia.

**Source:** European Commission, 2013

- **Appendix.4**

**African countries benefiting from the USA's AGOA agreement**

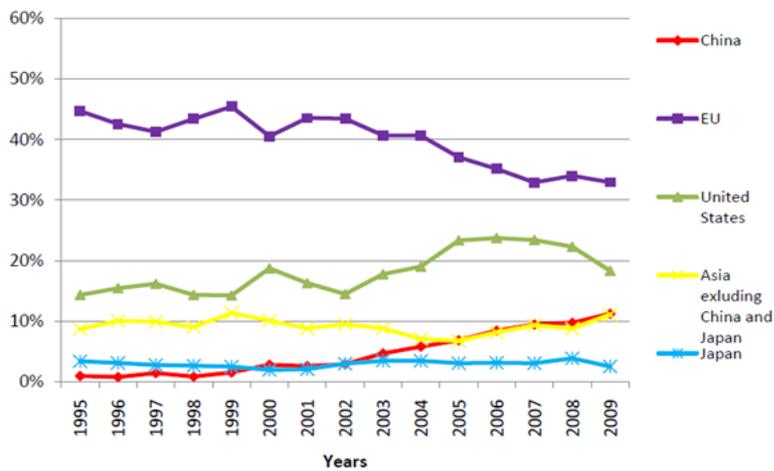
Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Cote d'Ivoire, Comoros, Congo, DR.Congo, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, South Africa, south Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia.

**Source:** US department of Commerce.

- **Appendix 5.**

**Figure 1.**

Top destinations for Africa's exports from 1994 to 2009

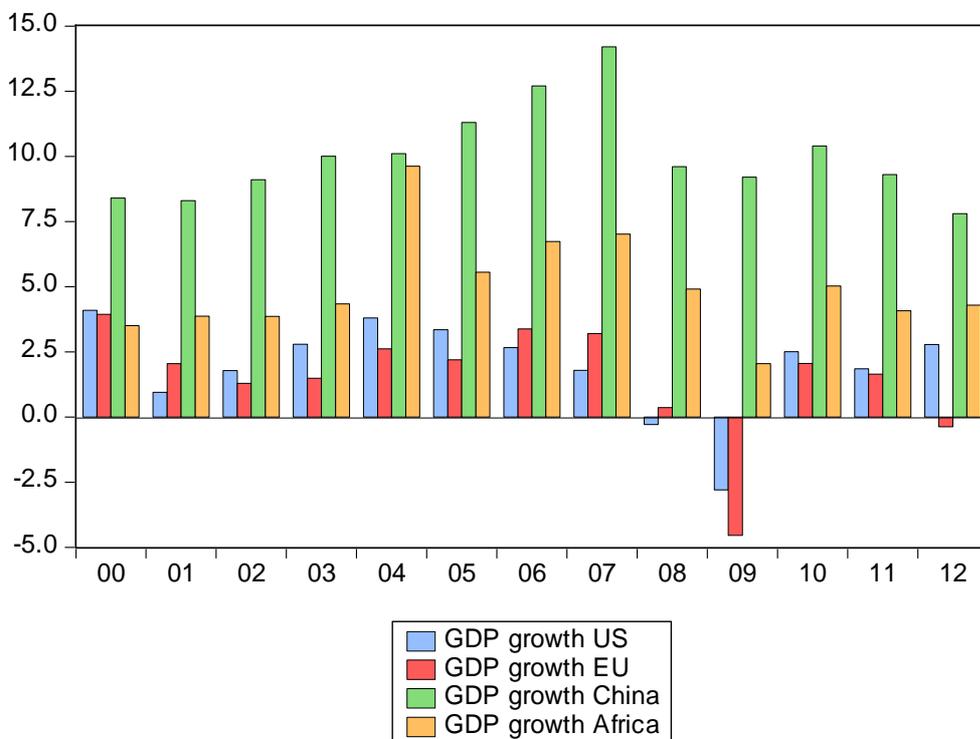


Source: African Development Bank, (2010:2)

- **Appendix 6.**

**Figure 2**

GDP growth for the EU, China, USA and Sub-Saharan Africa during 2000-2012



Note: The notation Africa refers to Sub-Saharan Africa whose data has been averaged by the World Bank.

Source: Author's own calculations using data from the WDI

- **Appendix. 7**

**Unit root testing:**

variable	Test: ADF-Fisher Chi-Square	P-value
$\Delta GDP_{Africa}$	207.089	0.000
$\Delta GDP_{EU}$	160.838	0.00
$\Delta GDP_{China}$	130. 41	0.000
$\Delta GDP_{US}$	202.381	0.000
<i>trade openness</i>	97.3272	0.011

Comment: Maximum lag length was automatically chosen using AIC

## Appendix 8. Diagnostic testing

### Wald tests

Variable	Model 1		Model 2		Model 3		Model 4	
	t-stat	P-value	t-stat	P-value	t-stat	P-value	t-stat	p-value
$\Delta GDP_{Africa}(-1)$	6.669	0.000	24.679	0.000	14.747	0.000	14.701	0.000
$\Delta GDP_{EU}$	-1.703	0.089	19.699	0.000	8.984	0.000	3.853	0.000
$\Delta GDP_{China}$	5.059	0.000	2.259	0.025	1.837	0.067	1.834	0.068
$\Delta GDP_{US}$	1.160	0.247	-3.544	0.000	-5.596	0.000	-2.105	0.036
<i>Intradeopenness</i>	1.962	0.050	-6.196	0.000	-18.357	0.000	-18.225	0.036
<i>Dummy * <math>\Delta GDP_{China}</math></i>			37.084	0.000	-1,629	0.104	-1.008	0.000
<i>Dummy * <math>\Delta GDP_{EU}</math></i>					-0.792	0.428	-0.617	0.314
<i>Dummy * <math>\Delta GDP_{US}</math></i>					-0.121	0.904	-0.139	0.889
$\Delta GDP_{EU} * \Delta GDP_{US}$							-0.078	0.938
F-test	53.359	0.000	3966.521	0.000	474.031	0.000	507.290	0.000

Note: Although all the models except for model two fail to reject the null hypothesis of some coefficients being equal to zero, the F-test indicates that all the coefficients are not simultaneously equal to zero. Which implies that every model at least has some explanatory power. Model 2 is however preferred since all its coefficients are individually significantly different from Zero.