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Does China's Growing Economic Engagement Hamper Intra-regional Trade in ECOWAS?

by

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The rapid growth of China's economic influence in the Economic Community of Western Africa (ECOWAS) in recent decades has raised concerns about its impact on many aspects of economic development in the region. One issue is the potential negative impact on intra-regional trade, as the influx of Chinese imports could harm local industries while the growing commodity exports to China could reinforce resource dependency. This study examines the relationship between ECOWAS countries' growing economic engagement (including trade, FDI and construction) with China and intra-regional trade in the region by employing a quantitative approach based on the gravity model of international trade. The main findings can be summarized as follows: 1) Chinese economic engagement is found to be a significant determinant of intra-regional trade patterns in ECOWAS; 2) imports from China seem to have an overall positive impact on intra-regional trade, particularly for poorer ECOWAS countries; 3) Chinese engineering and construction projects generally seem to contribute to intra-regional trade; 4) the impact of exports to China appears to vary substantially depending on country-characteristics; and finally, 5) FDI is found to have either negative or no impact on intra-regional trade. The findings show that the relationship between Chinese economic engagement and intra-regional trade is complicated and it varies depending on country-characteristics.

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1 Introduction

China's steadily growing influence in Africa is a widely debated topic in academia and international political fora alike (Hadland, 2012). There are widespread concerns about multiple aspects of the Chinese economic engagement, one of which is that cheap Chinese goods might outcompete local African products and thereby damage the few industries the countries have managed to develop (Hodzi, 2018; Zeleza, 2014). Chinese investment in resource extraction industries, as well as high volumes of resource exports to China, can also reinforce Africa's resource dependency and thereby hamper industrialization in the continent (Alden, 2019). These two trends might substantially weaken the future prospects of intra-regional trade within Africa, particularly because most of the intra-regional trade in the continent is in locally manufactured industrial goods, whereas the resource exports are mainly geared towards the global market (UNECA, 2013). On the other hand, China has also built infrastructure and actively promoted manufacturing and industrialization in Africa, and many believe that the process might accelerate in the future, as wages increase along with industrial upgrading in China and the country seeks new locations for cheaper manufacturing (Alden and Jiang, 2019; Brautigam, 2009, p. 223; McMillan and Harttgen, 2014; Qobo and le Pere, 2018; Tang, 2018; Zeng and Shu, 2018).

Since locally manufactured goods currently make up a substantial proportion of intra-African trade, further regional economic integration arguably provides great opportunities for industrial development that could benefit many countries in the region. One of the most notable economic integration schemes in Africa is the ECOWAS Trade Liberalisation Scheme aimed at promoting economic integration in West Africa. ECOWAS (the Economic Community of West African States) is a regional organization consisting of fifteen countries located in West Africa with a total population of roughly 350 million, and it accounts for 28% of intra-regional trade in Africa (AfDB, 2012). As in the rest of Africa, China has emerged as a major economic partner to ECOWAS, and the region has been affected by rivalry between foreign powers, including, besides China, the United States and the European Union (Amadasun and Oghoator, 2012). A number of studies have examined China's influence on intra-African trade (see Azu, Okezie and Hirwa, 2019; Khosla, 2015; Montinari and Prodi, 2011), but no study has focused explicitly on the effect in a context with a relatively high degree of regional economic integration. Not only is this study set to fill this gap by examining the relationship between the growing Chinese economic engagement and intra-regional trade in ECOWAS, but it also attempts to explore new avenues by expanding the set of independent variables to cover aspects of economic engagement not included in previous studies.

1.1 Research Problem

The main research question of this study is: *how does ECOWAS countries' growing economic engagement with China influence intra-regional trade in ECOWAS?*. The focus is on a more broadly defined 'economic engagement' instead of only 'trade' for a number of reasons. First, while the expanding trade between China and Africa has been the single most prominent feature of the China-Africa economic relations in the 2000s, other aspects of China's economic engagement, including FDI, aid and infrastructure loans, have played a major role in the overall China-Africa economic relations (Hruby, 2019; Shinn, 2019). Second, the Chinese trade and FDI are known to be complementary (Abeliansky and Martínez-Zarzoso 2019), creating a logical basis for examining both simultaneously, since neglecting the first could lead to erroneous conclusions about the impact of the latter. In addition to trade and FDI, the concept of 'economic engagement' used in this study also comprises the revenues of Chinese companies' engineering and construction projects. Aid and infrastructure loans are left out because of the lack of data, but this might not be excessively problematic for two reasons: first, the Chinese aid has been limited in scope relative to the other forms of economic engagement in the continent, and second, the infrastructure loans and investment are to some degree proxied by the construction revenues.

The question about China's impact on intra-regional trade is particularly topical in the present for two reasons. First, the recent establishment of the African Continental Free Trade Area (AfCFTA) means that it is crucial to understand the determinants of intra-regional trade patterns in the continent for the African countries to make the most of the agreement. Understanding the effect of the Chinese influence in the context of ECOWAS in recent decades could be an indication of what the influence could be on a continental level once AfCFTA is in full swing. The second reason is the global trade disruption that the 2020 coronavirus pandemic has caused; the pandemic has revealed the vulnerability of the growth strategy based on commodity exports, to a large extent driven by China, in Africa at large (OECD, 2020) as well as in individual countries, such as Nigeria, the largest ECOWAS economy (UNDP, 2020). The continent has arrived at a juncture where the governments need to reconsider their development strategies and what the role of China will be in their future. The research problem this study is set to address is thereby relevant not only to the academics in the field of China-Africa relations but also to policymakers that devise the future cooperation with China on a national and continental level in Africa. The study contributes to our understanding of these issues by using more recent data, focusing on a specific context, and examining a wider range of types of economic engagement than previous studies, thereby providing new insights into the regional impact of China-Africa economic cooperation.

1.2 Aim and Scope

This study aims to accomplish the following main objectives. First, based on the research question, the principal aim of this study is to provide tentative quantitative evidence of the

relationship between ECOWAS countries' growing economic engagement with China and intra-regional trade in the region. Second, the study aims to contribute to the existing body of research by delving into more specific aspects of the relationship, which has so far only been examined on a very general and continent-wide level. Previous studies on the topic, the most relevant ones being Montinari and Prodi (2011) and Khosla (2015), have mainly focused on the role of *trade* with China, even though there are strong theoretical reasons to expect other forms of economic engagement, such as FDI and construction, to have an impact on intra-regional trade as well. Additionally, the role of more specific country characteristics is explored in order to better understand the mechanisms through which China's economic engagement influences intra-regional trade. Finally, the study attempts to formulate the findings in a manner that could provide useful information to policymakers in both Africa and China.

The study takes an approach based on the gravity model of international trade, which is an econometric model widely used to examine bilateral trade relations and trade policy. Because relatively little is known about the subject, the study examines aggregate trade patterns instead of disaggregated product categories, as it is necessary to understand the overall patterns before delving into more specific sectoral or product category trends. The study employs exclusively quantitative methods to examine the issue, however, the findings are also extensively discussed and contextualized in the light of the broader academic literature and research on China-Africa economic relations.

1.3 Outline of the Thesis

The thesis is organized as follows. Section 2 first reviews and discusses relevant literature and previous research on three main areas: China's rise in Africa, economic integration in ECOWAS, and Chinese influence on economic integration. Moreover, Section 2 discusses the theoretical foundations of the study and lays out the specific theoretical framework for the analysis. Section 3 presents and discusses the quality and sources of data used in the study. Section 4 presents the econometric model and the reasoning behind the methodological approach employed in the analysis, including a brief explanation of the gravity model of international trade. Section 5 presents the results of the regressions for the whole dataset and a number of subgroups, after which the main findings are summarized. Section 6 discusses and contextualizes these findings within the theoretical framework and broader literature. Finally, Section 7 concludes by summarizing the main findings as well as their implications for policy and future research.

2 Theory

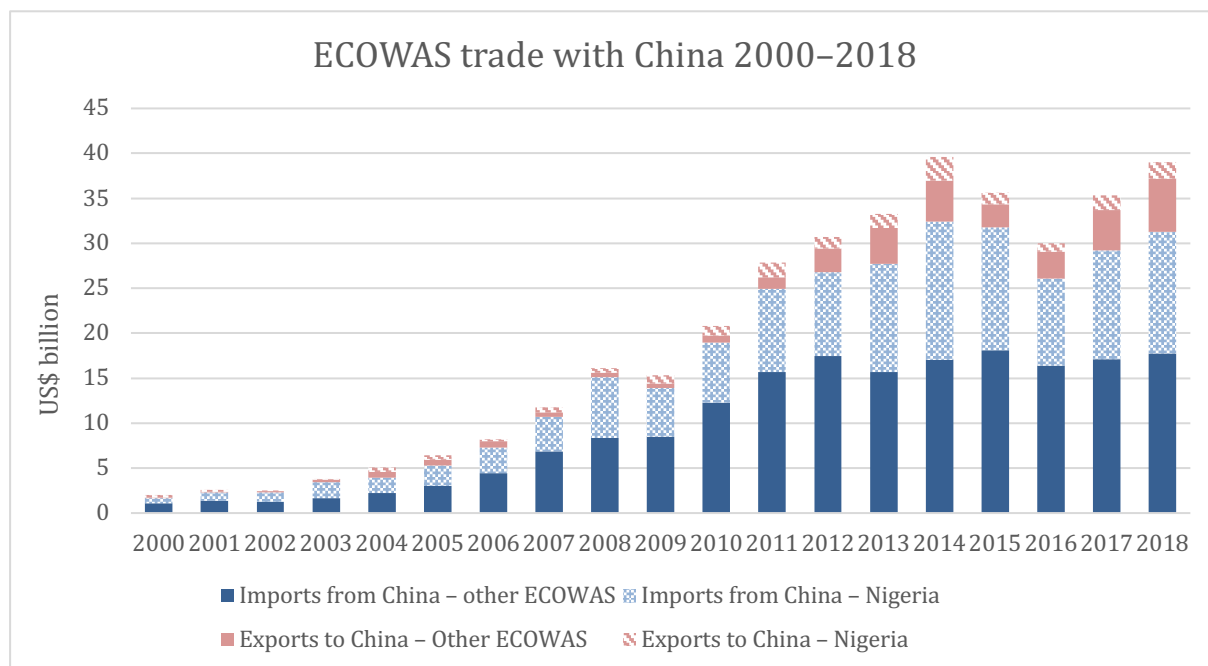
2.1 Literature review

This section sets the scene for the analysis and discussion by exploring the existing literature on China-Africa economic relations, intra-regional trade in ECOWAS, and how the two are related to each other. First, China's rapid rise to prominence in Africa as well as its implications for the continent are discussed, after which the focus shifts to the trends and consequences of the economic integration process in West Africa. Once these two key strands of literature are covered, the discussion can move on to explore the literature that focuses on China's impact on trade patterns in Africa, establishing the more specific research context in which this study is situated.

2.1.1 China's rise in Africa and ECOWAS

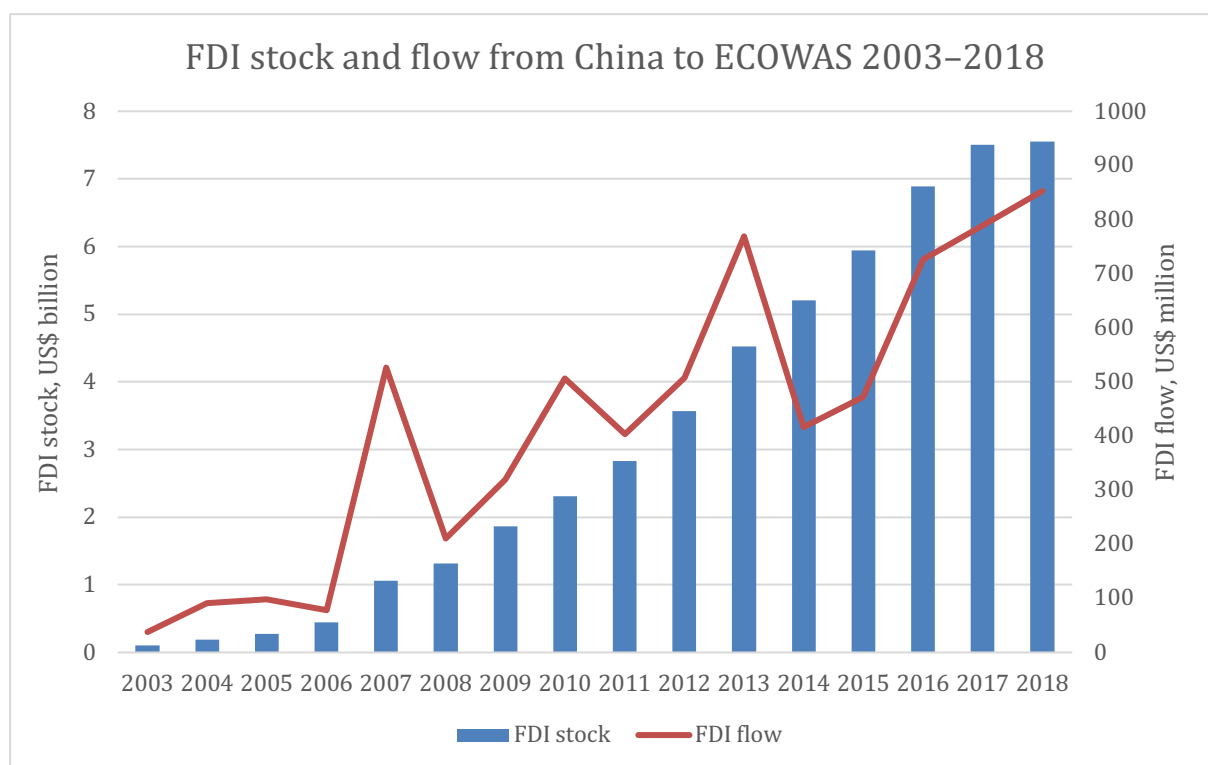
China-Africa economic relations have grown at an extremely rapid rate in the 2000s, and ECOWAS is no exception. Figure 1 shows that trade between China and ECOWAS has grown from some two billion USD in the early 2000s to nearly 40 billion USD in 2015 and 2018. China's economic presence in Africa and ECOWAS is enormous and complicated: in addition to trade, the economic engagement comes in form of aid, FDI, concessional loans, commercial loans and technical assistance (Busse, Erdogan and Mühlen, 2016; Hruby, 2019; Kummer-Noormamode, 2014; Shaw, 2011; Shinn, 2019; Taylor, 2019). In the 2000s, the growth in China-Africa trade has far outpaced the growth in Africa's trade with Western countries, and the relationship has become stronger and more formalized with the establishment of the Forum of China-Africa Cooperation (FOCAC) in the year 2000, particularly after the 2006 summit in Beijing (Brautigam, 2009, pp. 158, 240–241; Shaw, 2011; Zeng and Shu, 2018). FOCAC is essentially a platform for China and African countries to conduct collective consultations encompassing a wide range of issues, including agricultural cooperation, investment, market access, debt relief as well as peace and security affairs (Zeng and Shu, 2018). China has grown to be the single largest trade partner of Africa (Busse, Erdogan and Mühlen, 2016; Shinn, 2019), and the country has in recent years also been one of the largest FDI sources in the continent (UNCTAD, 2018). China's trade and FDI in Africa have been found to be complementary, and particularly FDI seems to foster trade with the FDI destination country (Abeliansky and Martínez-Zarzoso 2019). Figure 2 shows that the amount of Chinese FDI has grown rapidly also in ECOWAS in the 2000s. While China's economic expansion has undeniably been enormous in scale, the systematicity of the relationship is often exaggerated; China-Africa economic landscape consists of countless relationships between relatively uncoordinated state

Figure 1 – China-ECOWAS trade between 2000–2018



Source: UN Comtrade (2020)

Figure 2 – Chinese FDI to ECOWAS between 2003–2018



Source: CARI (2020b)

and private actors (Hadland, 2019), which also often compete with each other for different projects on the continent (Hruby, 2019). On that basis, the word ‘China’ used in this study is generally not to be interpreted as the ‘Chinese state/government’, but rather as the multiplicity of Chinese state and private actors that are engaged in economic activities in the African continent.

China’s growing presence in Africa has been a widely debated topic among academics and politicians alike; some see China as a positive, development-promoting counterforce to the long-standing Western domination, while others consider it a neo-imperialist power that mainly exploits the continent to get access to its natural resources and to find new markets for industrial surplus (Hadland, 2012; Zeleza, 2014). Initially, China’s economic engagement with Africa was arguably driven mostly by the need for resources, but the relationship has grown more comprehensive and complex over time (Alden and Jiang, 2019). Few studies have explicitly focused on the Chinese influence in ECOWAS, but Kummer-Noormamode (2014) and Brautigam (2009, p. 279, 307-308), for instance, argue that the economic relationship with China has been predominantly positive to the majority of countries in Africa, whereas other scholars, such as Busse, Erdogan and Mühlen (2016), find the outcomes of the relationship to be more mixed. Some scholars, such as Shinn (2019) and Zeleza (2014), find that many aspects of the Chinese economic engagement have generally had positive economic impacts on Africa; natural resource exports to China boost GDP and technological development, cheap and relatively high-quality imports from China benefit African consumers and traders, aid contributes to economic growth and is mostly complementary to Western aid, and FDI has multiple positive effects through employment creation and technology transfer. However, both authors also recognise that there are major problems associated with China’s economic engagement; the country has contributed to high levels of indebtedness in many African countries, China’s continued need for resources might keep some countries from diversifying, and the Chinese FDI has, on many occasions, raised environmental and labour concerns.

Authors like Hodzi (2018) and Cheru and Oqubay (2019, p. 303) duly point out that recognizing the agency of the African political elite is important in the analysis of China-Africa relations. Hodzi (2018) argues that while investment and aid from China—or any other country, for that matter—can contribute to the economic performance of African countries, the development outcomes are ultimately determined by the African political elites. On the other hand, China’s promotion of its own style of governance in Africa has become more assertive under Xi Jinping (Taylor, 2019), implying that the actions of the political elites in Africa might be partially determined by China’s growing influence. It is still debated whether China’s presence has a considerable impact on governance in Africa¹, but an interesting insight into how these dynamics work in an ECOWAS country is provided by Philips (2019), who finds that China’s growing role as a trading partner has not effectively influenced macroeconomic governance in Ghana because the agency of the state remains limited due to the loan conditions sanctioned by IMF and the World Bank.

¹ For further discussion on China’s impact on democracy and governance in Africa, see e.g. Taylor (2019), Hackenesch (2019) and Broich (2017).

All in all, the economic relationships between China and individual African countries are often highly complex, and the outcomes are generally found to be very different in different economic, political and institutional contexts (Alden and Jiang, 2019; Busse, Erdogan and Mühlen, 2016; Kummer- Noormamode, 2014; Zeleza, 2014). In other words, the specific circumstances in each country determine much of the outcomes, and one should be very cautious with generalizations.

2.1.2 Economic integration in ECOWAS

ECOWAS was established in 1975 to promote economic integration in West Africa, primarily within the ECOWAS Trade Liberalisation Scheme framework, the goal of which is to eliminate tariffs and non-tariff barriers to trade and to establish common external tariffs for the region (Adam and Chaudhry, 2014; Adom, 2012). The extent and nature of economic integration in ECOWAS has been extensively studied, and the findings are mixed, ranging from observed trade diversion to relatively successful trade integration, depending on the specific research topic and methodology (Adom, 2012; Afolabi, Aznin and Izraf, 2017; Ametoglo et al, 2018; Deme and Ndrianasy 2017; Guei and le Roux, 2019; Obasaju et al, 2018; Shuaibu, 2015; Sule, 2018; Turkson, 2018). By looking only at the share of intra-regional trade in ECOWAS, which has been hovering around 10% for decades, one can easily come to the conclusion that market integration in the region has been somewhat of a failure. However, it is necessary to note that the aggregate figures are heavily distorted by the massive oil exports of Nigeria; when trade in *non-oil* goods is examined, one can see that intra-regional trade, particularly in manufactured goods, has played an important role in many ECOWAS countries (Von Uexkull, 2012).

In an analysis of eight ECOWAS countries between 1998–2011, Shuaibu (2015) finds that trade liberalization has resulted in increased intra-regional trade. The author also points out that the quality of infrastructure and institutions play a role; this is important to note because China is a major funder of infrastructure projects in Africa (Brautigam, 2019, p. 151; Hruby, 2019). Both Musila (2005) and Deme and Ndrianasy (2017) find that integration efforts in ECOWAS have resulted in trade creation and net welfare gains, but contrarily, Afolabi, Aznin and Izraf (2017) observe trade diversion among ECOWAS countries over a longer period between 1983 and 2013. While trade openness seems to increase trade, Guei and le Roux (2019) find that trade liberalization has had a negative impact on GDP per capita in West African countries over the long term. Ametoglo et al (2018) explore the distributional outcomes of trade integration in ECOWAS and find that while political integration has the potential to reduce income inequalities, economic openness and integration tends to increase them; thus, explicit policies to address the issue should be devised on a regional level. Obseaju et al (2018), as well as Adam and Chaudhry (2014), find that the membership of a regional monetary union increases trade. Besides, Obesaju et al (2018) find that similar levels of GDP increase bilateral trade, while tariffs seem to have no significant effect on trade in intermediate goods. In a similar vein, Candau, Guepie, and Schlick (2019) find that the countries belonging to the West African Economic and Monetary Union, a currency union of which eight ECOWAS countries are part of, have benefited more from trade integration in ECOWAS. They also find that large countries, Nigeria in particular, have benefited relatively more from trade integration. Several authors, including e.g. Amadasun and Oghoator (2012), Santos, Almeida, Sanches and Duarte (2018)

as well as Ezeoha, Okoyeuzu, Udu and Edeh (2018), point out that for ECOWAS to reach its full potential, it is critical that the region achieves stability and that the people can live and do business under the rule of law without recurrent violent conflicts. Finally, the lack of infrastructure is identified as a major impediment to deeper integration in ECOWAS by multiple authors, including Akpan (2014), Santos et al (2018) and Sule (2018).

All in all, the general picture that emerges from the literature is that economic integration has been able to increase intra-regional trade to some degree. That being said, the integration process still seems to have fallen short of expectations due to numerous non-tariff barriers, and the fruits of the development do not reach large segments of the populations of ECOWAS countries.

2.1.3 Chinese influence on economic integration

There are only a few studies specifically focused on China's influence on trade patterns within Africa, but the small handful of studies that do exist serve as the background against which the findings of this study can be interpreted. Montinari and Prodi (2011) examine the role of China as a trading partner of SSA (Sub-Saharan Africa) between 1999-2007. They find the effect to be different depending on the total trade between China and the individual SSA countries; exports to China are observed to have a negative impact when the total exports are high and a positive impact when the total exports are low. Oil-exporting countries are found to have a tendency to detach themselves from intra-African markets, whereas non-oil-exports to China appear to make the countries engage in more intra-African trade (Montinari and Prodi, 2011).

In a study with a panel of 135 countries, Khosla (2015) finds that the presence of China has in general reduced bilateral trade between African countries between 1990–2012, most likely due to the substantial inflow of cheap Chinese goods that outcompete local products. However, the author also notes that China's weakening effect on intra-regional trade has become less intense in the 2000s, which could be due to China's growing investment in infrastructure and capacity-building. Another study, by Giovannetti and Sanfilippo (2009), examines the indirect impact of China on African exports using disaggregated data for the period 1995–2005. They find that Chinese imports have crowded out African exports across various product categories, particularly in manufactured goods.

More specifically about ECOWAS, Azu, Okezie and Hirwa (2019) find that ECOWAS countries have been realigning their trading partners; China has become the largest exporter to the region, and India has become the largest importer of ECOWAS goods—at the expense of the more traditional trading partners. Finally, Stapel and Söderbaum (2019) examine the external funding of regional economic communities (including ECOWAS) in Africa; they find that China is increasingly interested in promoting economic integration in Africa through both the African Union and regional economic communities, as the country considers regional stability in Africa to contribute to its broader geostrategic and economic interests in the region.

2.2 Theoretical approach

This section delves into the theoretical foundations of this study. The overarching theoretical framework for the analysis is primarily based on empirically well-established principles of international trade theory and theory of regionalism, but the theoretical arguments need to be examined in the light of the special contextual features of Sub-Saharan Africa.

2.2.1 International trade theory

Ever since the early influential economic thinkers, such as Adam Smith and David Ricardo, laid the foundations for the theory of international trade, economists have generally agreed on the benefits of free trade (Krugman, 1988). The neoclassical theory of international trade suggests that openness to trade can be beneficial through multiple channels that increase productivity within and among countries that trade with each other. First, trade can increase productivity by creating competitive pressure: local firms need to compete with foreign imports, but at the same time they have better access to foreign markets (Winters, 2004). These dynamics can stimulate efficiency and result in scale benefits as well as a more efficient allocation of resources (Krugman, 1993; Winters, 2004). Free trade also makes it possible for countries to avail themselves of their comparative advantages, but, according to Krugman (1993), trade can benefit countries even through non-comparative-advantage specialization. Trade is also generally positively associated with technology transfer and knowledge spillovers, which can be particularly advantageous to countries that engage in trade with more developed countries (Winters, 2004).

2.2.2 Theory of regionalism

Much of the theory of regionalism builds on the principles of trade theory. The fundamental framework for the contemporary debate over regional economic integration was set more than half a century ago by authors like Viner (1950) and Lipsey (1960), who pioneered the economic and political analysis of customs unions and trade agreements. The potential welfare gains of economic integration identified by Lipsey (1960) stem from the usual suspects in neoclassical analysis: comparative advantage, economies of scale and competitive pressure. While regionalism and regional integration can be defined in many different ways, the concept conventionally involves the notion of economic integration of the participating countries in the form of a customs union or a more comprehensive economic union (Gibb, 2009; Grobbelaar and Meyer, 2017). The member countries can therefore enjoy the benefits of free trade within the union and still be able to maintain selected tariffs to non-member countries. Economic integration also has other benefits: the larger market size can help the member countries to attract more FDI, and policy coordination between different jurisdictions can facilitate trade, bring political stability and improve the management of shared resources in the region (Mattli, 1999; Grobbelaar and Meyer, 2017). From a geopolitical angle, regional integration can collectively increase the bargaining power of the member countries against the larger economies, such as the US, China, and the EU (Grobbelaar and Meyer, 2017). Particularly in

developing countries, regionalism has earlier also been perceived through the lens of dependency theory, suggesting that regional integration is necessary to achieve development independently of the West by promoting region-wide protectionism and import substitution policies (Gibb, 2009). While the integration of ECOWAS has arguably been rather neoliberal in nature, this line of thought can be useful in analysing the modern-day China-Africa relations, as Western narratives of the relationship increasingly characterise China as an aggressor aiming to increase its influence on the continent by making African countries dependent on Chinese debt (DeBoom, 2020; Brautigam, 2020).

2.2.3 The Sub-Saharan African context

The classical theory of regionalism has highly Eurocentric foundations (Gibb, 2009), which is important to keep in mind when applying the theoretical concepts to the context of SSA. The European post-WWII experience of regionalism is mainly one of relatively competitive and strong nation states, while in SSA the context has been much less organized with the inherited arbitrarily drawn colonial borders and a high degree of political instability (Gibb, 2009). Although regional integration has been a political priority for most SSA countries since their independence, the integration experience has not been consistent with theory, and the efforts have been largely undermined by conflicts and nation-building efforts (Gibb, 2009; Jordaan, 2014). Where the integration has been more successful, the process has been driven by broad coalitions with a strong neoliberal agenda, consisting of national governments, large companies, intranational financial institutions (such as IMF and World Bank) and donors, and therefore poverty-reduction and other development issues have often been neglected (Söderbaum, 2004). However, Adom (2012) finds that intra-regional trade in ECOWAS has been overall a more effective driver of economic growth compared to development aid and argues that promoting intra-regional trade is, therefore, of paramount importance in ECOWAS.

2.2.4 Theory in relation to China's impact on intra-regional trade

The essential puzzle of this study is to explore how the growing economic engagement of China in ECOWAS influences the dynamics of economic integration in the region. There are theoretical reasons to expect either a positive or a negative impact on trade within ECOWAS, which makes it particularly important to provide empirical evidence of the potential impact. First, there are several mechanisms through which China's economic engagement could increase intra-regional trade in ECOWAS: 1) access to cheap intermediate goods can benefit local entrepreneurs in SSA, which in turn could boost trade in higher value-added goods in the region; 2) China has actively promoted export diversification (mostly in the form of special economic zones) in some countries, including Nigeria; and 3) infrastructure-related lending and investment can facilitate trade between ECOWAS countries (Abugnrin and Manyeruke, 2020, p. 156; DBSA, 2012; Drummond and Xue, 2013; Schiere, 2011; Shinn, 2019). The latter might be particularly important because the lack of infrastructure has been a major impediment to trade integration in SSA and ECOWAS (Akpan, 2014; Jordaan, 2014). China has also formally expressed its interest in promoting economic integration in ECOWAS by promoting trade facilitation, FDI, cross-border infrastructure construction and development aid (MOFCOM,

2013), which suggests that there is some level of political support on the Chinese side to promoting integration. On the other hand, there are also mechanisms that could hamper intra-regional trade, primarily related to the concerns that the economic engagement with China might crowd out African exporters (Giovannetti and Sanfilippo, 2009) and perpetuate most African countries' role as resource exporters (Alden, 2019, p. 94; Mason, 2017; Shinn, 2019). In the light of the trade theory discussed above, it can be assumed that if the growing trade with China generally impedes specialization and the development of domestic manufacturing capacity, there would be a negative effect on intra-regional trade since it would imply that the countries source a larger share of their consumer and intermediate goods from China at the expense of their neighbours. This seems particularly plausible because 1) a large share of intra-regional trade in ECOWAS has been in locally manufactured industrial goods (WTO, 2011), and 2) Chinese imports are known to have stifled local industries on multiple occasions (Hodzi, 2018; Zeleza, 2014). Furthermore, despite the apparent support to integration, China tends to work with African countries on a bilateral basis (Schiere, 2011; Stapel and Söderbaum, 2019), which could, according to Africa Research Institute (2012), further undermine the burgeoning efforts towards integration.

2.2.5 Theoretical framework

By taking the discussed strands of theoretical and empirical literature together, the overall theoretical framework of this study can be conceived. First, increasing intra-regional trade can benefit the ECOWAS countries through multiple channels: it can increase productivity, help the countries to attract more investment, and increase the bargaining power of the region in international fora. The growing trade with China, in turn, could have an impact on intra-regional trade in ECOWAS in several different ways, and there are theoretical reasons to expect both positive and negative effects. In the light of this basic framework, examining the relationship between the Chinese economic engagement and intra-regional trade in ECOWAS is important for two reasons: 1) since economic integration and intra-regional trade can benefit ECOWAS countries, it is necessary to understand how their rapidly growing economic engagement with China has influenced intra-regional trade; and 2) since the different types of Chinese economic engagement can, in theory, both promote and impede intra-regional trade, it is particularly important to provide quantitative evidence to complete the fragmented anecdotal evidence.

3 Data

This section presents and discusses the data used in this study, with a particular focus on issues regarding the reliability and validity of the measures chosen. The data used in the analysis is panel data of fifteen ECOWAS countries, compiled from secondary sources and organized by country pairs for the period 2000-2018. The dataset includes conventional gravity variables (bilateral trade flows, distance, contiguity, socio-cultural dummies, remoteness), variables about the Chinese economic engagement (exports, imports, FDI stock, construction) as well as relevant controls (trade openness, GDP per capita difference).

The most important data for the study are import and export statistics for the period 2000-2018. The bilateral trade data of ECOWAS countries is obtained from the IMF (2019) DOTS database. Due to reliability issues arising from bilateral asymmetries² in international trade statistics, the study only uses import data for within-ECOWAS trade flows. As for the trade between China and individual ECOWAS countries, only Chinese-reported data retrieved from the UN Comtrade (2019) database is used, because the data is likely to be highly consistent as it is collected by the same authorities using the same methods, whereas individual African countries are likely to be less consistent in their practices (CARI, 2020a). Trade data also typically contains a considerable number of missing values, which can sometimes be difficult to distinguish from zero trade flows (WTO, 2012). The study deals with missing values using a strategy suggested by WTO (2012): missing values are replaced with zeros when the values around the missing value are zero or near zero, or by interpolation (taking the average of the previous and following values) when the values around the missing value are considerably over zero. The approach suits the data of this study well because there seem to be no borderline cases, i.e., the missing values are clearly either very close to, or very far from zero. When dealing with trade data, it is also good to keep in mind that all trade flows do not necessarily imply deeper economic relations—let alone economic interdependence—between China and its ECOWAS trading partners. This is because of how the global economy works; goods and components can be produced anywhere in the world. For example, if an American company that has operations in ECOWAS has a Chinese subcontractor for some components/products it needs for its operations, it does not substantially increase the ‘economic interdependence’ between China and ECOWAS, yet this will increase the trade flows between the two.

For GDP values, World Bank (2020) data is used. Due to the inherent difficulty of constructing GDP data in developing contexts, the values should only be treated as rough approximations. However, since the World Bank data is systematically compiled by experts, the figures for ECOWAS countries are considered sufficient to make comparisons between the countries. The data on Chinese FDI and construction are from the China-Africa Research Initiative database (CARI, 2020b; CARI, 2020c). The study uses data on FDI stock instead of FDI flows because

² This means that exports from country A to country B are reported to be different from the imports from B to A, usually because imports are part of the tax base and are therefore reported more carefully than exports, see for example WTO (2012).

the former provides a better approximation of the long-term impact of the investment. However, it is necessary to acknowledge that the available FDI figures are to some extent incomplete, as they do not capture all FDI flows that go through offshore financial centres, smaller investments, or acquisitions that take place in a non-African jurisdiction, but include assets located in Africa (CARI, 2020b). This does not mean that the results obtained using these figures are invalid, but that the results do not represent all FDI and must therefore be interpreted with due caution. It is also necessary to consider the validity of the ‘construction’ data, which, to be more exact, includes gross annual revenues of Chinese companies’ engineering and construction projects in ECOWAS. The variable does not measure directly Chinese investment in infrastructure development in ECOWAS, as the data do not include, for instance, Chinese-funded projects that are subcontracted to non-Chinese companies, and on the other hand, many projects undertaken by Chinese companies are funded by non-Chinese actors (Brautigam, 2019, p. 139), and these projects, instead, are included in the data. It is therefore a rough proxy for the Chinese engagement in the infrastructure sector, used in the absence of more comprehensive data.

The rest of the gravity variables are obtained from the CEPII (2011) database. Most of the variables are relatively straightforward, but the *distance* variable requires a brief explanation. The *distance* that is used in the analysis is weighted by internal distances within each country in order to account for the effects of internal distances on trade; having short distances within a country has a positive impact on domestic trade, while long distances within a country imply relatively more trade with neighbouring countries (Mayer and Zignago, 2011). The *remoteness* variable is computed from World Bank (2020) and CEPII (2011) data by using a formula suggested by WTO (2012) (Appendix A).

4 Methods

The study is essentially an econometric analysis of the impact of Chinese economic engagement on intra-regional trade in ECOWAS. The analysis examines the bilateral trade patterns between ECOWAS countries by making use of the gravity model of international trade. The gravity model is used as the basis of the analysis because it has proven to be a powerful empirical tool in explaining bilateral trade patterns, and additional variables can be conveniently added to the model to study the impact of country-specific features on trade (WTO, 2012). Based on a number of models used in previous studies—with a varying degree of similarity with the topic at hand—an econometric model is constructed to examine China’s influence on bilateral trade between country pairs (countries i and j). It is necessary to note that all the potential model specifications have their strengths and weaknesses, and this study addresses this issue by running a set of robustness checks using different model specifications; if different model specifications yield similar results, the confidence in the findings increases considerably despite the limitations of each model.

4.1 The gravity model of international trade

The gravity model of international trade is a model that has been used for decades to examine bilateral trade patterns between countries or regions (Krisztin and Fischer, 2015; Montinari and Prodi, 2011). Krisztin and Fischer (2015, p. 451) succinctly explain the crux of the model as follows: “*In its simplest form, the model states that the volume of trade between any two countries is proportional to the product of their gross domestic products and a distance deterrence function where distance is broadly construed to include all factors that might create trade resistance*”. In other words, bilateral trade between two countries or regions is determined to a large degree by the size of their economies and various barriers to trade, proxied by distance. However, this very simplistic version of the model is evidently insufficient to account for the complexities of international trade, and numerous variations and extension of the model have been developed over the last decades (Krisztin and Fischer, 2015; Anderson and Wincoop, 2003). Gravity model was originally considered primarily an empirically strong model without solid microeconomic foundations (WTO, 2012), but its theoretical foundations have been become stronger over time, owing to authors such as Bergstrand (1985) and Anderson and Wincoop (2003). The theoretical foundations of the gravity are discussed in detail by Anderson and Wincoop (2003), who contribute to the understanding of the model by specifying that what matters are *relative* trade barriers; in other words, the importance of bilateral trade barriers necessarily depends on the *average* trade barriers the countries have with *all* their trading partners. These relative trade barriers are collectively referred to as *multilateral resistance*

(MLR) to trade, and not accounting for them can lead to biased estimates (Anderson and Wincoop, 2003).

There are multiple different strategies to account for MLR, and the most appropriate strategy depends on the scope of the study and the properties of the data (WTO, 2012). Based on a preliminary data analysis as well as the properties of the dataset, the main strategy to account for MLR in this study is to use a *remoteness* variable, computed using a formula that measures a country's average weighted distance from its trading partners, weights being the partner countries' shares of the total world GDP (Appendix A). A higher value indicates a higher MLR, i.e., the country is farther from its trading partner in relation to the world market, and vice versa. Another strategy is to use exporter and importer dummies, but this approach has two drawbacks: first, it assumes that MLR terms are constant over time, which is in our case unlikely, since ECOWAS countries have realigned their trading partners during the period of the study (Azu, Okezie and Hirwa, 2019), and second, using the dummies removes much of the between-country variation, which is problematic, because the dataset used in the study does not show sufficient within-country variation to get any meaningful results.

4.2 The model

The main econometric model used in the empirical analysis is constructed on the basis of theory and previous studies on similar topics. The basic econometric model used in the study is the following:

$$\begin{aligned} \ln(\text{imports}_{ij}) = & \alpha + \tau + \beta_1 \ln(\text{GDP}_{it}) + \beta_2 \ln(\text{GDP}_{jt}) + \beta_3 \ln(\text{distance}_{ij}) + \beta_4 \text{remoteness}_{it} \\ & + \beta_5 \text{remoteness}_{jt} + \beta_6 \ln(\text{China_imp}_{it}) + \beta_7 \ln(\text{China_imp}_{jt}) + \beta_8 \ln(\text{China_exp}_{it}) + \\ & \beta_9 \ln(\text{China_exp}_{jt}) + \beta_{10} \ln(\text{FDI}_{it}) + \beta_{11} \ln(\text{FDI}_{jt}) + \beta_{12} \ln(\text{construction}_{it}) + \\ & \beta_{13} \ln(\text{construction}_{jt}) + \beta_{14} \text{contiguity}_{ij} + \beta_{15} \text{com_language}_{ij} + \beta_{16} \ln(\text{trade_openness}_{it}) \\ & + \beta_{17} \ln(\text{trade_openness}_{jt}) \varepsilon_{ijt} \end{aligned}$$

where:

imports = imports from country i to country j

$\text{GDP}_{it/jt}$ = GDP of country i/j

distance_{ij} = the distance between the countries i and j , weighted by internal distances

$\text{remoteness}_{it/jt}$ = MLR term: average weighted distance from its trading partner of i/j

$\text{China_imp}_{it/jt}/\text{China_exp}_{it/jt}$ = imports from/exports to China of countries i and j

$\text{FDI}_{it/jt}$ = Chinese FDI stock in country i/j

$\text{construction}_{it/jt}$ = revenues of Chinese engineering/construction companies in country i/j

contiguity_{ij} = dummy for a common border

com_language_{ij} = dummy for a common language of the ethnic majority

$trade_openness_{i/jt}$ = total trade as percentage of GDP

The model includes the conventional gravity variables (GDP, distance and the dummies), the variables representing the economic engagement with China, *remoteness* as a proxy for MLR and *trade openness* as an additional control variable. Most of the scale variables have been converted to a natural logarithm (ln) to correct their distribution and to improve the model fit. *Imports* is the dependent variable in the model. The name might be slightly misleading because the variable accounts for both exports and imports, as each country pair appears twice in the dataset; for instance, the dataset includes the trade flow from Ghana to Nigeria as well as the trade flow from Nigeria to Ghana as two separate data points. Country *i* is always the exporter and country *j* the importer, and the coefficients of country-specific variables need to be interpreted accordingly. For instance, the coefficient of GDP of country *i* indicates the relationship between exporter GDP and bilateral trade, and vice versa. This is important to keep in mind when interpreting the results.

GDP and distance are the key gravity variables of the model, and it is expected, according to the gravity theory, that GDP has a positive effect and distance a negative effect on *imports*. *Remoteness* is expected to have a negative impact on *imports*, because the more remote the country is from its ECOWAS trading partners in relation to the global market, the less it is expected to trade with ECOWAS countries. Based on the theory, we can expect the China-related variables to have mixed or no impact on *imports* as discussed in more detail in Section 2.2.4 of this paper. Finally, it is crucial to control for trade openness of the ECOWAS countries, because otherwise the effect of increasing overall trade could be falsely ascribed to the increasing trade with China.

The model is aimed at revealing how ECOWAS countries' economic engagement with China influences bilateral trade between them. By examining the results of the regressions, a picture should emerge about the potential systematic relationship between the Chinese trade and the intra-regional trade within ECOWAS. While endogeneity and reverse causality issues are common when examining trade policy (WTO, 2012), it is assumed that they are not a major concern for this study, because China's trade with ECOWAS countries is unlikely to be influenced to any significant extent by intra-ECOWAS trade *per se*, after the overall trade openness is controlled for. The external validity of the results is limited even within SSA, as there are significant differences between African regional economic communities and the countries within them.

Since analysing the dataset as a whole does not say much about how different country characteristics might influence the relationship, a set of subgroups is also analysed to give depth to the findings. The choice of using subgroups instead of interaction variables is based on the properties of the data and models used in the study³, and this approach is also taken in a similar study by Montinari and Prodi (2011). The chosen subgroups stem from the theory and literature, although some potential subgroupings were left out after a tentative analysis, mainly because

³ The model has four variables of interest (Chinese imports, exports, FDI and construction), and because the data is organized by country pairs, all these country-specific variables have two separate coefficients, one for country *i* and one for country *j*. Interacting multiple categories with all these variables would result in excessively large and impractical tables that would be difficult to interpret; hence the preference for subgroups.

there are not enough data points to get robust or meaningful results when a subgroup consists of considerably less than a quarter of the cases. The specific grouping criteria are presented in detail in Appendix B, but in brief, the divisions that are included in the analysis are based on the following features: level of income, export structure, being landlocked, and historical trade openness. The subgroup analysis should be thought of as a supplement to reinforce the main findings from the overall dataset rather than a stand-alone analysis, because the risk of inflated coefficients and falsely determined significance increases as the population size decreases. This is particularly important with regard to Nigeria, because its economy accounts for more than half of the total ECOWAS GDP, and its trade patterns with other ECOWAS countries have experienced relatively rapid changes during the period (Chete and Adewuyi, 2012). This means that the country is associated with many outlier values, and every model has therefore also been run without Nigeria to check for robustness.

The main model used in the analysis is an OLS model with a time dummy and clustered standard errors to account for serial correlation and heteroskedasticity in the errors. While theoretically imperfect, OLS with a time dummy (and often also exporter/importer dummies) is a popular estimator in the gravity literature and generally produces quite similar results with more sophisticated models (WTO, 2012; Baldwin and Taglioni, 2006). Moreover, other potential approaches have major drawbacks: using a fixed-effects OLS estimator would be theoretically robust, but it absorbs between-country variation and all the time-invariant variables; random-effects GLS does not seem to suit the data (based on the Hausman test); and finally, Poisson pseudo-maximum likelihood (PPML) estimator that is often used in the trade literature would require the use of importer/exporter dummies that, similarly to fixed-effects models, absorb much of the between-country variation, which would be problematic given the small size of the dataset. However, a number of robustness checks using these different models as well as OLS with slightly different sets of variables are performed to test whether different models or model specifications—that all have their merits and drawbacks—yield similar, or at least non-contradictory results.

5 Empirical Analysis

This section presents the results of the empirical analysis. First, the results for the dataset as a whole are presented and explained, after which a number of subgroups based on different country characteristics are analysed to examine if and how the relationship between Chinese economic engagement and intra-regional trade varies depending on the context. Finally, the main findings of the analysis are summarized.

5.1 Results

The results of the analysis of the dataset as a whole are shown in Table 1. The table shows three separate regressions; the first one is a baseline model with only gravity variables, the second one adds the Chinese imports and exports (*imports from* and *exports to* China, respectively), and the third one adds FDI and construction. The first thing that can be seen from the results is that the basic gravity variables show expected results: GDP of countries i and j is positively associated with bilateral trade between the two countries, whereas distance is negatively associated with bilateral trade. Both relationships are statistically significant at .01 level. The economic significance of the variables is substantial, more than 2 for both variables in the baseline model, which means that e.g. 1 per cent increase in *distance* results in 2.354 per cent decrease in bilateral trade, *ceteris paribus*. It is noteworthy that these coefficients are considerably higher than in many other studies examining trade patterns in Africa, though still within a reasonable range. The difference is most likely due to differences in model specifications and control variables; for instance, controlling for tariffs could in theory decrease the coefficients for both distance and GDP. Interpreting the country-specific variables is a bit trickier because one gets two coefficients for each variable, one for country i (exporter) and one for country j (importer). In the baseline model, the coefficients for country i and country j are 2.908 and 2.238, respectively, which implies that the GDP of the exporter has on average a stronger effect on bilateral trade than the GDP of the importer. These relationships weaken a little, yet remain similar relative to each other when additional variables are introduced to the model. The *remoteness* variable shows also an expected result; increase in MLR/remoteness (from the ECOWAS market) is negatively associated with bilateral trade. The basic gravity variables provide similar results across all the subgroups, which supports the robustness of the findings. With some smaller subgroups, the coefficients of some gravity variables are not statistically significant, but this is most likely due to the limited sample size.

Moving on to the second and third models, we can see that the overall model fit first slightly improves when the variables about Chinese trade are added, but introducing the FDI and construction to the third model weakens the model fit again. Imports from China seem to be positively associated with bilateral trade between countries i and j ; the relationship is relatively

Table 1 – Results for the whole dataset

Model	(1)	(2)	(3)
Dependent variable	Model A <i>Ln_imports</i>	Model B <i>Ln_imports</i>	Model C <i>Ln_imports</i>
<i>Ln_GDP i</i>	2.908*** (0.266)	2.259*** (0.333)	2.140*** (0.361)
<i>Ln_GDP j</i>	2.238*** (0.243)	2.042*** (0.316)	1.949*** (0.342)
<i>Ln_distance</i>	-2.354*** (0.419)	-2.018*** (0.456)	-1.970*** (0.491)
<i>Remoteness i</i>	-0.0567*** (0.0126)	-0.0563*** (0.0129)	-0.0545*** (0.0130)
<i>Remoteness j</i>	-0.0366*** (0.0130)	-0.0382*** (0.0135)	-0.0344** (0.0135)
<i>Ln_China_imp i</i>		0.649*** (0.214)	0.640*** (0.246)
<i>Ln_China_imp j</i>		0.280 (0.207)	0.182 (0.228)
<i>Ln_China_exp i</i>		0.0404 (0.0440)	0.0465 (0.0542)
<i>Ln_China_exp j</i>		-0.0180 (0.0439)	-0.0183 (0.0545)
<i>Ln_FDI i</i>			-0.247 (0.182)
<i>Ln_FDI j</i>			-0.133 (0.142)
<i>Ln_construction i</i>			0.301* (0.162)
<i>Ln_construction j</i>			0.174 (0.144)
<i>Contiguity</i>	0.482 (0.705)	0.914 (0.736)	0.891 (0.744)
<i>Comlang_ethno</i>	2.006*** (0.493)	1.593*** (0.516)	1.692*** (0.522)
<i>Trade openness i</i>	0.0127* (0.00680)	0.00286 (0.00699)	0.000729 (0.00701)
<i>Trade openness j</i>	-0.00251 (0.00805)	-0.00654 (0.00702)	-0.00863 (0.00704)
Constant	-86.45*** (7.870)	-86.12*** (8.841)	-80.56*** (10.94)
Observations	3,990	3,990	3,276
R-squared	0.484	0.500	0.493

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

strong and statistically significant at .01 level for country i , but not as strong and statistically insignificant at .1 level—although still positive—for country j . In other words, imports from China are positively associated with intra-regional *exports*. Exports to China, instead, seem to be unrelated to bilateral trade between countries i and j ; the coefficients have different signs for countries i and j , the economic significance is small, and all the coefficients are statistically insignificant. FDI appears to be negatively associated with bilateral trade, but the results are not statistically significant at .1 level. Finally, construction appears to be positively associated with bilateral trade between i and j ; the relationship is statistically significant at .1 level for country i , but the economic significance is considerable for both i and j .

The validity of the models is assessed by performing necessary model diagnostics and robustness checks. While no multicollinearity is observed for the models, the skewness and kurtosis test indicates that the null hypothesis of normality must be rejected. However, after eliminating outliers and log-transforming most variables, the distribution of errors, observed by Q–Q plot, improves considerably and is close to normal. Heteroskedasticity is accounted for by clustering robust standard errors by country pairs. Several robustness checks have been performed throughout the analysis to ensure that the results are consistent across different models and that data manipulation does not skew the results in any substantial manner. The most noteworthy robustness check, using three different estimators in addition to OLS, is presented in Appendix C; the main takeaway from the robustness checks is that the estimators yield similar results insofar that the signs of all statistically significant coefficients are consistent, but the observed scale of the effect varies considerably. Thus, the coefficients found in the analysis should be treated as indicative, not definitive.

One interesting observation is that nearly all coefficients have a much more significant effect—both economically and statistically—for country i than country j . In other words, it seems that the conditions of the exporter country have generally a stronger influence on bilateral trade between ECOWAS countries. This seems reasonable because a similar pattern can also be observed in other studies examining bilateral trade in SSA, for example Montinari and Prodi (2011) and Osabuohien et al (2019). Ultimately, this pattern does bear much significance for the research question of this study; even if China has an impact on intra-regional trade mainly through the exporter countries, it does not really change the implications for the region as a whole, since ‘intra-regional exports’ of one country are by definition ‘intra-regional imports’ of another.

The following subsections present the results for the supplementary analysis of a number of different subgroups, divided on the basis of export structure, GDP per capita, being landlocked, and historical trade orientation.

5.1.1 Export structure

First, the countries are divided into three subgroups by their main export category since it is reasonable to assume that ECOWAS countries' trade with each other depends on their overall export structure. Moreover, drawing from Montinari and Prodi's (2011) finding that countries exporting particularly high volumes of oil to China are prone to detach themselves from the intra-African market, the countries are also divided into two subgroups based on their exports to China in relation to GDP. In other words, the countries are divided by their *degree of dependency on exports to China* to test whether the relationship observed by Montinari and Prodi (2011) applies to non-oil exports as well.

The three export categories are a) *mixed*, b) *agriculture and forestry* (A&F) and c) *oil and mining* (O&M); the division—described in detail in Appendix B—ineluctably cuts corners in order to have a sufficiently small number of categories, but nearly all countries fall into one of the categories relatively smoothly⁴.

The results are presented in Table 2, but a couple of mentions need to be made regarding Tables 2–5. First, all the variables are in logarithmic form (*ln*), the dependent variable is *imports* in all models, and the controls are the same as in Table 1; since these details remain unaltered in all tables, they are left out to save space. Finally, it is important to note that only half of the country-specific coefficients, marked in bold, indicate the *direct* impact of country characteristic on bilateral trade, and therefore the analysis focuses on these coefficients. Taking the column 1 of Table 2 as an example, the coefficient in bold in the first row indicates the association between *Chinese imports* to country *i* and the trade flow between *i* and *j* when *i* is a *mixed* exporter, whereas the following coefficient that is not in bold (in the second row) indicates the association between *Chinese imports* to country *j* and the trade flow between *i* and *j* when *i* is a *mixed* exporter, which intuitively seems much less important. While the latter coefficient could, in theory, reveal some meaningful indirect effects, the judgment of the author of this paper is that, given the small size of the dataset, interpreting these coefficients would be problematic. It is very likely that what they indicate are just the general relationships found in the analysis for the whole dataset—but skewed because of the smaller amount of observations—and interpreting them could therefore lead to ambiguous, or even completely spurious conclusions.

The most conspicuous finding with these subgroups is that the impact of China seems to be more pronounced for the *mixed* exporters; it is the only subgroup, the intra-regional trade of which shows a statistically significant positive relationship with Chinese imports and construction. This could imply that the impact of Chinese economic engagement is stronger when the export sector has more linkages with the rest of the economy; in other words, the knock-on effects of Chinese imports and construction might find their way to contribute to intra-regional trade more easily in countries with a more diversified export basket. Another interesting observation is that exports to China of the *mixed* subgroup appear to be negatively associated with intra-regional exports, whereas the association is positive for A&O and O&M subgroups, although only at .1 level of significance. These results are difficult to explain since

⁴ The only borderline case is Burkina Faso, which exported predominantly cotton roughly for the first half of the period and predominantly gold for the second; the judgement of the author was to label it as a *mixed* exporter.

one would rather expect the countries with less diversified export baskets to detach themselves from intra-regional trade as their exports to China grow.

The results for the second export-based subgroup division, instead, yields expected results (Table 3). Exports to China are negatively associated with intra-regional exports for countries that export more to China in relation to GDP, while for countries that export less to China the effect is the opposite. The finding is to some extent similar to Montinari and Prodi (2011) and might explain the unexpected results for the *mixed* export category presented above, but the mechanisms are discussed in more detail in section 6.1.3.

Table 2 – Results for the subgroups based on the main export category

Main exports	(1) <i>Mixed¹ i</i>	(2) <i>A&F i</i>	(3) <i>O&M i</i>	(4) <i>Mixed j</i>	(5) <i>A&F j</i>	(6) <i>O&M j</i>
Variables						
<i>China_imp i</i>	-0.0271 (0.418)	0.0553 (0.438)	0.349 (0.633)	0.548 (0.360)	0.903** (0.371)	0.827** (0.391)
<i>China_imp j</i>	-0.319 (0.358)	0.490 (0.505)	0.338 (0.396)	1.027*** (0.358)	0.316 (0.507)	-0.233 (0.454)
<i>China_exp i</i>	-0.503** (0.212)	0.142* (0.0778)	0.125* (0.0738)	0.116 (0.0745)	-0.115 (0.136)	0.101 (0.0842)
<i>China_exp j</i>	0.0560 (0.0729)	-0.0804 (0.0980)	-0.0215 (0.0731)	-0.0494 (0.241)	-0.0548 (0.0740)	-0.00719 (0.0808)
<i>FDI i</i>	0.335 (0.273)	0.361 (0.371)	-0.0325 (0.491)	-0.304 (0.286)	0.118 (0.312)	-0.355 (0.315)
<i>FDI j</i>	0.222 (0.232)	-0.638** (0.290)	-0.399 (0.248)	-0.356 (0.279)	-0.396 (0.271)	0.399 (0.504)
<i>Construction i</i>	0.834*** (0.280)	-0.122 (0.271)	0.455 (0.381)	0.384 (0.238)	0.179 (0.326)	0.113 (0.266)
<i>Construction j</i>	0.0583 (0.242)	0.595** (0.282)	0.189 (0.250)	-0.0717 (0.248)	-0.0530 (0.307)	0.423 (0.412)
<i>Constant</i>	-80.98** (31.32)	-40.70 (37.23)	-61.00*** (18.88)	-112.1*** (27.82)	-61.01 (42.17)	-105.3*** (18.47)
Observations	1,287	884	1,105	1,287	884	1,105
R-squared	0.499	0.497	0.548	0.533	0.449	0.567

1. *Mixed* = mixed exports; *A&F* = agriculture and forestry exports; *O&M* = oil and mining exports

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3 – Results for the subgroups based on exports to China in relation to GDP

	(1)	(2)	(3)	(4)
Export to China in relation to GDP	Lower half <i>i</i>	Higher half <i>i</i>	Lower half <i>j</i>	Higher half <i>j</i>
Variables				
<i>China_imp i</i>	0.494 (0.339)	0.719*** (0.252)	0.429 (0.304)	0.785*** (0.268)
<i>China_imp j</i>	0.318 (0.298)	-0.0757 (0.316)	0.0421 (0.394)	0.0928 (0.235)
<i>China_exp i</i>	0.110* (0.0620)	-0.462** (0.198)	-0.0101 (0.0729)	0.108 (0.0655)
<i>China_exp j</i>	-0.0598 (0.0568)	0.0467 (0.0726)	-0.0614 (0.0664)	-0.256 (0.209)
<i>FDI i</i>	-0.599*** (0.225)	0.126 (0.220)	0.0528 (0.287)	-0.396* (0.204)
<i>FDI j</i>	-0.406** (0.200)	0.00182 (0.198)	-0.0361 (0.203)	-0.366* (0.219)
<i>Construction i</i>	0.417** (0.200)	-0.00215 (0.213)	0.114 (0.239)	0.421** (0.195)
<i>Construction j</i>	0.340 (0.208)	0.0703 (0.203)	0.0944 (0.233)	0.453** (0.204)
<i>Constant</i>	-84.66*** (12.78)	-78.77*** (12.58)	-81.85*** (13.84)	-79.35*** (11.72)
Observations	1,432	1,844	1,432	1,844
R-squared	0.547	0.460	0.479	0.513

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.1.2 GDP per capita

Next, three subgroups based on GDP per capita are examined. This division might show some interesting patterns because income levels are known to influence trade and investment flows in favour of relatively richer countries in ECOWAS and other economic communities that comprise only low-income countries (Jordaan, 2014; Venables, 1999). The results are presented in Table 4. First, it can be seen that Chinese imports are positively associated with intra-regional exports of the lower- and middle-income third, but the statistical and economic significance is weaker for the latter. This is compatible with the theory, because if access to cheap consumer and intermediate goods boosts intra-regional trade, a stronger relationship would arguably be found for the lower-income third.

The results also suggest a statistically significant negative association between Chinese FDI and intra-regional exports for the higher-income third, which is interesting, because many models suggest that FDI might have a negative effect on intra-regional trade, but in most of the models the relationship is not statistically significant. Finally, construction seems to be positively associated with intra-regional imports for the middle-income countries; this seems

logical since better infrastructure can decrease transportation costs, but what remains unclear is why the same relationship is not observed for the lower- and higher-income thirds.

Table 4 – Results for the subgroups based on GDP per capita

	(1)	(2)	(3)	(4)	(5)	(6)
Income third	<i>Lower i</i>	<i>Middle i</i>	<i>Higher i</i>	<i>Lower j</i>	<i>Middle j</i>	<i>Higher j</i>
Variables						
<i>China_imp i</i>	0.987*** (0.255)	0.595* (0.303)	0.0163 (0.443)	0.951** (0.421)	1.045*** (0.352)	0.208 (0.267)
<i>China_imp j</i>	0.804** (0.343)	-0.156 (0.381)	0.00786 (0.342)	0.0759 (0.330)	0.290 (0.309)	0.0213 (0.321)
<i>China_exp i</i>	0.0934 (0.0566)	0.00775 (0.151)	0.0517 (0.0766)	-0.0646 (0.0699)	0.0403 (0.107)	0.115 (0.0695)
<i>China_exp j</i>	-0.0959 (0.0678)	0.0233 (0.0956)	0.0168 (0.0743)	-0.00128 (0.0595)	-0.0162 (0.175)	0.105 (0.0768)
<i>FDI i</i>	-0.263 (0.294)	0.336 (0.325)	-0.833*** (0.277)	-0.570* (0.324)	-0.638** (0.263)	0.190 (0.245)
<i>FDI j</i>	-0.456 (0.280)	0.0256 (0.246)	-0.270 (0.166)	0.263 (0.294)	-0.416 (0.256)	0.121 (0.292)
<i>Construction i</i>	0.294 (0.225)	-0.0180 (0.274)	0.0254 (0.284)	0.295 (0.309)	0.570** (0.237)	0.131 (0.210)
<i>Construction j</i>	0.262 (0.260)	0.198 (0.291)	0.231 (0.189)	0.389 (0.260)	0.490** (0.226)	0.00401 (0.236)
<i>Constant</i>	-42.13* (22.33)	-107.2* (63.73)	-110.7*** (17.92)	-81.36*** (23.15)	-174.4*** (63.98)	-59.13*** (13.18)
Observations	814	1,185	1,277	814	1,185	1,277
R-squared	0.435	0.375	0.655	0.529	0.476	0.517

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.1.3 Landlocked countries

Landlocked countries are known to face difficulties concerning international trade because of their lack of sea access, and therefore it could be expected that Chinese construction would particularly benefit landlocked countries. There are only three landlocked countries in the sample, so the results must be interpreted with caution. Nonetheless, Table 5 shows that there seems to be a statistically significant positive relationship between construction and intra-regional exports, and the relationship is statistically significant only for landlocked countries. Additionally, Chinese FDI appears to be positively associated with intra-regional imports of landlocked countries, whereas the opposite is the case for countries with access to the sea. However, given the small number of cases, relatively low statistical significance and the slightly illogical coefficients, these relationships cannot be considered robust.

5.1.4 Historical trade openness

Finally, the countries divided into two categories based on their average trade openness in the 1960s and 1970s. The idea for these subgroups arises from the literature on institutions; it could be that the trade regime is more institutionalized in countries that have been trade-oriented since their independence, and they might therefore be less susceptible to external influence on trade patterns. The results are presented in Table 5. After comparing the results with current day trade openness, the only major relationship that can be attributed solely to *historical* trade openness is that construction seems to be positively associated with intra-regional imports and exports for countries that traded less in the first decades of their independence, though only at .1 level of significance. However, this could imply that the countries that have a longer history of trading do not enjoy a similar increase in intra-regional trade from Chinese construction since their trade regimes might be more entrenched and thereby less susceptible to external influence.

Table 5 – Results for the subgroups based on being landlocked/historical trade openness

Subgroup	(1) <i>LL</i> ¹ <i>i</i> =1	(2) <i>LL</i> <i>i</i> =0	(3) <i>LL</i> <i>j</i> =1	(4) <i>LL</i> <i>j</i> =0	(5) <i>HO</i> <i>i</i> =1	(6) <i>HO</i> <i>i</i> =0	(7) <i>HO</i> <i>j</i> =1	(8) <i>HO</i> <i>j</i> =0
Variables								
<i>China_imp i</i>	-0.344 (0.421)	0.263 (0.292)	0.915** (0.392)	0.569** (0.255)	0.820** (0.369)	1.021*** (0.330)	0.625* (0.344)	0.621 (0.391)
<i>China_imp j</i>	-0.0831 (0.445)	0.125 (0.287)	0.268 (0.794)	0.217 (0.317)	0.168 (0.352)	0.273 (0.321)	0.110 (0.222)	0.919* (0.510)
<i>China_exp i</i>	-0.0275 (0.0827)	0.107 (0.0693)	0.0848 (0.0864)	0.0422 (0.0631)	0.129* (0.0662)	-0.0191 (0.0800)	-0.0289 (0.0931)	0.158** (0.0757)
<i>China_exp j</i>	-0.0263 (0.0842)	-0.00317 (0.0584)	-0.0793 (0.100)	0.0202 (0.0688)	0.00525 (0.0870)	0.00671 (0.0669)	-0.0340 (0.0561)	0.0969 (0.0729)
<i>FDI i</i>	-0.131 (0.201)	-0.327 (0.268)	-0.666* (0.387)	-0.147 (0.204)	-0.187 (0.183)	-0.116 (0.426)	-0.327 (0.266)	-0.362 (0.281)
<i>FDI j</i>	-0.200 (0.321)	-0.192 (0.164)	0.406* (0.210)	-0.531** (0.240)	-0.188 (0.223)	-0.0923 (0.205)	0.0871 (0.146)	-0.0772 (0.405)
<i>Construction i</i>	0.543** (0.254)	0.201 (0.206)	0.316 (0.295)	0.297 (0.185)	0.383* (0.195)	-0.0285 (0.253)	0.403* (0.230)	0.425 (0.272)
<i>Construction j</i>	0.106 (0.257)	0.259 (0.174)	0.148 (0.307)	-0.0103 (0.176)	0.127 (0.199)	0.0854 (0.220)	0.313* (0.171)	-0.148 (0.277)
<i>Constant</i>	-96.27 (70.03)	-80.23*** (11.47)	-200.8*** (71.76)	- (12.43)	-84.79*** (15.22)	-75.78 (48.96)	-69.64*** (16.53)	-57.19** (24.59)
Observations	624	2,652	624	2,652	1,508	1,547	1,508	1,105
R-squared	0.646	0.488	0.701	0.465	0.565	0.533	0.560	0.488

1. *LL* = landlocked, *HO* = historically trade oriented.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.2 Main findings

Overall, the results point towards many interesting and statistically significant relationships, but it is also important to keep in mind that dataset is relatively small to begin with, and the methodological caveats associated with small amount of data are even more pronounced in the subset analysis. Thus, the results for the dataset as a whole are to be considered the principal results of this study, which are then supported and fleshed out with the subgroup analysis. Although great care has been taken to make sure that the method and models are well-suited for the data and RQ, the possibility of confounding variables that bias the results cannot be excluded, and this should be kept in mind when drawing conclusions from the results of the data analysis. In other words, the results must be taken for what they are; not conclusive or exhaustive by any means, but still sufficiently robust to show that China's economic engagement seems to have a considerable impact on intra-regional trade patterns in ECOWAS. Perhaps most importantly, the results are generally in line with theory and previous research, which increases the confidence in the findings of the analysis.

Given these considerations, the main findings that arise from the analysis can be summarized as follows: 1) imports from China seem to have a considerable positive impact on intra-regional trade, and this relationship is stronger for lower-income countries and countries with a mixed export basket; 2) the impact of exports to China seems to depend on the amount of these exports in relation to the GDP of the exporter since exports to China seem to have a negative impact on intra-regional trade for countries that export more to China in relation to GDP, whereas the opposite effect is observed for countries with a relatively lower level of exports to China; 3) the results suggest that Chinese construction most likely has a positive impact on intra-regional trade, particularly for landlocked countries and for countries that are historically less trade-oriented; and finally 4) the overall results show that there is no robust statistically significant relationship between FDI and intra-regional trade. However, the few statistically significant coefficients that are found point towards a negative impact of FDI on intra-regional trade; examining this relationship in more detail would require a larger dataset with more disaggregated data.

6 Discussion

In this section, the findings are connected with the theory and literature on China's economic influence on Africa. Before delving into the more specific aspects of the results, the overall findings are discussed in order to situate the findings within the broader debate of China-Africa economic relations. Once this background is established, the discussion moves on the role of Chinese imports and infrastructure, after which the role of exports to China is reviewed against the backdrop of dependency theory. Finally, the role of FDI is discussed.

6.1 The extent and importance of China's influence on intra-regional trade

First and foremost, it is necessary to understand the relative scale of the Chinese impact found in the analysis. All things considered, the results strongly suggest that the Chinese economic engagement has a considerable impact on bilateral trade in ECOWAS, but the observed impact is still relatively limited in size. While in some models the coefficients for the different aspects of Chinese economic engagement are indeed substantial, it is necessary to keep in mind that each relationship seems to be significant only in certain types of countries and that China's economic engagement with the importer (of each country pair) does not have such a large impact on the bilateral trade patterns. Moreover, the Chinese influence is not explicitly positive or negative; while the results of this study generally point more towards a trade-enhancing effect, they also suggest that export to China and Chinese FDI might in some cases have a negative impact on intra-regional trade. These findings are in line with what many China-Africa experts often emphasize: the relationship between China and Africa is complex and constantly evolving.

It is also necessary to consider why these findings are important. According to the theoretical framework of this study, China's influence on intra-regional trade matters, because it reflects one considerable aspect of how external actors influence the growth- and welfare-enhancing dynamics of free trade and economic integration in SSA and ECOWAS. Many scholars, development banks and politicians alike firmly believe that free trade and regional integration hold plenty of promise for ECOWAS and SSA in terms of development potential (AfDB, 2011; World Bank, 2018; Adom, 2012; Thorbecke and Ouyang, 2016, p. 261; Afolabi, Aznin and Izraf, 2017), and it is therefore crucial to understand how different forces influence the patterns of intra-regional trade. ECOWAS (2010) as an organization, too, considers promoting intra-regional trade as a key element of its long-term industrial strategy, the objectives of which include diversifying industrial production and increasing the contribution of manufacturing to the regional GDP from the 2010 average of 6–7 % to an average of over 20 % by 2030. Thus, the findings of this study—together with the broader literature—can provide ECOWAS and the

governments of its member countries with information that can help them to make the most of the growing economic engagement with China.

Given these considerations, the findings of this study support the notion that China's economic engagement in Africa or ECOWAS cannot be labelled simply as 'positive' or 'negative', but its different aspects must be carefully examined and put into context to incrementally build up a better understanding of the evolving landscape. While the findings of this study are similar to previous studies by Montinari and Prodi (2011) and Khosla (2015) insofar that the Chinese economic presence is found to be a significant determinant of intra-regional trade patterns in Africa, there are also considerable differences, which are discussed in the following subsections.

6.1.1 The role of imports from China

The positive association between Chinese imports and intra-regional trade is arguably the most robust relationship found in the empirical analysis of this study. This finding is very noteworthy because it is only in part in line with the theory and previous studies. Beginning with theory, the results do not support the argument that Chinese imports would have a negative impact on intra-regional trade because of their negative impact on local producers, as suggested by Khosla (2015), for instance. This does not mean that Chinese imports could not stifle local industries, but rather that even if they do, the negative effect is either too weak to be detected or is offset by other dynamics that go beyond the simplistic idea of bilateral trade being a zero-sum game. It is also possible that Chinese imports outcompete mainly other non-ECOWAS imports instead of local producers; this type of trend is observed by Jenkins and Edwards (2006) in a study of 21 African countries, including four major ECOWAS countries.

The results support some of the theoretical arguments presented in the section 2.2.4; the competitive pressure created by Chinese imports can have a positive impact on the productivity of the export sector in country i , but the improved access to cheap intermediate and consumer goods might be equally or even more important. Cheap industrial inputs and other goods can provide new opportunities for entrepreneurs and traders to engage in trade with firms and consumers in the neighbouring ECOWAS countries. The results of the income-based subgroup analysis further support this conclusion, because the positive impact of Chinese imports appears to be stronger for poorer countries, and firms and traders in poorer countries can arguably benefit relatively more from the access to cheap Chinese goods.

This finding is somewhat different from similar studies by Khosla (2015) and Montinari and Prodi (2011), which is most likely due to differences in the methodology, period and countries studied. Both of these studies examine China's impact on intra-regional trade in Africa as a whole, and even though it is reasonable to expect similar trends to be found in ECOWAS, the results are not directly comparable with the results of this study to begin with. Nevertheless, Montinari and Prodi (2011) do not find a statistically significant relationship between Chinese imports and intra-regional trade. There are a couple of plausible explanations for why the findings of this study are different. First, ECOWAS is more integrated than Africa as a whole, and the Chinese influence on trade might therefore be different in the subregion. Second, the period of the studies is quite different; the dataset used in this study extends more than ten years

beyond the data used in Montinari and Prodi (2011), and since China-Africa relations have expanded and evolved rapidly, ten years can make a big difference. Finally, there are considerable methodological differences between the studies; the choice of model in Montinari and Prodi (2011) entails that they use a different estimator and a slightly more limited set of variables, which can have an influence on the estimates. Khosla (2015), on the other hand, finds that the economic presence of China had a negative impact on intra-regional trade in Africa during over the period 1990–2012. However, the study uses dummies for the Chinese economic presence instead of the actual trade figures, which means that the model does not capture the specific impact of Chinese imports nor the scale effect of the Chinese economic presence. Essentially, the author examines a relationship that is markedly different from the one analysed in this study, and therefore the results are not directly comparable. Interestingly, Khosla (2015) also finds that the negative impact on intra-regional trade of the overall Chinese economic presence has reduced considerably over time as the Chinese economic engagement has become increasingly associated with activities that can have positive spillover effects on African economies. This could in part explain why the findings of this study point rather towards a positive overall impact.

6.1.2 Construction and infrastructure

Another relatively robust relationship arising from the data is the positive association between Chinese construction and intra-regional trade. This finding is consonant with the arguments found in the literature on economic integration in SSA, as the lack of infrastructure has been identified as one of the main obstacles to intra-regional trade in ECOWAS and SSA by African Development Bank (2012) as well as by several scholars (Mbekeani, 2010; Akpan, 2014; Jordaan, 2014; Buys, Deichmann and Wheeler, 2010). Thus, it is reasonable to assume that the infrastructure built by Chinese companies has a positive impact on intra-regional trade. In fact, rather than asking why Chinese construction seems to have a positive effect on trade in some cases, it could be even more important to ask why the effect is *not* statistically significant and robust across all the models and subgroups.

A couple of theoretical reasons for the weakness of the relationship can be identified. First, the subset analysis (Section 5.1.3) suggests that Chinese construction has a stronger positive impact effect on landlocked countries. This seems plausible because landlocked countries in SSA face extraordinarily high transportation costs (Mbekeani, 2010), and therefore the marginal positive effect of infrastructure improvements is arguably higher in these countries. It is also likely that the infrastructure projects in landlocked countries are focused on linkages with their neighbouring countries with access to the sea, whereas in the latter much of the construction can be focused on infrastructure that does not necessarily serve primarily intra-regional trade, such as port facilities. Perhaps relatedly, the results also suggest that the countries that have been historically less trade-oriented benefit more from Chinese construction in terms of intra-regional trade; it seems likely that historically trade-oriented countries have either initially better infrastructure or easier access to the world market even with limited infrastructure, and therefore the marginal positive effect of infrastructure improvements is lower in these countries.

Another potential reason for the relatively weak impact of Chinese construction is that the physical infrastructure by itself is not enough to connect the markets, but it must be accompanied by effective regulatory and administrative practices (Mbekani, 2010). Many authors recognize that regulatory and institutional barriers to trade are rife in SSA and ECOWAS (Jordaan, 2014; Santos et al, 2018) and therefore it is plausible that these barriers dampen the trade-enhancing impact of construction to some degree. Finally, it is necessary to keep in mind also the fact that the *construction* variable used in this study is only a rough proxy for infrastructure investment and does not thereby tell the whole story about the impact of Chinese engagement in infrastructure funding and construction.

6.1.3 Exports and dependency

Another interesting finding of this study is that there does not seem to be a strong connection between exports to China and intra-regional trade when examining ECOWAS as a whole, but the relationship varies across the subgroups depending on the export structure. The fact that the impact seems to be positive for some countries and negative for others is consistent with the findings of Montinari and Prodi (2011), who find that higher export levels to China—mostly associated with oil exports in their dataset—have a negative effect on intra-regional trade, while lower levels have a positive effect. Since Nigeria is the only ECOWAS country completely reliant on oil exports, the role of oil exports could not be similarly examined in this study. However, the results do indicate that exports to China have a negative impact on intra-regional trade for countries that export more to China in relation to their GDP, while the effect is positive for countries that export relatively less to China.

The findings of Montinari and Prodi (2011) can give some indication of the likely mechanisms at play behind the varying impact on intra-regional trade of exports to China. The authors suggest that the effect arises from two separate forces that can offset each other; on one hand, increased income from the exports tends to enhance intra-regional trade, while on the other hand, oil exports to China make countries more isolated from the intra-African market. Assuming that the isolating effect is not limited to oil-exporters, the combined effect of these two forces could in part explain the differences between ECOWAS countries. However, it is difficult to say why exports to China also seem to have a trade-reducing impact on countries that have a mixed export basket, whereas the opposite effect is observed for the exporters of agricultural and mining goods. A closer look at the data shows that, on average, the countries with mixed overall exports also export more to China, which implies that the relationship found using this subgroup division might be spurious, as it might only capture the scale effect discussed above. Nevertheless, one cannot exclude the possibility that the structure of export basket does play a role, but in order to attain a more complete picture, it would be necessary to examine a larger number of countries, break down the exports into more specific product categories, and differentiate between exports to China and the rest of the world.

On the theoretical level, the above considerations imply that both free trade and dependency arguments are to some extent able to explain the impact of exports to China on intra-regional trade. The findings suggest that the concerns about China contributing to Africa's dependency on resource exports, discussed by Qobo and le Pere (2018) and Alden (2019), are warranted also as far as economic integration is concerned, since the trade-enhancing effect of export

revenues seems to disappear at higher levels of dependency on China. However, it can also be argued that the problem is not so much the high level of exports to China, but rather the high degree of dependency on resource exports. The findings are thereby in line with Busse, Erdogan and Mühlen (2016), who conclude that resource exports to China provide both challenges and opportunities for African countries; the additional export revenues provided by China can *make it more difficult* for some countries to escape the resource curse, but they can also benefit from the exports through the additional income that can have many positive effects across the economy—including a potential increase in intra-regional trade.

6.1.4 FDI

Finally, it is necessary to discuss the impact of FDI, which was largely found to be either insignificant or negative. This is a rather unexpected finding, as, for instance, Khosla (2015) concludes that FDI has probably been one of the factors that have made the Chinese economic presence more favourable to intra-regional trade, and Shinn (2019) argues that Chinese FDI has generally positive economic impacts, such as creating employment and facilitating technology transfer and management learning, and these effects, in turn, could be expected to have positive spillover effects to intra-regional trade. Moreover, some Chinese FDI in ECOWAS has been targeted to the manufacturing sector in for instance Nigeria (Chen, 2020; Nnanna, 2015) and Ghana (Tang, 2018). This type of FDI could arguably have a positive effect on intra-regional trade since manufacturing exports constitute a substantial share of intra-regional exports for many ECOWAS countries (Von Uexkull, 2012). While these arguments seem reasonable, the analysis tells a different story, and a number of potential reasons for the slightly surprising findings can be identified by taking a look at the literature.

Firstly, many authors, such as Megbowon, Mlambo and Adekunle (2019) and Alden and Jiang (2019), point out that the majority of Chinese FDI is directed to sectors with few linkages with the rest of the economy. This includes for example mining and other capital-intensive resource-based industries that mostly serve the global export market, and these investments are therefore unlikely to substantially contribute to intra-regional trade. In fact, it is possible that this kind of FDI even has a trade-reducing effect regionally through a Dutch disease-type mechanism, but testing this hypothesis would require more specific sectoral data. Manufacturing investment, instead, represents only a small share of FDI stock for most SSA countries (Alden and Jiang, 2019), so even if it has a positive impact on intra-regional trade, the relationship is unlikely to be detected when analysing aggregate-level data. Another issue, noted by for example Khosla (2015), is that the effect of FDI is far from immediate; its impact on trade might not be fully observable until years or even a decade after the original investment was made. Figure 2 shows that the Chinese FDI flows to ECOWAS has continued to grow rapidly towards the last years of the dataset, which means that much of the impact on intra-regional trade of the Chinese FDI most likely extends beyond the years included in the dataset, and therefore the results might not tell a realistic story of the long-term impact of FDI.

7 Conclusions

China's economic engagement in Sub-Saharan Africa and ECOWAS has grown tremendously over the last two decades, which has raised concerns about its impact on economic development in the region. One particular concern is that trade with China might hamper the process of economic integration of regional economic communities, such as ECOWAS, because the influx of Chinese goods can stifle local industries while at the same time the growing exports to China can contribute to ECOWAS countries' dependency on resource exports. On the other hand, many Chinese private and state actors have also invested in infrastructure and industrial development in the region, which could arguably have a positive impact on intra-regional trade, as the lack of infrastructure and industrial capacity are among the main obstacles to trade within ECOWAS. This puzzle is at the centre of this study, i.e., it investigates how ECOWAS countries' growing economic engagement with China influences intra-regional trade in the region. The study explores this question using quantitative methods, taking an approach based on the gravity model of international trade.

The findings of the empirical analysis indicate that the relationship between Chinese economic engagement and intra-regional trade is perhaps more complicated than what previous studies have found, and that the relationship varies significantly depending on country characteristics and the type of economic engagement. Five main findings arise from the analysis:

- First, the results show that economic engagement with China does have a considerable impact on intra-regional trade in ECOWAS, particularly through its effects on ECOWAS countries' intra-regional exports, which is also in line with the findings of previous studies that have examined the relationship on a continental level.
- Second, imports from China seem to have a positive impact on intra-regional trade, particularly in poorer ECOWAS countries. This could be due to the market opportunities created by the improved access to cheap Chinese intermediate and consumer goods, but efficiency gains associated with the growing competitive pressure could also play a role.
- Third, Chinese engineering and construction projects are in general positively associated with intra-regional trade, and the relationship appears to be stronger in landlocked countries as well as in countries with more diversified exports. This finding is compatible with the literature and previous research, as the lack of infrastructure is often identified as one of the main obstacles to intra-regional trade in ECOWAS.
- Fourth, the results suggest that the impact of exports to China depends on the amount of these exports in relation to the GDP of the exporter; exports to China seem to have a negative impact on intra-regional trade for countries that export more to China in relation to GDP, whereas the opposite effect is observed for countries with a relatively lower level of exports to China. The effect arises plausibly from the interaction of two counteracting forces; on one hand, increased income through exports tends to enhance intra-regional trade, while on the other hand, high volumes of exports to China can contribute to resource dependency, which can in turn have a negative impact on intra-regional trade. The

combined effect of these two forces could explain why the sign of the relationship varies between different country subgroups.

- Finally, FDI is found to have either negative or no impact on intra-regional trade. This is a slightly unexpected result, but it might be because the majority of Chinese FDI is directed to sectors with few linkages with the rest of the economy

Overall, these findings strongly suggest that the question should not really be *if* China's economic engagement hampers intra-regional trade in ECOWAS, but rather *how* and *through which mechanisms* different aspects of China's economic engagement influence intra-regional trade. The first question surely is interesting insofar that if the answer is 'yes', countries should reconsider their economic relationship with China, but in the real world such simple answers rarely exist, and therefore answering the second question is not only scientifically more relevant but also provides more useful information to politicians and other actors working with trade and economic policy. This study is one more piece in the puzzle of the constantly changing China-Africa landscape that is full of negative, positive and ambiguous relationships. Chinese actors are most likely in Africa to stay, and therefore the best thing we can do is to build up knowledge, piece by piece, so that ECOWAS countries can make the most out of the new opportunities offered by the increasing number of actors willing to trade and invest in the region.

The findings of this study also open multiple avenues for future research. Since the topic of this paper has not been extensively studied, the approach employed in the analysis is rather exploratory, analysing the broad trends that the aggregate-level data can reveal. However, as the findings strongly indicate, the dynamics at play are truly complex and depend on both the type of economic engagement and specific characteristics of the exporter and importer countries. Therefore, an extensive analysis of one specific type of economic engagement using disaggregated, product category-level data for a larger set of countries, such as SSA as a whole, would most likely provide intriguing additional insights into what kind of imports and exports have a positive impact on intra-regional trade and vice versa. Moreover, a larger dataset would allow for the use of more sophisticated and statistically robust models, which would increase the confidence in the findings. Besides, an in-depth case study of one or more countries, for instance combining qualitative evidence with firm-level data, could also contribute to our understanding of the micro-level mechanisms through which the presence of Chinese actors can influence intra-regional trade.

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Appendix A

Computing remoteness

The *remoteness* variable used as a proxy for MLR was computed on Stata using the following formula suggest by WTO (2012):

$$Remoteness_i = \sum_j \frac{dist_{ij}}{GDP_i/GDP_w}$$

where *dist* is the distance (weighted by internal distances) between *i* and *j* divided by the partner countries' shares of the world GDP (GDP_i/GDP_w).

Appendix B

Grouping criteria

The specific criteria for the subgroup divisions are described in detail in the table below:

Subgroup	Division criteria
Landlockedness	The countries were divided into two subgroups based on whether they are landlocked or not.
Historical trade orientation	The countries were divided into two subgroups (lower and higher) based on their <i>average trade to GDP ratio between 1960–1979</i> using World Bank (2020) data; Guinea was left out due to lack of data.
GDP per capita	The observations were divided into three equally sized groups based on their GDP per capita. A robustness check with a country-based division (instead of observation-based) was conducted to ensure that the observation-based division does not skew the results.
Export to China relative to GDP	The observations were divided into two equally sized groups based on their exports to China in relation to GDP (Exp_China_{ij}/GDP_{ij}). A robustness check with a country-based division (instead of observation-based) was conducted to ensure that the observation-based division does not skew the results.
Main export	Countries were divided into three subgroups according to their main export category. The main export category was calculated by HS2 product classification using UN Comtrade (2020) data. A category was counted as the ‘main export category’ if more than 50 % of the exports of a country consisted for more than half of the period (2000–2018) of goods falling under one of the two broad categories created for the analysis: <i>agriculture and forestry</i> and <i>oil and mining</i> . The former includes all the HS2 categories related to agriculture, food processing, raw cotton production and forestry, while the latter covered precious metals, mineral products (including oil), metals and chemical products (mainly uranium in Niger). The rest was labelled as <i>mixed exporters</i> .

It is necessary to emphasize that while these divisions are the result of a careful process that included trying out several potential ways to split up the dataset, the divisions are in equal parts pragmatic and arbitrary, and can only help to approximate the effect of different country characteristics.

Appendix C

Robustness checks

Tables 6 and 7 below show the results of the main robustness checks for the baseline and complete models, respectively, using the whole dataset. The models include the baseline OLS, random-effects GLS, Tobit and Poisson pseudo-maximum likelihood (PPML) estimators. The latter two are commonly used estimators in gravity literature, but they were not considered appropriate for the main analysis of this paper, because their proper usage would require using exporter/importer dummies, which turned out to be unfeasible due to dataset properties, as mentioned in Section 4.1. However, some authors have also used PPML together with MLR terms (Osabuohien et al, 2019, for instance), which arguably provides sufficient grounds for using it as a robustness check. The coefficients of OLS, RE GLS and Tobit estimators are directly comparable with each other, but not with those of PPML because the latter uses non-logged imports as the dependent variable. The robustness checks were also performed for the restricted model (Model B in Table 1) as well as for a number of subgroups and different sets of variables, but these are not reported, as the results did not show any major deviations from the patterns seen in Tables 6 and 7.

Table 6 – Robustness check for the baseline model using RE GLS, Tobit and PPML estimators

Model	(1) OLS	(2) RE GLS	(3) Tobit	(4) PPML
Variables	<i>Ln imports</i>	<i>Ln imports</i>	<i>Ln imports</i>	<i>Imports</i>
<i>Ln_GDP i</i>	2.863*** (0.264)	1.992*** (0.229)	1.981*** (0.204)	0.926*** (0.328)
<i>Ln_GDP j</i>	2.251*** (0.248)	1.519*** (0.200)	1.614*** (0.203)	-0.148 (0.367)
<i>Ln_distance</i>	-2.348*** (0.419)	-2.023*** (0.433)	-2.043*** (0.525)	-0.306 (0.542)
<i>Remoteness i</i>	-0.0590*** (0.0126)	-0.0261*** (0.00630)	-0.0256*** (0.00653)	-0.00421 (0.00503)
<i>Remoteness j</i>	-0.0364*** (0.0129)	-0.0149*** (0.00563)	-0.0139** (0.00650)	0.00440 (0.00351)
Constant	-85.16*** (7.894)	-53.36*** (7.293)	-54.64*** (7.093)	
Constant exports				2.141 (5.716)
Observations	3,990	3,990	3,990	3,990
R-squared	0.480			
Number of cpid		210	210	210

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7 – Robustness check for the complete model using RE GLS, Tobit and PPML estimators

Model Variables	(1) OLS <i>Ln_imports</i>	(2) RE GLS <i>Ln_imports</i>	(3) Tobit <i>Ln_imports</i>	(4) PPML <i>Imports</i>
<i>Ln_GDP i</i>	2.137*** (0.348)	1.739*** (0.273)	1.712*** (0.239)	0.804** (0.352)
<i>Ln_GDP j</i>	2.037*** (0.357)	1.740*** (0.286)	1.724*** (0.238)	0.0282 (0.292)
<i>Ln_distance</i>	-1.988*** (0.488)	-1.938*** (0.461)	-1.932*** (0.520)	-0.144 (0.465)
<i>Remoteness i</i>	-0.0547*** (0.0131)	-0.0197*** (0.00725)	-0.0186** (0.00803)	-0.00484 (0.00379)
<i>Remoteness j</i>	-0.0325** (0.0135)	-0.0109* (0.00601)	-0.0102 (0.00798)	0.00109 (0.00400)
<i>Contiguity</i>	0.866 (0.751)	1.410* (0.728)	1.435* (0.827)	0.718 (0.654)
<i>Common_language</i>	1.741*** (0.529)	2.058*** (0.542)	2.076*** (0.583)	-0.789 (0.593)
<i>Ln_China_imp i</i>	0.644*** (0.235)	0.271 (0.193)	0.257* (0.133)	0.373*** (0.122)
<i>Ln_China_imp j</i>	0.0818 (0.255)	0.110 (0.184)	0.111 (0.132)	0.000593 (0.0708)
<i>Ln_China_exp i</i>	0.0443 (0.0566)	0.0641* (0.0345)	0.0636*** (0.0231)	0.141*** (0.0457)
<i>Ln_China_exp j</i>	-0.00506 (0.0561)	0.00986 (0.0282)	0.0100 (0.0231)	0.0246 (0.0172)
<i>Ln_FDI i</i>	-0.241 (0.187)	-0.00273 (0.132)	-0.00255 (0.0953)	-0.185** (0.0787)
<i>Ln_FDI j</i>	-0.188 (0.157)	-0.156 (0.116)	-0.159* (0.0953)	-0.166** (0.0755)
<i>Ln_Construction i</i>	0.297* (0.165)	-0.0250 (0.131)	-0.0255 (0.0768)	-0.0149 (0.0506)
<i>Ln_Construction j</i>	0.219 (0.154)	-0.0157 (0.120)	-0.0183 (0.0768)	-0.00936 (0.0559)
<i>ln_alpha</i>				1.447 (1.423)
<i>Constant</i>	-81.25*** (10.96)	-60.33*** (8.893)	-59.23*** (7.891)	
<i>Constant exports</i>				-9.989 (7.732)
Observations	3,276	3,276	3,276	3,276
R-squared	0.491			
Number of groups		210	210	210

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1