

Examining How China-Africa Trade Has Evolved Over The Years And Implications For Africa's Industrial Development

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Abstract

The China-Africa trade was examined for the period 2001-2022. Trade indexes were used to examine the nature of this trade and how it has evolved over the years. The trade indexes used are the Revealed trade preference index (RTP_{ij}), the Trade complementarity index (TCI_{ij}), and the Revealed trade barrier index (RTB_{jk}). Since 2009, China has overtaken Africa's traditional trading partners to become Africa's top major trading partner. While the China-Africa trade is least among the other regions China trades with (USA, Asia, Europe, and South America and the Caribbean) and is also the least complementary, the RTP_{ij} results show that China-Africa trade linkages have strengthened over the years, and the TCI_{ij} results show that trade between the two has become more complementary over the years. China's major imports from Africa are mainly mineral resources and fuels, and the RTB_{jk} results show that China gives more preferential treatment to these products to ensure them easier entry into China. China's major exports to Africa are manufactured goods, and RTB_{jk} results show that China does not give preferential treatment to these products originating from Africa and thus they cannot easily access China's market. This trend has not changed over the years. China's major trading partners in Africa are mineral resources rich countries (Angola, Algeria, Egypt, Nigeria, South Africa) and this too has not changed over the years. The RTP_{ij} results show that China's trade linkages with these countries have strengthened over the years, and the TCI_{ij} results show that China's trade with these African countries has become more complementary over the years.

Date of Submission: 14-03-2024

Date of acceptance: 24-03-2024

I. Introduction

China has a special bond with African countries which began with the Bandung conference of 1955, which was organised by Egypt, Indonesia, Myanmar, Sri Lanka, India, and Pakistan, to promote Afro-Asian economic and cultural collaborations. The other objective of the conference was to oppose colonialism by imperialistic nations like the United States and the Soviet Union. During the conference, many leaders from African countries which had gained their independence met with China for the first time. (Mutambara, 2016; Ofodile, 2008).

After the conference, Chinese officials and Ministers of Finance embarked on a trade mission to Africa, to establish diplomatic relations, resulting in Egypt being the first African country to have diplomatic relations with the People's Republic of China (Ismael, 2008). The period 1960 - 1965 saw Chinese affiliation with the African Continent growing, with China entering into Diplomatic relations with fourteen independent African nations (Mutambara, 2016; Ofodile, 2008). In the 1970s, China embarked on an aid program for Africa by supporting African Independence Movements, and during the mid-1970s, they pledged about \$1.815 million to Africa (Ofodile, 2008: 515).

Over the years, apart from engaging Africa through trade, China has also been strengthening its relations with Africa through foreign direct investments into various sectors in Africa, e.g., the mining and quarrying sector, oil sector, energy sector, infrastructure and construction sector through the Belt and Road initiative, manufacturing sector, wholesale and retail sector, the health and education sectors, as well as in the services sector (Resgissahui, 2019; Nirzard, 2017; Hai and Cohen, 2017; Zheng, 2016). Furthermore, China has provided developmental aid, as well as advancing huge loans to Africa countries to help them to develop their economies, which some of the countries are struggling to repay, as noted by Cohen (2011), Brautigam and Hwang (2016) and Herman (2015).

To facilitate trade with Africa, China established the Forum on China-Africa Cooperation (FOCAC) in 2000. Mutambara and Ndzabukelwako (2021:8) and Mutambara (2016:52) note that through FOCAC, other

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initiatives have been set up to foster China-Africa economic and trade linkages, e.g., the China-Africa Joint Chamber of Commerce set up in 2006, the Conference of Chinese and African Entrepreneurs, and the China-Africa Joint Business Council founded in 2000. Under the auspice of the Belt and Road Initiative and FOCAC, Viljoen (2019 cited in Mutambara and Ndzabukelwako, 2021:10) notes various Memorandums of Understanding signed between China and African countries seek to facilitate cooperation on trade issues, e.g. construction of timber processing plants in Mozambique to enable the export of logs; bilateral cooperation of coffee exports to upgrade the Ethiopian coffee industry; and bilateral cooperation on Sanitary and Phytosanitary measures to enable market access by Africa's various agricultural products into China.

Furthermore, Mutambara (2016:52) notes that over the years, China has signed bilateral trade agreements with African countries as well as taking initiatives for trade facilitation with Africa through enhancing cooperation in customs, taxation, inspection, and quarantine. Furthermore, China has zero-tariff policy on some of the exports from some of the African countries with which it has diplomatic relations, thus increasing Africa's exports that enter duty-free into China. China's Duty-Free Quota-Free (DFQF) Programme which is a non-reciprocal tariff preference treatment for less developed countries, includes African countries as beneficiaries, and serves to increase China-Africa trade, as noted by Mutambara and Ndzabukelwako (2021:9, 10). Other trade facilitation measures which China has put in place include having African commodity exhibitions through African product exhibition centres and offering free stalls or reducing stall rents (Mutambara, 2016:52; People's Republic of China State Council, 2010).

This research article is organised as follows; Section 2 discusses the methodology used by explaining the various trade indexes computed for empirical evidence; Section 3 presents and discusses the results for China-Africa trade and the implications for Africa's industrial development; Section 4 concludes.

II. Methodology

The trade data for empirical analysis that is essential in examining and analysing China-Africa trade were obtained from the United Nations Conference on Trade and Development (UNCTAD) database available at <http://www.unctad.org> as well as from the International Trade Centre (ITC) trade database available at <http://www.trademap.org> focusing on trade data for the period 2001 - 2022. The indexes used for empirical evidence are: (i) the Revealed trade preference index (RTP_{ij}) which gives insights into the extent to which a country's trade is oriented towards its trading partners and the implications this has for strengthening and deepening trade ties; (ii) the revealed trade barrier (RTB_{ij}) indexes to examine ease of market access; and (iii) the trade complementarity indexes (TCI), which show how well the structure of a country's exports match (or complement) the import requirements of another country, as well as showing where trade relations could possibly be developed further. Each of these indexes is discussed in the sections below.

Bilateral trade intensity index

Bilateral trade intensity indices are used to measure the extent to which countries trade with each other. The index gives some insight into how countries value each other as trading partners, and they can be used as indicators of the relative strength or resistance to bilateral trade flows. The most widely used and well-known bilateral trade intensity index (I_{ij})³, which together with its variations have some limitations, *viz.* range variability, range asymmetry, and dynamic ambiguity, which have to be corrected for as noted by Hamanaka (2015:4-5), Iapadre & Tajoli (2013:S93), Iapadre & Luchetti (2010:4) Iapadre & Tiron (2009:7-10), Iapadre (2006:68-69) and Iapadre (2004:7-9). Range variability arises because the index is not homogeneous across regions as the range of its values and its maximum value are influenced by the size of the partner country (or region). The range symmetry problem arises because the index is asymmetric around the geographic neutrality threshold of 1, resulting in biased assessments of changes in the index, depending on whether such changes occur above or below the geographic neutrality threshold. Dynamic ambiguity occurs when trade bias towards the partner country and the bias towards the rest of the world move in the same direction, thus, conveying ambiguous information (Hamanaka, 2015:4-5; Iapadre & Tajoli, 2013:S93; Iapadre & Luchetti, 2010:4; Iapadre & Tiron, 2009:7-10; Iapadre, 2006:68-69; Iapadre, 2004:7-9).

$$^3 I_{ij} = (S_{ij}/(W_j)) = (T_{ij}/T_{iw})/(T_w/T_w)$$

Where: $0 \leq (I_{ij}) \leq \infty$

T_{ij} = trade (exports + imports) between reporting country i and partner country j ; T_{iw} = trade between the world and country i ; T_{wj} = world trade with country j ; T_w = total world trade (Hamanaka, 2015:2; Iapadre & Tajoli, 2013:S93; Iapadre & Tiron, 2009:8). = 1 signifies that the share of country i 's exports to country j is exactly equal to the share of country j 's imports from the rest of the world. The partners are therefore geographically unbiased. > 1, means that trade between the two countries is more intense than anticipated. < 1 means that trade between two countries is less intense than anticipated (Mutambara and Ndzabukelwako, 2021:14; Mutambara, 2017:98).

The bilateral revealed trade preference index (RTP_{ij}) (also known as the trade introversion index, TI_i), is corrected for all these limitations⁴, and therefore deemed robust, and this is the index used in this research. The bilateral revealed trade preference index (RTP_{ij}) thus shows the *relative bilateral trade intensity between* two regions, i and j (i.e., region i 's introversion towards region j), and is given by:

$$\text{-----[1]}$$

Where:

H_{ij} is the homogeneous bilateral trade intensity index (HI_{ij}) and HE_{ij} is the homogeneous intensity to the rest of the world excluding the partner country (i.e., the *extra-regional homogeneous trade intensity* between the regions) and is the complementary indicator for H_{ij} ⁵.

$RTP_{ij} = -1$ indicates no bilateral trade; $RTP_{ij} = 1$ indicates only bilateral trade (or no extra-regional trade); and $RTP_{ij} = 0$ indicates geographic neutrality (Hamanaka, 2015:2; Iapadre & Tajoli, 2013:8; Iapadre & Luchetti, 2010:5; Iapadre & Tironi, 2009:9). A higher index shows that region i 's (or country i 's) trade is relatively more oriented towards region j (or country j) than towards others. The bilateral RTP , unlike all the other trade intensity indices is perfectly symmetric, as $RTP_{ij} = RTP_{ji}$ independently of country (or region) size (Iapadre & Tajoli, 2013:8; Iapadre & Tironi, 2009:9; Iapadre, 2004:12).

Revealed trade barriers index

Revealed Trade Barrier (RTB) indices attempt to determine if the imports by country j of a particular commodity, k , from country i , are more or less valued compared to the country's overall imports of that commodity from all other sources. The index therefore serves as an indicator of the possibility of trade barriers against the importation of a commodity from a particular source. Thus, the index gives insight into the ease of market access for a product from a particular source. The RTB index is obtained by equation:

$$\text{----- [2]}$$

Where:

the portion of commodity k in country j 's imports from country i
 the portion of commodity k in world's total imports
 imports of commodity k by country j from country i
 country j 's total imports from country i
 world's total imports of commodity k
 world's total imports

Interpretation of results:

< 1, Country i exports relatively more of commodity k to the rest of the world as compared to Country j . This indicates there is possibly discrimination against commodity k coming from Country i into Country j .

= 1, Country j does not have discriminatory trade barriers against commodity k originating from County i .

> 1, Country j is importing a lot of commodity k from Country i than expected. Commodity k originating from country i is possibly being given preferential treatment by Country j (Mutambara and Ndzabukelwako, 2021:19; TIPS, 2019:6-7; Mutambara, 2017:99; Kalaba, *et al.*, 2005:77).

Trade complementarity index

Trade Complementarity Indices (TCI_{ij}) provide useful information on prospects for intra-regional (as well as inter-regional) trade by showing how well the structure of a country's exports match, or complement, the import requirements of another country. TCI_{ij} therefore, approximate the adequacy of country j 's export supply to country i 's import demand by calculating the extent to which country i 's total imports match country j 's total exports. The trade complementarity index is given by the equation below.

$$\text{----- [3]}$$

Where:

⁴ See Hamanaka (2015:2, 4-5); Iapadre & Tajoli (2013:S93, 8); Iapadre & Luchetti (2010:4-5); Iapadre & Tironi (2009:7-9); Iapadre (2006:68-71); Iapadre (2004:8-9, 11-12, 14).

⁵ $(HI_{ij}) = (S_{ij})/(V_{ij}) = (T_{ij}/T_i)/(T_{oj}/T_{ow})$ and $(HE_{ij}) = (1-S_{ij})/(1-V_{ij}) = [1 - (T_{ij}/T_i)]/[1 - (T_{oj}/T_{ow})]$

Where: $0 \leq (HI_{ij}) \leq \infty$

T = total trade (exports + imports); T_{ij} = exports of region i to region j + exports of region j to region i [i.e. trade between region i and region j]; T_i = total exports of region i to the world + total imports of region i from the world [i.e. trade between region i and the world]; T_{oj} = exports of world excluding region i (rest of the world) to region j + imports of world excluding region i (rest of the world) from region j [i.e. trade of region j with the rest of the world]; T_{ow} = total exports of world excluding region i + total imports of world excluding region i (Hamanaka, 2015:2; Iapadre & Tajoli, 2013:S93; Iapadre & Tironi, 2009:8).

$$0 \leq TC_{ij} \leq 100$$

Y_{ki} is the share of good k in all imports of country i .

X_{kj} is the share of good k in all exports of country j .

$TC_{ij} = 0$ if there is no overlap at all.

$TC_{ij} = 100$ if imports and exports match perfectly. The higher the index, the more complementary trade is between country i and country j (WITS, 2018; Vahalik, 2014:712; UNCTAD and WTO, 2012:30; Mikic and Gilbert, 2009:81).

By showing the extent to which one country's imports overlap with another country's exports, the TCI_{ij} can be used as one of the measurements to determine whether countries (regions) are natural trading partners, and therefore well suited for prospective bilateral or regional trade agreements with each other. The TCI_{ij} can be calculated from the perspective of each country (region) to a trade agreement because while country (region) i 's import structure may not match country (region) j 's export structure, country (region) j 's import structure may match country (region) i 's export structure, thus indicating trade complementarity from country (region) j 's perspective. Analysing TCI_{ij} for a period of years helps to determine (i) whether trading partners' trade profiles were becoming more compatible; and (ii) whether further development of trade relations would be economically beneficial for both trading partners.

In calculating the TCI_{ij} between trading partners, the exports and imports are relative to the world and not to each other. This results in the shortcomings of the index, in that while the index may show a strong match between the trade profiles of trading partners, the high complementarity indices may be misleading because (i) if the countries are geographically distant, and the distance becomes a trade barrier, thus negatively affecting trade between trading partners despite the high TCI_{ij} levels; (ii) if the size difference in the economies is large, a match in percentage terms does not imply a match in levels; (iii) it does not say whether the amount supplied by one country (region) satisfies the import demand of the other country (region), or alternatively whether the export amount is not too high to be absorbed by the importing trading partner; (iv) some exports are ring-fenced for projects being carried out by other countries in the partner country, and thus, high TCI_{ij} levels would not necessarily lead to an increase in trade between trading partners; (v) trade barriers negatively affect trade between countries because high trade barriers reduce the size of exports and thus reduce actual trade between trading partners despite high TCI_{ij} levels; and (vi) the level of aggregation of trade data affects the size of TCI_{ij} , because the higher the level of trade aggregation is, the higher TCI_{ij} will be, thus masking the fact that some of the specific products within the broad product category may not match the import demand of such specific goods by the other country.

III. Results And Analysis

The results for bilateral trade intensity indexes (RTP_{ij}), the revealed trade barrier indexes (RTB_{jik}), the trade complementarity indexes (TCI_{ij}), as well as the nature of products traded were obtained using trade data from the United Nations Conference on Trade and Development (UNCTAD) database available at <http://www.unctad.org>. These were used in examining China-Africa trade and how it has evolved over the years.

An overview of China's trade with Africa compared with other regions (2001 – 2020)

Table A-1 (Appendices) shows Africa's major trading partners (the USA, France, Italy, Germany, the United Kingdom, South Africa, Spain, China, India, the Netherlands, Japan, Belgium) as well as how China-Africa trade has evolved over the years. The USA was Africa's top trading partner in 2001-2008, followed by France and Italy, until 2007 and 2008, when China became Africa's 2nd major trading partner after the USA. From 2009 onwards, China overtook the USA to rank first as Africa's major trading partner. Thus, China caught up with, and overtook Africa's traditional trading partners and former colonial powers and is now regarded as Africa's top trading partner. Therefore, as the global economy recovered after the global financial crisis, China's trade with Africa also maintained a favourable recovery and development momentum. As Africa's top trading partner the Africa-China trade constituted 17.2% of Africa's total world trade in 2021.

However, while China is Africa's major trading partner, Table A-2 (Appendices) shows that Africa is not China's major regional trading partner. China-Africa trade as a share of China's total trade only rose from 2.11% in 2001 to 4.20% in 2021. China's major regional trading partner is Asia, followed by Europe and the USA, in that order, where their respective shares of China's total trade in 2021 were 50.6%, 15.8% and 12.5%, respectively. Therefore, Africa faces stiff competition from these other regions who are China's significant import sources.

Table A-3 (Appendices) shows bilateral trade intensity in China's trade with the five regional groups. The high RTP_{ij} indexes show that China's trade linkages are strongest with Asia, and its trade is most oriented towards Asia, a region in which it is located. However, the extent of its trade orientation towards Asia has been on a decline over the years, as shown by continuous fall in the index, from $RTP_{ij} = 0.55$ in 2001 to $RTP_{ij} = 0.22$ by 2022. China's trade intensity with Africa, and thus the strength of its trade linkages with Africa has been

rising, with China's trade becoming more and more oriented towards Africa. This is shown by the bilateral trade intensity rising from $RTP_{ij} = -0.01$ in 2001 to $RTP_{ij} = 0.30$ by 2022. This is despite the fact that the share of Africa-China trade in China's world trade is lowest among the five regions China trades with. Therefore, while China's trade was most oriented towards Asia with its trade linkages strongest with that region in the first decade of the period considered, its trade has since become more oriented towards Africa with its trade linkages with Africa becoming stronger and the importance of Africa as a trading partner to China continuing to grow. China's trade linkages with the USA have remained moderately low with bilateral trade intensity indices at $0.03 \leq RTP_{ij} \leq 0.16$ throughout the period. While the strength and orientation of China's trade to the Latin America and Caribbean region is still weak, this has been slowly improving as shown by the steady rise in the bilateral trade intensity indexes, rising from $RTP_{ij} = -0.4$ in 2001 to $RTP_{ij} = 0.17$ by 2022. China-Europe trade linkages are the weakest, as shown by $-0.5 \leq RTP_{ij} \leq -0.6$ throughout the period 2001 – 2022, even though, among the five regional groups, the share of China-Europe trade in China's world trade is second to Asia's where its trade with Europe constitutes 15.9% of China's total trade as shown in Table A-2 (Appendices). Mutambara (2016:63) also shows that among the regions considered (Australia, USA, Brazil, EU28, and Russian Federation), EU28 was a region which China traded least intensively with.

The trade complementarity indexes in Table A-4 (Appendices) were calculated from China's perspective to show or indicate trade complementarity from China's perspective. The results show how well the export supply of each region matches China's import demand. Asia's export supply matches China's import demand the most, with $79.7 \leq TCI_{ij} \leq 86.5$ over the period, followed by the USA export supply where $76.0 \leq TCI_{ij} \leq 83.8$. However, the results show that over the years, trade between China and Asia, the USA, and Europe, has become less complementary. This is shown by TCI_{ij} falling from 84.4 in 2001 to 79.7 in 2022 in China-Asia trade, TCI_{ij} falling from 78.3 in 2001 to 66.0 in 2022 in China-Europe trade, and TCI_{ij} falling from 83.8 in 2003 to 77.8 in 2022 in China-USA trade. Africa's export supply matches China's import demand the least, with $42.5 \leq TCI_{ij} \leq 66.6$ over the period. However, the results show that over the years, trade between China and Africa has become more complementary, as shown by TCI_{ij} rising continuously from 45.0 in 2001 to 66.6 in 2022. Trade between China and Latin America and the Caribbean region has also become more complementary over the years, as shown by TCI_{ij} rising from 66.5 in 2006 to 76.5 in 2022.

The nature of China's trade with Africa

The nature of China-Africa trade is examined by analysing (i) the type of major products traded, (ii) the major trading partners in African, (iii) bilateral trade intensity of China's trade with the African countries, (iv) ease of market access by products originating from Africa, and (v) the extent of trade complementarity with major African countries traded with. The results are presented in the sections below.

An overview of China's trade with Africa (2001 – 2022)

As already noted in Section 3.1, China-Africa bilateral trade intensity indexes show that the strength of trade linkages between the two regions has become stronger over the years with China's trade becoming more and more oriented towards Africa. Table 5 (Appendices) shows China's trade with Africa and that this trade has grown exponentially, rising from a mere US\$10.8billion in 2001 to US\$282billion in 2022, with significant increases occurring after 2009. China-Africa trade as a share of Africa's total trade has been steadily rising, from a mere 3.32% in 2001 to 16.8% in 2022. While China started off experiencing a trade surplus in its trade with Africa, from US\$1.17 billion in 2001 to US\$1.77 billion in 2003; from 2004 to 2014, it continuously experienced trade deficits, from US\$1.9 billion in 2004 to peak at US\$28 billion in 2012, after which it fell continuously to US\$9.8 billion in 2014. Thereafter, China has experienced significant trade surplus with Africa, which rose from US\$38.1 billion in 2015 to US\$46.7 billion in 2022. Therefore, as noted by Mutambara and Ndzabukelwako (2021:23), the claim by the People's Republic of China State Council (2010) that "for years, China has been promoting comprehensive and balanced trade with Africa", is misleading.

Table A-6 (Appendices) shows that most of China's exports to Africa are high value-added manufactured goods (i.e. SITC 5 to 8 less 667 and 68)⁶, with the value of such exports rising from 87.7% of China's exports to Africa in 2001 to 93.2% in 2022. Exports of Food, basic (i.e. SITC 0 + 22 + 4) rank second, with the export share of such products continuously falling from 6.41% of China's total exports to Africa in 2001 to a mere 1.98% in 2022. In his research, Resgissahui (2019) found that Sub Saharan countries' imports from China in the period 2007 – 2017 were Capital goods which constituted 42.5% of their total imports from China, followed by Consumer goods with an import share of 32.58%, and Intermediate goods constituting 22.82%. This may imply that China is most likely to have a comparative advantage in producing these types of goods.

⁶ This is made up of Chemical products (SITC 5), Machinery and transport equipment (SITC 7), and Other manufactured goods (SITC 6 + 8 less 667 and 68).

China's major imports from Africa are Fuels (i.e. SITC 3) with the value of such imports in China's total imports from Africa increasing from 56.2% in 2001 and reached a peak of 73.3% in 2006, after which they began to decline to their lowest level of 35.3% in 2022. China's 2nd major import from Africa is Other ores and metals (i.e. SITC 27 + 28) whose import share of China's imports from Africa rose from 11.1% in 2001 to 21.9% in 2022. Non-ferrous metals (i.e. SITC 68) rank 3rd with its import share in China's imports from Africa rising from a mere 2.77% in 2001 to 22.7% in 2022. In his research, Resgissahui (2019) notes that Sub Saharan countries' exports to China in the period 2007 – 2017 were Raw materials which constituted 87.85% of their total exports to China. In their research, Mutambara and Ndzabukelwako (2021:37) show that China's top 20 major imports from Africa are dominated by Mineral fuels, Non-fuel primary commodities, and Resource-intensive manufactured goods; with very few high value-added manufactured products, thus constituting 93.2% - 98.8% of China's total imports from Africa.

The dominance of Mineral fuels⁷, Non-ferrous metals, and Other ores and metals in China's imports from Africa is consistent with arguments that China's energy needs and energy security agenda is a priority. Therefore, as Mutambara (2016:57 cited in Mutambara and Ndzabukelwako, 2021:37) noted, Africa just like other resource-rich countries like Brazil, Australia, and the Russian Federation, constitute significant import sources for China with regards to Mineral fuels and essential minerals. This is consistent with Resgissahui's (2019) observations that Africa with a rich endowment of natural resources, such as minerals and oils, is the main reason China trades with Africa so that it can get access of these natural resources. Nizard (2017) also makes a similar observation that China's interest in the African Continent, whether through trade or investment, is mainly focused on the mining sector due to the Continent's richness in fuels and minerals resources.

China's major trading partners in Africa

Table A-7(a) (Appendices) shows that China's major trading partners in Africa are South Africa, Angola, Nigeria, Egypt, and Algeria, in that order. These five countries are some of Africa's countries which are well-endowed with large mineral and oil reserves. It is common that African countries that have large mineral and oil reserves gain favourable trade relations with China, as China's major imports from these countries are from the mining sector.

South Africa ranks 1st among China's trading partners in Africa while China became South Africa's number one trading partner after 2010. Alden and Wu (2014) note that South Africa granted China market economy status in 2004 as part of their strategic partnership, to "narrow the parameters to pursue certain kinds of trade disputes in terms of World Trade Organization criteria". South Africa became a member of BRICS⁸ in December 2010, and this has helped to enhance China's trade relations with South Africa. This is because multilateral schemes and arrangements generate, among other things, fair trade, and market access gains for participating countries, as these schemes increase chances of a member country to establish free trade or preferential trade with other member countries.

Angola ranks 2nd as China's major trading partner in Africa and it is the second largest oil producer in Africa. In January 2007, Angola formally joined the Organisation of Petroleum Exporting Countries (OPEC), thus, underlining its growing role in the global energy system. China's non-trade activities in Angola include aid, loans, and foreign direct investments, and these are mainly concentrated in oil and resource extraction areas (Mutambara and Ndzabukelwako, 2021:25). Nigeria ranks 3rd as China's major trading partner in Africa. Economic relations between China and Nigeria can be traced back to 1971, with the establishment of FOCAC strengthening current relations and growth in bilateral trade between the two countries, as noted by Ajayi (2020).

Egypt ranks 4th as China's major trading partner in Africa, despite it being the first Arab and African country to establish direct diplomatic relations with China in 1956. Bilateral cooperation between the two countries has grown and remained positive with different agreements and protocols especially in economic and commercial spheres. Dahshan (2021), Badri (2020), and Tiezzi (2015) note that 2014 marked an important turning point in China-Egypt relations with the signing of the Comprehensive Strategic Partnership (CSP), and since then, at least 25 bilateral agreements have been signed by the two countries. Furthermore, FOCAC has served to deepen strategic partnership between the two countries for sustainable development, as noted by Mutambara and Ndzabukelwako (2021:26).

Algeria ranks 5th as China's major trading partner in Africa, and it is North Africa's largest economy and an important gas- and oil-exporting country. Hamaizia (2020, cited in Mutambara and Ndzabukelwako,

⁷ This is a product category made up of Coal, coke, and briquettes; Petroleum, petroleum products and related materials; Gas, natural and manufactured; and Electric current (Electrical energy)

⁸ BRICS is a multilateral arrangement of five countries, i.e. Brazil, Russia, India, China and South Africa, and these countries constituted 42% of the world's population by 2017. China is the biggest of the five countries, constituting 67% of the five countries' GDP by 2016 (Statistics South Africa, 2018).

2021:23), notes that the China-Algeria trade and investment relations took off in earnest in the 2000s, and that from China's perspective, there are four key drivers to the relationship, *viz.* (i) Algeria's geostrategic location with proximity to Europe and access to the Sahel and the Sub-Saharan region through the Trans-Saharan Highway, thus making it an important hub for the Belt and Road Initiative; (ii) Algeria's political influence in the Mediterranean and in the African Union; (iii) Algeria as a key arena for government contracts and commercial opportunity for Chinese companies; and (iv) Algeria's latest mining plans for mining phosphates, gold, uranium, zinc and iron ore, provide new opportunities for China's perpetual pursuit of raw materials. Furthermore, Mutambara and Ndzabukelwako (2021:24) note that, Hamaizia (2020) and Calabrese (2021) observe that some of the initiatives which have helped to deepen and strengthen trade and economic relations between Algeria and China include the Forum on China-Africa Cooperation (FOCAC), China-Arab States Cooperation Forum (CASCF), as well as the Comprehensive Strategic Partnership which is the highest tier of diplomatic and economic relations which China affords to its most important partners. The 2018 Memorandum of Understanding on cooperation under the Belt and Road Initiative framework also serves to strengthen relations between the two countries.

The nature of China's trade with its major African trading partners

Table A-7a (Appendices) shows that these five countries (South Africa, Angola, Nigeria, Algeria and Egypt) contributed 50% - 63% of China's total trade with Africa in the period 2001-2021, with the highest contributions of 60%-63% in the period 2011-2014. China was among their top 5 major import sources from 2001 - 2021, and from 2009 onwards, China has ranked 1st or 2nd as their major import source. From 2009 onwards, China has ranked 1st as the export destination for South Africa and Angola.

Table A-7b (Appendices) shows that currently more than 10% of each of these countries' total trade is with China, and that for each country, this has been rising over the years. Angola leads with 51.9% of its total trade in 2021 accounted for by its trade with China. This is followed by South Africa and Nigeria, in that order. Most of China-Africa trade is with South Africa with such trade constituting 17%-21% of China-Africa trade in 2001-2022. This is followed by China-Angola trade which constituted 12%-20% of China-Africa trade for most years. Some of these countries experienced trade surpluses in their trade with China. For example, throughout the period, Angola had a trade surplus in its trade with China, with this trade surplus rising from US\$0.68billion in 2001 to US\$18.4billion in 2021. The trade surplus was at its highest in 2010-2014 where it ranged between US\$20billion and US\$29.5billion. South Africa experienced trade surplus in its trade with China from 2008 where it was US\$0.66billion and rose to US\$11.86billion in 2021. The trade surplus peaked in 2012-2014 where it was between US\$28.9billion and US\$32.6billion. South Sudan also experienced a trade surplus in its trade with China, although this has been falling over the years, from US\$0.47billion in 2012 to US\$0.16billion in 2021.

Table A-8 (Appendices) shows bilateral trade intensity in China's trade with its major trading partners in Africa, thus the strength of China's trade linkages with these countries. The results show that the intensity of China's trade with each country has improved over the years. The high RTP_{ij} indexes in the China-Angola trade show that China trades most intensively with Angola, with trade linkages between the two continuing to be very strong over the years, as shown by the bilateral trade intensity indexes $0.59 \leq RTP_{ij} \leq 0.78$ for most years. The China-South Africa trade linkages rank 2nd with $0.34 \leq RTP_{ij} \leq 0.60$ after 2010. The most improvement in trade linkages is in the China-Nigeria trade, where for 14 years (2001 - 2014) the trade linkages were very weak with negative bilateral trade intensity indexes of RTP_{ij} between -0.01 and -0.34, after which trade linkages between the two have gradually become stronger with the bilateral trade intensity index rising to $0.17 \leq RTP_{ij} \leq 0.42$ in the 2015 - 2022 period. The weakest trade linkages are with Algeria, with RTP_{ij} negative throughout the period.

Table A-9 (Appendices) shows that China's major imports from Africa's dominant oil producing countries (Angola, Algeria, South Sudan, and Nigeria) are Fuels (SITC 3). In the period 2001 - 2021, Fuels (SITC 3) constituted 100% of China's imports from South Sudan; 99.95% of its imports from Angola; 90% - 99% of its imports from Algeria; and 61% - 95% of its imports from Nigeria. From Egypt, 60% - 69% were Fuels (SITC 3) for most years, while from South Africa, 25% - 47% of China's imports were Other Ores and Metals (SITC 27 + 28), for most years. Due to the huge imports of Fuels from Angola and South Sudan, both countries each maintained a positive trade balance with China throughout the period 2001 - 2021, as already shown in Table A-7b (Appendices). Mutambara and Ndzabukelwako (2021:52-53) note that some of the mineral resources and oil exports [i.e. Fuels (SITC 3), Other Ores and Metals (SITC 27 + 28) and Non-ferrous metals (SITC 68)], from the resource-rich countries in Africa are ringfenced by China through the resources-for-infrastructure deals which China has with these countries. Thus, through the resources-for-infrastructure deals, African countries use or export minerals resources, hydrocarbons such as oil and other resources, directly to pay for the infrastructure built by Chinese firms.

Table A-10 (Appendices) shows that most of China's exports to its major trading partners in Africa are high value-added manufactured goods (i.e. SITC 5 to 8 less 667 and 68)⁹. For most years, these exports

constituted 90% - 96% of China's exports to each of these countries. Therefore, the nature of China's trade with its major trading partners in Africa simply mirrors that of its overall trade with the African Continent, i.e. China importing mainly mineral and oil resources while exporting high value-added manufactured goods.

Market access into China's market by products from the selected African countries

Table A-11 (Appendices) shows the revealed trade barrier indexes (RTB_{ijk}) for the different products imported by China from its major African trading partners, thus giving some insights into the ease with which these products can access the Chinese market. Preferential treatment is indicated by $RTB_{ijk} > 1$, and the results show that the products which China extends preferential treatment are mainly from the Mining sector i.e. (i) Fuels (SITC 3) from Algeria, Angola, Nigeria, and South Sudan in all years, and from Egypt after 2006 (Table 11f, Appendices); (ii) Other ores and metals (SITC 27 + 28) from Egypt, Nigeria and South Africa in all years (Table 11e, Appendices); and (iii) Non-ferrous metals (SITC 68) from South Africa in all years, Egypt for 6 years, and Nigeria for just 3 years, i.e., 2020 – 2022 (Table 11d, Appendices). Agricultural raw materials (SITC 2 less 22, 27 and 28) from Egypt and South Africa are given preferential treatment for most years, and from Nigeria in 2013 – 2018 only (Table 11c, Appendices). The size of the value of RTB_{ijk} for products from the Mining sector compared to that for Agricultural raw materials shows that China accords more preferential treatment to the former than the latter. These results are consistent with those in Mutambara and Ndzabukelwako (2021). Thus, apart from the "China-Africa Swap which replaces the resource-for-infrastructure deals with these Africa countries, the significant preferential treatment, as shown by the high RTB_{ijk} contribute to explaining why these are the products that dominant China's imports from its major trading partners in Africa, as shown earlier in Section 3.2.3.

Low value-added manufactured products i.e., Food, basic (SITC 0 + 22 + 4), Beverages and tobacco (SITC 1), as well as medium and high value-added manufactured goods (SITC 5 to 8 less 667 and 68) do not easily access the Chinese market, and thus are mainly discriminated against, as shown by $RTB_{ijk} < 1$ throughout the period for these products from all the five countries. Discrimination against Food, basic (SITC 0 + 22 + 4) originating from Egypt and South Africa has been falling slightly in recent years as seen by a slight rise in RTB_{ijk} although $RTB_{ijk} < 1$ throughout the years (Table 11a, Appendices). Discrimination against Beverages and tobacco (SITC 1) originating from South Africa has been falling slightly in recent years as seen by a slight rise in RTB_{ijk} although $RTB_{ijk} < 1$ throughout the years (Table 11b, Appendices). For Manufactured goods (SITC 5 to 8 less 667 and 68), there has not been any sign of a reduction in discrimination, in fact, these products originating from Egypt and South Africa experienced lesser levels of discrimination in earlier years (2001-2009) than in current years, as seen by the fall in their respective RTB_{ijk} after 2008 and 2009, respectively (Table 11g, Appendices).

Trade complementarity with the selected African countries

The trade complementarity indexes in Table A-12 (Appendices) were calculated from China's perspective to show or indicate trade complementarity from China's perspective. The results therefore show how well the export supply of Africa in general, and China's trading partners in Africa match China's import demand. The results show that Africa's export supply matches China's import demand in a moderate manner with $42.5 \leq TCI_{ij} \leq 66.6$ over the period. However, the results show that over the years, trade between China and Africa has become more complementary, as shown by TCI_{ij} rising continuously from 45.0 in 2001 to 66.6 in 2022.

Regarding China's trading partners, the results show that over the years, China's trade with each country has become more complementary, as shown by the rise in trade complementarity indexes in China's trade with each country throughout the period 2001 – 2022. Egypt's export supply matches China's import demand the most, with $39.1 \leq TCI_{ij} \leq 64.5$ over the period, followed by South Africa's export supply where $33.1 \leq TCI_{ij} \leq 45.7$, and then Algeria's export supply where $20.4 \leq TCI_{ij} \leq 44.9$. Angola's export supply matches China's import demand the least, where $16.9 \leq TCI_{ij} \leq 30.7$, followed by Nigeria's export supply where $15.8 \leq TCI_{ij} \leq 36.2$. However, the most improved trade complementarity is with Nigeria where $TCI_{ij} = 17.7$ in 2001, and steadily rose to $TCI_{ij} = 36.2$ in 2022.

With trade becoming more complementary with Africa in general and with each country; opportunities for China-Africa trade to increase will emerge as the export supply of Africa begins to match China's import demand more. The geographical nearness of Africa to China, together with bilateral trade agreements with African countries, the duty-free quota-free programme, and other trade facilitation measures which China has put in place, would also help to promote more trade between China and Africa.

⁹ This is made up of Chemical products (SITC 5), Machinery and transport equipment (SITC 7), and Other manufactured goods (SITC 6 + 8 less 667 and 68).

Implications of China-Africa trade for Africa's development

The trends in exports and imports indicate that the China-Africa trade is primarily an exchange of resource (i.e., fuels, minerals, and primary goods) by Africa for manufacturing products from China. As per the Heckscher-Ohlin theorem, different relative factor endowments between trading partners have implications for the nature of trade between them. The country with abundant capital will be able to produce relatively more of the capital-intensive good, while the country with abundant labour will be able to produce relatively more of the labour-intensive good. Therefore, a country will export the commodity that uses relatively more intensively its relatively abundant factor of production, and it will import the good that uses relatively intensively its relatively scarce factor of production (Appleyard and Field, 2017:133, 137; Eisenman, 2012:797, 798; Baskaran et al, 2011, Subasat, 2003:150). China-Africa trade is in line with the Heckscher-Ohlin theorem where African countries as resource abundant countries¹⁰, tend to be able to produce relatively more of the resource-intensive goods, and thus mainly export those commodities that use relatively more intensively their relatively abundant factors of production, which are resources; and import high value-added manufactured goods (SITC 5 to 8 less 667 and 68), that use relatively more intensively their relatively scarce factors of production, which is capital and high-skilled labour.

The nature of China-Africa trade show that Africa continues to serve mainly as a supplier and source for raw materials, minerals, oil and low value-added inputs to China and a recipient of high value-added manufactured goods from China. Given that China is a big and significant market for Africa since it is Africa's top trading partner, the nature of China's major imports from Africa (see Section 3.2.3) and the types of products which China tends to give preferential treatment to enter its markets (see Section 3.2.4); tend to confine Africa to its areas of comparative advantages in low value-added products. Thus, African countries have remained primarily extractive in nature and heavily reliant on natural resources, raw materials, and primary goods. Comparative advantage is endogenously determined by past technological change, and therefore, specialisation according to current comparative advantage may be welfare reducing for African countries. Being confined to these areas of comparative advantages does not champion Africa's goals in developing its economies further through developing a more robust manufacturing sector, as these raw materials and primary goods would continue to be exported and then imported back as high cost finished products.

As Africa's major trading partner, the annual trade deficit Africa experiences in trading with China has risen very significantly in the period 2015 – 2022, rising from US\$38.1 billion in 2015 to US\$46.7 billion in 2022. With Africa's trade with China alone at 15% - 17% of Africa's overall trade since 2015 (Table A-5, Appendices), this trade deficit with China alone is a significant component of Africa's overall annual trade deficit. Trade deficits result in capital outflows to finance these deficits, and this is money most African countries do not have due to their lower levels of industrial development. Thus, they often resort to using foreign capital inflows and loans to finance these deficits, thus further pushing them into debt.

The steady growth in Africa's trade deficits with China over the years, has implications for job losses in those sectors which are the major sources for the trade deficits, and thus fuelling unemployment rates. While some of the workers who are no longer employed in some of those sectors may eventually find jobs elsewhere in the long run, this is often usually in industries where wages are much lower, and this has implications for increasing levels of income inequality. Unemployment levels and income inequalities are challenges which African countries are already grappling with and these potential effects of trade deficits with China only serve to exacerbate these problems.

Increased imports from China which have thus led to the huge trade deficits currently experienced by African countries in their trade with China, can have a crowding out effect on local African producers who fail to compete with Chinese imports. This applies particularly to labour-intensive manufactured goods like textiles, footwear, bedding, other household items, and even furniture, where African producers have had a considerable local market share but find themselves being crowded out by cheaper Chinese imports. Such import penetration negatively affects the local manufacturing sector and may constrain and limit African countries ability to diversifying their own industry.

While trade restrictions may be used to reduce trade deficits, this may, as argued by Appleyard and Field (2008:320), lead to (i) constraining entry of essential inputs needed by local producer which may result in raising production costs; (ii) reducing exports of African countries if the imports now excluded were inputs in the production of Africa's exports; (iii) inflationary pressures in African countries as reducing imports turns demand inward to home-country products, and this new demand could, in some cases, generate upward price pressures; and (iv) when inflationary tendencies occur, home-country firms become less competitive in the world market as well as in the domestic market against goods of other countries. Therefore, it is important for

¹⁰ Abundant in mineral resources, oil reserves, agricultural land, forestry, fisheries, and labour, especially unskilled, low skilled and medium skilled labour.

African countries to diversify and strengthen their industrial base so that they can reduce the trade deficits they currently experience in trading with China.

As noted in Section 3.2.3, China's major imports from Africa are mineral resources and oil [i.e., Fuels (SITC 3) and Ores and Metals (SITC 27 + 28 + 68)], and mainly from the resource-rich countries in Africa. Some of these exports are ringfenced through the resources-for-infrastructure deals¹¹, where the resource-rich countries in Africa use minerals, hydrocarbons, and other resources directly to pay for the infrastructure built by Chinese firms¹². Olander (2020a; 2020b) notes that "The China-Africa Swap" which replaces the resource-for-infrastructure deals, will provide loans in advance for African countries' development projects at a completely fixed price for the settled supply of resources. Therefore, it can be argued that this would be beneficial to African governments as they can invest in public works now and pay later with future exports, thus allowing African leaders to leverage their resource wealth as collateral to access credit at a manageable interest rate as well as a viable reimbursement option. Thus, while for China, the swap formula allows them access to vital resources, for African countries, this enables access to ways to transform their natural resources advantage into development advantage by using the loans to build the much-needed large-scale transport and communication infrastructure, productive infrastructure, and other projects.

While the Africa Continent is well endowed with significant mineral reserves that are essential for batteries, solar panels and other green technologies that underpin the energy transition from fossil fuels to renewables, its mining industry remains largely structured around channelling mineral ores elsewhere for processing. However, the current increasing uptake of clean energy technologies globally, and the expected growth and increase in demand this has for critical minerals such as cobalt, lithium, graphite, and manganese, would make critical mineral supply chains strategic for many mineral-rich African countries. Therefore, instead of continuing to export mineral resources elsewhere for processing and continue to accept and maintain its position as a source of unprocessed minerals for other major markets, Africa should seek more favourable and win-win partnerships for more processing and promoting mineral value addition on the Continent, and thus develop dynamic comparative advantages. African countries could leverage their mineral resources to develop dynamic comparative advantages through successfully exploiting their critical mineral resource endowments by adopting some of the strategies raised by Joseph (2023) and African Development Bank Group (2022), namely, (i) fostering regional cooperation to strengthen the developmental impacts of the mining sector on the Continent; (ii) developing and implementing targeted industrial policies that focus on investment for developing domestic processing capacity and at the same time supporting socially and environmentally responsible mining given the new social and environmental challenges that would emerge with a substantial increase in demand for these mineral resources; (iii) focussing on realising economies of scale by developing and promoting cluster production through special economic zones and industrial parks, thus having regional value chains that foster regional collaboration and support economic diversification; (iv) creating and maximising influential mining sectoral linkages¹³, thus encouraging diversification out of mining for beneficial spill-overs into the rest of the economy at national, regional and continental levels; and (v) entering into investment partnerships as well as implementing policy adjustments to reposition the African continent within global supply chains, not just as a cheap resource import source, but in ways that demonstrate Africa's ability to play a leading and significant role in the global energy transition.

Escalated tariff structures¹⁴ have correspondingly heavier protection for domestic manufactured goods industries than for intermediate goods and raw materials industries, and this has relevance for trade between developed and developing countries. Since developed countries have escalated tariff structures, developing countries consider this as discrimination against their attempts to develop stronger manufacturing bases and thus are consigned to exporting products at an early stage of fabrication when they too would like to export high value-added manufactured goods (Appleyard and Field, 2008:268). Section 3.2.4 shows that unlike the Mining sector products [i.e. Fuels (SITC 3), Other ores and metals (SITC 27 + 28), and Non-ferrous metals (SITC 68)], manufactured products do not easily access the Chinese market, and thus are mainly discriminated against, as

¹¹ This is also known as the "Angola Model". In mid-2000s, the Chinese identified Angola as a potentially major supplier of oil. Since Angola needed to rebuild its infrastructure after decades of civil war which ended in 2002, China offered to rebuild Angola's infrastructure, set a price for all the infrastructure to be provide and then Angola would pay with oil rather than cash (Olander, 2020a).

¹² Some of the examples are soft loans to Angola repaid in oil at fixed prices (Busse, *et al.*, 2014:8); the Congo River dam in the Republic of Congo being financed by the China Exim Bank loans backed by guarantees of crude oil, Bui Dam in Ghana also being financed by China Exim Bank backed by guarantees of cocoa, and the loan for Souapiti Dam in Guinea which is linked to mining revenue from Bauxite (IDE-JETRO, 2009:70).

¹³ These include knowledge linkages, fiscal linkages, consumption induced linkages, infrastructure linkages, forward/downstream linkages, backward/upstream linkages, lateral linkages.

¹⁴ Nominal tariff rates on imports of manufactured goods are higher than nominal tariff rates on intermediate inputs and raw materials

shown by $RTB_{ijk} < 1$ throughout the years, with no sign of a reduction in discrimination against high value-added Manufactured goods. This reflects an escalated tariff structure by China which is detrimental to Africa and its attempts to use trade with China to help develop its domestic manufacturing base. China is a significant market for Africa, with China and Africa's trade becoming more oriented towards each other over the years as shown in Sections 3.2. Therefore, a more beneficial China-Africa trade relationship would be one that provides Africa with an incentive and space to continue to modernise and improve the technological complexity of its manufactured products so that the Continent does not continue to remain largely as an import source for raw materials, resource inputs, and low value-added manufactured goods for China. Mutambara and Ndzabukelwako (2022:56) note that while both China and the USA are important markets for Africa, it is the USA and not China which provides Africa with more room and easier market access for the Continent's high manufactured value-added products, which is also noted by Mutambara (2013:291, 293) who says that Europe and the USA are significant markets for Africa's total export earnings from manufactured products, and give Africa much easier market access for its high manufactured value-added products.

IV. Conclusion

With strengthening trade linkages in Africa-China trade and the trade becoming more complementary (with Africa in general and with each country), opportunities for China-Africa trade to increase will emerge as trade between the two become more oriented towards each other and the export supply of Africa begins to match China's import demand more. The geographical nearness of Africa to China, bilateral trade agreements with African countries, the duty-free quota-free programme, and other trade facilitation measures which China has put in place, would also help to promote more trade between China and Africa.

By China giving more preferential access to mineral resources and fuels while discriminating against manufactured goods, the China-Africa trade would continue to consign Africa to the role of a supplier of resources to China. To break from this role, African countries should leverage their endowment in mineral reserves and develop dynamic comparative advantages. They should participate in the global energy transition, where critical mineral resources such as cobalt, lithium, graphite, and manganese which they have in abundance; make critical mineral supply chains strategic for the mineral-rich African countries.

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APPENDICES

Table A-1: Percentage (%) share of Africa’s total trade with its major trading partners (2001-2021)

Africa’s trade with	Years																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
USA	12.3	11.2	12.1	13.3	14.6	14.9	14.0	11.8	10.4	11.4	11.1	7.96	6.79	5.79	5.40	5.71	5.65	5.32	5.29	4.84	5.07
France	10.2	10.4	10.1	9.02	8.12	7.67	7.15	6.88	7.30	6.49	6.25	5.74	5.74	5.70	5.75	5.74	5.30	5.27	5.21	4.86	4.43
Italy	8.42	8.11	7.97	7.39	7.4	7.39	7.22	7.40	6.15	6.39	5.09	5.99	5.42	4.70	4.57	4.36	4.47	4.37	4.24	3.70	4.21
Germany	6.19	5.97	5.75	5.54	5.46	5.13	4.76	4.53	4.56	4.16	4.01	3.88	3.93	3.95	4.23	4.42	4.48	4.09	4.28	4.12	3.87
UK	6.30	5.89	5.62	5.06	4.49	4.21	3.75	3.53	3.40	3.26	3.46	3.73	3.64	3.08	2.79	2.89	2.64	2.67	2.44	2.21	2.27
S. Africa	3.91	3.91	4.17	4.16	3.63	3.46	3.61	3.23	4.18	3.90	3.93	4.04	3.88	4.02	4.28	4.16	3.94	4.47	3.72	3.68	3.53
Spain	4.77	4.88	5.09	4.75	4.79	4.77	4.47	4.63	4.15	3.87	3.79	4.10	4.33	4.45	4.30	4.34	4.56	4.27	4.48	4.05	4.22
China	3.32	3.67	4.67	5.95	6.85	7.55	8.54	10.8	10.7	11.2	11.6	12.9	13.9	14.7	15.1	14.9	15.5	16.3	16.9	16.9	17.2
India	1.95	2.24	2.00	2.04	2.25	2.99	3.65	4.54	4.10	4.83	5.32	5.31	5.40	5.94	5.71	5.38	5.73	5.98	6.10	5.25	5.95
Netherlands	2.85	2.98	3.04	2.63	2.82	2.73	3.1	3.18	3.14	3.17	3.17	3.3	3.26	3.43	3.05	2.72	2.75	2.97	3.03	2.90	2.89
Japan	2.78	3.2	3.12	3.20	2.92	2.93	2.9	2.88	2.18	2.27	2.22	2.46	2.19	2.16	2.05	1.76	1.67	1.50	1.52	1.71	1.75
Belgium	2.54	2.64	2.33	2.10	2.17	2.13	2.03	1.88	1.85	1.73	1.76	1.71	1.85	2.04	2.00	2.26	2.04	2.07	1.95	2.08	2.16

Source: Own tables constructed using statistical data from the UNCTAD trade database available at <http://www.unctad.org>

Table A-2: Percentage (%) share of China’s total trade with its top regional trading partners (2001-2020)

China’s trade with	Years																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Asia	56.8	58.5	58.2	57.6	56.8	55.7	54.7	53.3	53.1	52.6	52.3	52.9	53.5	52.9	53.0	52.9	51.8	51.5	51.8	51.4	50.6
USA	15.8	15.7	14.9	14.7	14.9	14.9	13.9	13.0	13.5	13.0	12.3	12.6	12.6	13.0	14.1	14.1	14.2	13.8	11.9	12.6	12.5
Europe	18.9	17.8	18.6	18.3	18.4	18.8	19.7	20.0	19.4	19.3	19.2	17.6	17.5	18.0	17.6	15.6	15.9	16.4	16.4	15.9	15.8
Africa	2.11	1.99	2.17	2.54	2.79	3.14	3.39	4.18	4.12	4.27	4.56	5.13	5.05	5.15	4.52	4.03	4.15	4.41	4.56	4.03	4.20
Latin America & Caribbean	2.91	2.85	3.12	3.44	3.52	3.96	4.7	5.57	5.47	6.13	6.58	6.71	6.24	6.07	5.92	5.85	6.27	6.61	6.9	6.83	7.42
All other regions	3.48	3.16	3.01	3.42	3.59	3.5	3.61	3.95	4.41	4.7	5.06	5.06	5.11	4.88	4.86	7.52	7.68	7.28	8.44	9.24	9.22

Source: Own tables constructed using statistical data from the UNCTAD trade database available at <http://www.unctad.org>

Table 3: China's trade intensity (RTP_{ij}) with its top regional trading partners

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Africa																					
-0.01	-0.02	-0.01	0.04	0.04	0.09	0.10	0.16	0.16	0.16	0.20	0.25	0.26	0.29	0.27	0.25	0.26	0.28	0.29	0.29	0.29	0.30
Asia																					
0.55	0.57	0.56	0.53	0.50	0.48	0.46	0.42	0.39	0.33	0.31	0.30	0.31	0.30	0.30	0.30	0.27	0.26	0.27	0.25	0.22	0.22
Europe																					
-0.5	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6	-0.5	-0.5	-0.6	-0.6	-0.6
Latin America and the Caribbean																					
-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.0	-0.0	0.03	0.05	0.06	0.02	0.02	0.01	0.02	0.06	0.10	0.13	0.16	0.19	0.17
United States of America																					
0.03	0.05	0.07	0.10	0.11	0.13	0.13	0.13	0.16	0.12	0.11	0.11	0.12	0.12	0.13	0.13	0.16	0.15	0.04	0.10	0.12	0.07

Source: Own tables constructed using statistical data from at <http://www.unctad.org>

Table 4: China trade complementarity with its top regional trading partners from China's perspective (2001-2022)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
China-Africa																					
45.0	43.0	42.5	44.1	43.9	44.0	44.6	47.1	47.9	50.8	53.8	54.3	57.2	59.2	59.2	60.2	60.7	60.6	62.2	60.8	63.5	66.6
China-Asia																					
84.4	83.3	85.1	84.8	83.4	82.0	83.1	83.7	83.2	84.7	86.5	84.8	84.2	84.0	82.0	82.0	83.0	83.5	81.5	78.5	79.2	79.7
China-Europe																					
78.3	76.9	77.3	77.2	76.5	75.9	72.8	73.0	71.6	74.1	74.7	74.1	72.7	72.4	72.5	70.6	70.4	68.8	66.7	64.8	64.2	66.0
China-Latin America and the Caribbean																					
71.7	69.0	67.1	67.8	66.9	66.5	67.3	71.0	69.7	72.0	74.1	76.1	75.9	76.1	74.6	73.7	75.0	75.6	75.4	72.9	74.8	76.5
China-United States of America																					
79.3	79.6	83.8	81.5	80.5	80.9	80.2	76.4	76.3	78.4	79.5	76.8	76.7	77.2	77.0	77.3	76.9	77.2	76.0	76.1	76.4	77.8

Source: Own tables constructed using statistical data from at <http://www.unctad.org>

Table A-5: China's trade with Africa (2001 – 2022)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
China-Africa total trade (US\$ billion)																					
10.8	12.4	18.5	29.4	39.67	55.4	73.7	107	91.0	127	166	198	210	221	179	149	170	204	209	188	254	282
China-Africa trade as a percentage (%) share of Africa's total world trade																					
3.32	3.67	4.67	5.95	6.85	7.55	8.54	10.8	10.7	11.2	11.6	12.9	13.9	14.7	15.1	14.9	15.5	16.3	16.9	16.9	17.2	16.8
China's trade balance with Africa (US\$ billion) [China exports – China's imports]																					
1.17	1.49	1.77	-1.9	-2.5	-2.2	1.0	-4.9	4.31	-7.3	-20	-28	-25	-9.8	38.1	35.3	18.6	5.4	17.19	40.3	42.3	46.7

Source: Own tables constructed using statistical data from at <http://www.unctad.org>

Table A-6: Nature of products in China's trade with Africa (2001-2022)

China's exports	Percentage share of China's total exports to Africa																					
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SITC 0+22+ 4	6.41	5.81	5.7	3.29	3.01	2.94	2.73	2.7	2.96	2.69	3.06	2.67	2.74	2.45	2.31	2.69	2.97	2.96	2.94	2.72	2.29	1.98
SITC 1	0.46	0.39	0.42	0.42	0.23	0.13	0.08	0.09	0.14	0.1	0.1	0.09	0.11	0.08	0.07	0.05	0.11	0.08	0.08	0.03	0.03	0.04
SITC 2 less 22, 27 & 28	0.23	0.28	0.33	0.61	0.35	0.24	0.29	0.28	0.24	0.24	0.27	0.22	0.24	0.3	0.36	0.37	0.45	0.42	0.44	0.42	0.61	0.52
SITC 68	0.45	0.4	0.46	0.67	0.7	1.05	1.3	1.28	1.06	1.27	1.47	1.3	1.34	1.21	1.17	1.19	1.28	1.37	1.26	1.25	1.34	1.32
SITC 27 + 28	0.29	0.28	0.21	0.22	0.12	0.08	0.05	0.08	0.09	0.11	0.09	0.07	0.05	0.05	0.05	0.04	0.06	0.09	0.05	0.05	0.05	0.08
SITC 3)	1.89	1	1.08	0.73	0.65	0.5	0.46	0.97	0.64	0.86	1.1	0.86	0.84	0.9	0.57	0.77	0.94	1.33	1.38	1.35	1.58	2.79
SITC 5 to 8 less 667 & 68	87.7	89.3	90.7	92.5	93.1	93.5	94.3	94.6	94.8	94.7	93.9	94.8	94.7	95	95.4	94.8	94.2	93.7	93.7	94.1	94.0	93.2
China imports	Percentage share of China's total imports from Africa																					
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SITC 0+22+ 4	1.09	1.06	0.97	0.73	1.08	1.03	0.67	0.58	1.11	0.99	0.86	0.71	0.99	1.42	2.39	2.85	2.26	2.2	2.82	4.11	3.54	3.15
SITC 1	2.26	2.8	1.92	0.75	0.62	0.39	0.37	0.28	0.35	0.26	0.38	0.41	0.54	0.66	1.08	1.25	0.93	0.65	0.7	0.97	0.58	0.69
SITC 2 less 22, 27 & 28	9.53	10.0	10.4	7.77	6.14	5.41	4.27	2.70	3.37	3.13	2.80	2.86	2.6	3.17	4.22	4.72	4.11	3.42	3.14	3.29	2.62	2.38

SITC 68	2.77	3.47	3.82	4.04	4.4	3.78	3.98	4.30	8.02	9.46	7.33	6.5	6.62	6.17	9.39	10.5	10.0	11.4	9.86	19.1	21.2	22.7
SITC 27 + 28	11.1	9.24	7.21	9.83	8.18	7.98	10.2	13.5	14.7	14.1	14.2	10.6	12.4	11.4	12.2	14.7	17.5	15.4	17.6	22.7	20.5	21.9
SITC 3	56.2	55.7	59.1	64.8	69.4	73.3	71.8	70.7	64.4	61.9	52.7	49.7	46.0	46.2	39.2	39.1	45.9	50.0	50.9	39.4	38.6	35.3
SITC 5 to 8 less 667 & 68	7.87	8.37	9.79	6.42	5.41	3.95	4.98	3.66	4.72	3.88	3.00	2.22	2.43	2.75	4.57	5.05	4.38	3.48	3.71	4.45	3.66	3.27

Source: Own tables constructed using statistical data from at <http://www.unctad.org>

Notes: Food, basic (SITC 0 + 22 + 4) Beverages and tobacco (SITC 1) Agricultural raw materials (SITC 2 less 22, 27 and 28)
 Non-ferrous metals (SITC 68) Other ores and metals (SITC 27 + 28) Fuels (SITC 3) Manufactured goods (SITC 5 to 8 less 667 and 68).

Table A-7(a): China's major trading partners in Africa

Top five major trading partners in Africa																					
African countries	Period of years																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	1 st	1 st	1 st	1 st	1 st	2 nd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st
Angola	4 th	3 rd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd
Nigeria	2 nd	2 nd	3 rd	3 rd	3 rd	4 th	4 th	3 rd	3 rd	3 rd	3 rd	3 rd	3 rd	3 rd	3 rd	4 th	3 rd	3 rd	3 rd	3 rd	3 rd
Egypt	3 rd	4 th	4 th	4 th	4 th	3 rd	3 rd	4 th	4 th	4 th	4 th	4 th	4 th	4 th	4 th	3 rd	4 th	4 th	4 th	4 th	4 th
Algeria	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th	5 th
Percentage (%) share of China's total trade with Africa																					
The five countries	50.0	50.8	53.6	53.9	52.9	54.4	55.8	57.3	55.5	55.5	59.7	63.2	63.4	61.3	57.1	54.0	55.1	53.8	52.2	49.5	51.4
Import source for:	China's ranking as a major import source																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	5 th	4 th	4 th	3 rd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st
Angola	--	--	--	4 th	4 th	3 rd	3 rd	--	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st
Nigeria	4 th	4 th	4 th	--	--	2 nd	1 st	1 st	1 st	2 nd	2 nd	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st
Egypt	4 th	3 rd	3 rd	3 rd	3 rd	3 rd	4 th	2 nd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st
Algeria	n/a	n/a	6 th	5 th	3 rd	3 rd	3 rd	3 rd	2 nd	2 nd	2 nd	2 nd	1 st	1 st	1 st	1 st	1 st	--	--	--	--
Export destination for:	China's ranking as a major export destination																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	6 th	6 th	6 th	6 th	6 th	6 th	5 th	5 th	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st
Angola	--	--	--	n/a	n/a	2 nd	1 st	--	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st	1 st

Nigeria	n/a	n/a	9 th	--	--	n/a	6 th	9 th	8 th	8 th	8 th	5 th	10 th	9 th	9 th	9 th	9 th	7 th	10 th	9 th	7 th	
Egypt	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Algeria	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	--	--	n/a	n/a

Source: Own tables constructed using statistical data from at <http://www.trademap.org>

Notes: --- = Statistical data is not available.

n/a = China was not among the top 10 export destinations.

Table A-7 (b): China’s major trading partners in Africa

	China’s trade share (%) in the world trade of its major trading partners in Africa																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	4.31	5.23	5.86	6.73	7.12	8.14	9.77	11.1	13.7	15.5	21.6	29.5	32.9	31.3	27.8	23.2	22.9	23.4	23.9	23.4	25.2
Angola	8.03	10.2	16.0	26.1	21.8	30.0	24.4	29.7	26.4	35.1	31.8	39.8	38	42.4	35.5	36.9	45.6	48.3	52.9	54.3	51.9
Nigeria	3.86	4.47	5.32	4.13	4.25	3.65	4.38	5.52	7.03	5.94	5.94	6.38	9.27	11.2	16.0	15.6	18.2	14.5	16.4	27.3	25.9
Egypt	5.42	5.22	5.35	6.15	6.07	7.25	8.36	7.89	8.41	8.77	9.38	9.61	10.7	11.8	15.1	14.0	11.6	13.6	12.2	16.7	17.4
Algeria	1.00	1.41	1.95	2.46	2.66	2.75	4.45	3.87	6.07	5.28	5.33	6.32	6.77	7.32	9.64	10.4	8.90	10.3	10.1	11.5	9.77
	Country’s trade share (%) in China-Africa trade																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	20.7	20.9	20.9	20.1	18.3	17.8	19.1	16.7	17.7	20.3	27.4	30.2	31.1	27.2	25.8	23.6	23.0	21.4	20.4	19.2	21.3
Angola	7.14	9.30	12.7	16.7	17.5	21.4	19.2	23.7	18.8	19.6	16.7	19.0	17.1	16.7	11.0	10.5	13.5	14.0	12.4	8.79	9.22
Nigeria	10.6	9.46	10.0	7.43	7.13	5.65	5.88	6.80	7.00	6.12	6.49	5.33	6.47	8.15	8.37	7.14	8.08	7.48	9.23	10.3	10.1
Egypt	8.87	7.65	5.89	5.37	5.41	5.77	6.38	5.89	6.44	5.48	5.30	4.81	4.86	5.25	7.21	7.39	6.35	6.78	6.32	7.75	7.87
Algeria	2.72	3.51	4.03	4.22	4.46	3.78	5.29	4.30	5.64	4.08	3.87	3.90	3.90	3.93	4.68	5.37	4.24	4.46	3.87	3.51	2.93
	African countries’ trade balances with China [Country exports to China – Country imports from China] (US\$ billion)																				
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
S. Africa	0.12	-0.1	-0.2	0.01	-0.4	-1.7	-0.8	0.6	1.3	4.1	18.7	29.3	32.6	28.9	14.3	9.38	9.58	11.1	9.05	5.59	11.86
Angola	0.68	1.03	2.06	4.52	6.21	10	11.7	19.4	12.3	20.8	22.1	29.5	28.0	25.1	12.3	12.3	18.4	23.6	21.8	13.0	18.4
Nigeria	-0.7	-0.3	-1.7	-1.3	-1.78	-2.6	-3.3	-6.3	-4.6	-5.6	-7.6	-8.0	-11	-13	-13	-8.8	-11	-12	-14.0	-14.0	-19.6

Egypt	-0.8	-0.8	-0.8	-1.2	-1.72	-2.8	-4.2	-5.5	-4.4	-5.1	-5.8	-6.9	-6.5	-9.3	-11	-9.9	-8.2	-10	-11.2	-13.0	-16.6
Algeria	-0.2	-0.3	-0.6	-0.7	-1.0	-1.8	-1.6	-2.9	-3.2	-2.8	-2.5	-3.1	-3.8	-6.1	-6.8	-7.3	-6.3	-6.8	-5.8	-4.60	-5.27
S. Sudan*	--	--	--	--	--	--	--	--	--	--	--	0.47	2.39	4.26	2.17	1.41	1.22	1.53	1.41	0.53	0.16

Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: --- = Statistical data is not available.

* = not among the top ten countries.

Table 8: China's trade intensity with its major trading partners in Africa

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Algeria																					
-0.62	-0.56	-0.50	-0.45	-0.45	-0.47	-0.28	-0.36	-0.19	-0.32	-0.33	-0.27	-0.26	-0.24	-0.12	-0.06	-0.15	-0.08	-0.10	-0.08	-0.18	-0.85
Angola																					
0.34	0.39	0.53	0.69	0.59	0.70	0.59	0.67	0.58	0.67	0.62	0.70	0.66	0.70	0.60	0.64	0.73	0.75	0.78	0.77	0.75	0.68
Egypt																					
0.15	0.05	-0.02	-0.00	-0.05	0.01	0.04	0.00	-0.02	-0.06	-0.03	-0.05	-0.02	0.02	0.13	0.11	0.00	0.08	0.01	0.14	0.15	0.07
Nigeria																					
-0.03	-0.03	-0.03	-0.21	-0.24	-0.34	-0.29	-0.19	-0.12	-0.27	-0.28	-0.27	-0.10	-0.01	0.17	0.17	0.26	0.12	0.18	0.42	0.38	0.25
South Africa																					
0.03	0.05	0.03	0.04	0.03	0.07	0.13	0.19	0.25	0.26	0.43	0.57	0.60	0.56	0.49	0.40	0.39	0.39	0.40	0.34	0.37	0.38
South Sudan																					

--	--	--	--	--	--	--	--	--	--	--	--	-1	-1	-1	-1	0.95	0.88	0.92	0.88	0.71	0.32
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Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: --- = Statistical data is not available.

$RTP_{ij} = -0.00$, the actual value is $RTP_{ij} = -0.003$

$RTP_{ij} = 0.00$, the actual values are $0.00074 \leq RTP_{ij} \leq 0.0027$

$RTP_{ij} = -1$ indicates no bilateral trade

$RTP_{ij} = 1$ indicates only bilateral trade (or no extra-regional trade)

$RTP_{ij} = 0$ indicates geographic neutrality

Table A-9: China’s major imports from its major trading partners in Africa (Percentage share of total imports from each country)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Fuels (SITC 3)																					
Angola	99.9 5	99.9 5	99.9 5	99.9 5	99.95	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.9 5	99.95	99.9 5	99.95
Algeria	94.3 8	89.0 0	73.3 7	99.7 4	99.48	96.9 8	99.6 7	99.5 7	98.6 3	99.2 1	99.5 9	99.7 9	99.7 7	99.5 2	99.0 6	96.8 4	97.8 0	98.3 8	99.48	97.4 3	93.54
S. Sudan	--	--	--	--	--	--	--	--	--	--	100	100	100	100	100	100	100	100	100	100	100
Nigeria	74.2 2	90.5 3	81.2 6	95.6	95.64	87.0 5	91.0 9	85.0 1	92.8 9	86.5 6	87.1 8	87.6 0	88.6 3	80.7 4	61.9 0	61.4 0	63.6 0	69.6 2	90.45	88.5 4	82.25
Egypt	5.76	3.69	9.23	1.72	7.677	12.2 1	14.6 2	42.0 1	62.7 2	59.9 8	68.0 1	64.9 8	76.7 1	69.3 0	67.7 2	54.1 5	69.4 8	73.1	52.90	64.4 0	67.10
S. Africa	1.27	1.48	0.43	0.44	1.58	4.64	16.4 6	1.24	0.81	4.78	3.66	4.36	2.29	1.04	0.43	0.41	1.23	0.98	0.07	0.11	2.53
Other ores and metals (SITC 27 + 28)																					
S. Africa	26.2 2	25.0 1	20.3 9	30.4 1	28.98	31.8	30.6 9	44.6 2	46.9 2	41.0 3	28.0 7	17.1 8	18.0 8	16.2 1	18.0 9	22.6 7	33.3 2	30.4 3	37.21	44.8 2	37.62
Nigeria	24.6 1	6.84	15.7 4	1.86	1.73	4.02	3.38	5.75	2.55	6.37	5.81	6.37	5.71	4.09	6.4	8.14	7.83	9.04	5.08	4.9	7.8
Egypt	70.2	53.6	45.4	50.5	35.7	48.4	52.3	31.5	17.2	20.5	14.3	19.6	14.5	20.4	16.6	22.3	10.2	6.59	10.36	5.83	4.22

	2	1	5	8		4	5	5	5	3	2	1	9	5	6		2				
Algeria	0.00	0.00	0.35	0.23	0.04	0.63	0.18	0.27	0.65	0.36	0.15	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.03	0.02	0.02
Non-Ferrous metals (SITC 68)																					
S. Africa	6.27	8.47	13.0	14.8	17.74	17.5	11.5	13.0	17.2	13.0	7.03	5.52	6.56	6.08	9.00	9.33	7.09	8.56	9.48	20.4	21.44
			4	1		4	3	6	6	3										7	
Nigeria	0.00	0.04	0.00	0.00	0.04	0.11	0.01	0.31	0.11	0.58	0.45	1.43	0.97	0.23	0.34	0.63	0.69	1.44	1.40	4.05	6.76
Egypt	0.10	0.02	0.55	2.44	0.80	2.96	1.59	0.20	4.20	2.30	1.73	0.83	0.98	0.60	0.35	0.65	0.46	0.71	0.29	1.86	5.35
												7									
Agricultural raw materials (SITC 2 less 22, 27 and 28)																					
Egypt	14.6	23.3				17.5	15.4									2.14					
	6	4	20.6	13.2	17.42	6	3	7.11	3.60	7.10	6.82	4.13	2.21	1.86	2.44	3	1.52	1.77	4.45	2.31	2.03
S. Africa	3.5	3.02	3.37	1.58	1.26	1.56	2.31	1.79	3.01	2.23	1.39	1.09	1.13	1.67	2.22	2.63	2.47	2.6	2.23	2.67	1.82
Angola	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Nigeria	0.45	0.43	0.97	0.73	0.44	3.06	0.92	1.28	0.62	0.75	1.66	1.35	2.87	13.3	28.5	24.5	23.7	15.9	0.99	0.68	0.74
Manufactured goods (SITC 5 to 8 less 667 and 68) *																					
S. Africa	23.6	20.6	31.3	22.3	20.6	14.8	17.6	13.7	15.6	10.4	5.8	3.51	3.94	4.66	7.22	8.77	8.68	6.58	7.73	8.6	5.77
	9	7	2	8	3	8	8		4	3											
Egypt	8.436	19.15	23.64	30.83	38.15	18.68	15.33	18.5	12.12	9.95	8.93	9.97	5.31	6.93	9.92	15.0	11.2	12.6	15.2	10.8	8.44
											9	4				7	8		2		
Nigeria	0.71	2.12	1.45	0.87	1.6	4.3	3.74	6.73	2.98	4.88	3.64	2.51	1.7	1.04	2.07	3.13	1.95	3.54	1.67	0.87	1.01

Source: Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: --- = Statistical data is not available.

* is made up of Chemical products (SITC 5), Machinery and transport equipment (SITC 7), and Other manufactured goods (SITC 6 + 8 less 667 and 68).

Table A-10: China's major exports to its major trading partners in Africa (Percentage share of total exports to each country)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Manufactured goods (SITC 5 to 8 less 667 and 68)*																					
Angola	96.0	88.5	96.0	95.0	94.87	96.6	97.1	97.9	97.9	96.7	96.1	97.0	97.1	97.3	97.2	89.5	95.4	96.3	95.64	95.3	93.41
	9	3	3	5		5	0	4	1	9	2	0	9	9	9	4	4	5		7	
Algeria	78.3	85.8	85.8	91.4	87.21	87.4	94.0	95.3	96.0	95.3	94.5	95.4	95.6	96.6	96.5	96.6	96.0	95.7	96.2	96.74	
	9	2	2	8		6	3	8	8	5	5	6	5	7	7	6	8	9	9	9	
Nigeria	92.4	97.0	97.4	97.2	97.15	96.5	94.1	92.9	92.2	92.1	90.7	90.7	92.1	93.5	94.3	93.7	94.5	94.3	95.0	95.3	
	9	8	3	9		1	8	6	1	6	5	2	2	4	3	7	7	4	3	3	
Egypt	81.6	83.8	89.8	87.5	94.44	94.6	94.7	95.4	95.5	95.1	94.7	95.2	95.1	96.3	96.4	96.6	95.7	96.0	94.79	96.2	96.47

	5	2	4	1		1	4	3	6	9	4	4	2	9	9	0	6	4		1	
S. Africa	90.1 2	90.7 1	88.7 3	93.0 8	94.61	94.8 1	94.5 1	94.1 3	94.9 2	95.3 7	95.7 7	96.3 5	96.8 6	96.2 8	96.5 6	95.3 3	94.7 1	94.9 5	95.11	96.1 4	96.03
S. Sudan	--	--	--	--	--	--	--	--	--	--	96.2 1	97.3 5	92.6 3	98.7 1	94.8 2	82.5 6	96.8 5	90.9 3	96.60	95.8 5	94.78
Food, basic (SITC 0 + 22 + 4)																					
Algeria	10.6 1	11.5 5	8.04	6.75	5.41	4.22	3.99	3.41	3.05	3.40	3.75	2.96	3.14	2.21	2.24	1.91	1.90	2.01	2.14	2.52	2.04
S. Africa	2.54	3.72	4.87	1.62	1.67	1.70	1.93	1.76	2.63	1.83	1.94	1.83	1.44	1.50	1.26	1.78	1.69	1.45	1.57	1.44	1.31
Angola	3.44	11.0 8	3.65	4.68	4.76	2.86	2.27	1.26	1.08	1.90	2.10	1.80	1.73	1.48	1.55	1.6	1.86	1.44	1.72	1.46	1.04
Nigeria	1.22	0.91	0.90	1.09	1.30	1.24	1.56	2.36	3.62	2.65	3.61	3.82	3.04	2.27	1.76	1.79	1.89	1.96	1.52	1.54	1.14
Egypt	4.81	2.19	2.41	0.92	0.91	1.16	1.27	1.69	1.82	2.24	2.65	2.53	2.53	1.67	1.55	1.77	1.67	1.96	3.00	2.02	1.42
Non-Ferrous metals (SITC 68)																					
Egypt	0.32	0.46	0.69	1.07	0.96	1.13	1.58	1.72	1.19	1.49	1.23	1.3	1.25	1.05	0.99	0.99	1.24	1.13	1.38	1.25	1.67
Nigeria	1.02	0.94	0.84	1.20	0.99	1.76	3.79	4.19	3.69	4.83	5.34	5.21	4.56	3.24	3.10	3.13	3.14	3.29	2.51	2.60	2.78
Algeria	0.13	0.23	0.52	0.61	0.77	1.23	1.18	0.96	0.65	1.04	1.44	1.37	1.1	0.99	1.1	1.08	0.85	1.06	0.86	1.00	0.90

Source: Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: --- = Statistical data is not available.

* is made up of Chemical products (SITC 5), Machinery and transport equipment (SITC 7), and Other manufactured goods (SITC 6 + 8 less 667 and 68).

Table A-11: Revealed trade barrier indexes (RTB_{ijk}) for products imported by China from its top trading partners in Africa

(a) Food, basic (SITC 0 + 22 + 4)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022

Originating from Algeria																					
0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.00	0.00	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.001	0.00	0.00	0.00	0.01	0.05
0			0			0	0	0		0		0	0			0	0	0	0	5	7
Originating from Angola																					
0.00	0.002	0.000	--	0.000	--	--	--	--	--	0.00	--	--	--	--	--	0.002	0.00	0.00	0.00	0.00	0.00
1										0							2	1	0	0	0
Originating from Egypt																					
0.12			0.19			0.11	0.09	0.01		0.02		0.02	0.09			0.72		1.79	1.67	2.33	
6	0.026	0.08	8	0.043	0.029	6	7	4	0.018	4	0.069	7	9	0.321	0.719	0.922	3	2.27	7	2	7
Originating from Nigeria																					
0.00			0.15			0.14	0.14	0.11		0.18		0.01	0.04			0.06	0.05	0.11	0.18	0.15	
2	0.004	0.087	2	0.093	0.260	7	4	7	0.126	4	0.107	6	7	0.106	0.284	0.291	1	3	5	4	8
Originating from South Africa																					
0.23	0.181	0.099	0.08	0.185	0.126	0.08	0.05	0.06	0.086	0.04	0.042	0.04	0.07	0.104	0.135	0.204	0.26	0.26	0.29	0.22	0.26
4			3			8	9	5		6		2	4					6	9	4	6

(b) Beverages and tobacco (SITC 1)

Years																					
200	200	200	200	200	200	200	200	200	201	201	201	201	201	201	2016	201	201	201	2020	202	2022
1	2	3	4	5	6	7	8	9	0	1	2	3	4	5		7	8	9		1	
Originating from Algeria																					
0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.00	0.01	0.053	0.02	0.00	0.01	0.000	0.00	0.006
0	0	0	8	2	0	0	8	0	0	3	6	1	9	6	2	5	0	7	2	7	
Originating from Angola																					
--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	0.002	0.00	0.00	0.00	0.001	--	--
														0		1	0	1			
Originating from Egypt																					
0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.05		0.05	0.04	0.04		0.01	
0	4	0	0	0	0	0	0	0	5	2	6	7	8	4	0.094	2	7	3	0.036	4	0.011
Originating from Nigeria																					
0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.000
0	4	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0		1	

Originating from South Africa																					
0.025	0.117	0.015	0.019	0.07	0.038	0.293	0.129	0.091	0.089	0.086	0.066	0.064	0.070	0.163	0.199	0.152	0.166	0.146	0.122	0.144	0.121

(c) Agricultural raw materials (SITC 2 less 22, 27 and 28)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Originating from Algeria																					
0.000	0.000	0.000	0.000	0.007	0.009	0.007	0.009	0.024	0.011	0.006	0.009	0.011	0.060	0.179	0.135	0.320	0.247	0.201	0.179	0.318	0.187
Originating from Angola																					
0.023	0.004	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.002	0.002	0.011	0.002	0.015	0.053	0.098	0.085	0.083	0.043	0.014	0.022	0.017
Originating from Egypt																					
7.850	13.61	12.37	7.073	9.102	6.999	5.961	3.233	1.900	3.183	2.952	2.043	1.150	0.970	1.262	1.171	0.767	0.878	2.343	1.091	0.835	6.365
Originating from Nigeria																					
0.233	0.229	0.529	0.413	0.263	1.929	0.591	0.892	0.438	0.470	0.980	0.871	1.872	8.875	18.92	16.28	15.63	10.68	0.715	0.499	0.519	0.788
Originating from South Africa																					
1.819	1.606	1.839	0.890	0.758	0.982	1.486	1.242	2.132	1.392	0.822	0.700	0.737	1.110	1.476	1.748	1.628	1.745	1.604	1.959	1.276	1.221

(d) Non-ferrous metals (SITC 68)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Originating from Algeria																					
3.003	0.000	0.080	0.000	0.015	0.000	0.001	0.001	0.026	0.052	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.089	0.654
Originating from Angola																					
--	--	--	--	--	--	--	--	--	--	--	0.00	0.00	0.00	--	--	0.00	--	0.00	0.03	0.04	0.091

											0	0	0			1		8	7	9	
Originating from Egypt																					
0.055	0.009	0.332	1.306	0.417	1.178	0.614	0.091	2.218	1.033	0.748	0.415	0.513	0.311	0.183	0.355	0.233	0.352	0.152	0.88	2.203	2.243
Originating from Nigeria																					
0.000	0.021	0.000	0.000	0.022	0.043	0.002	0.143	0.059	0.259	0.194	0.709	0.507	0.122	0.176	0.342	0.351	0.714	0.741	1.915	2.782	4.606
Originating from South Africa																					
3.358	4.941	7.83	7.935	9.27	6.992	4.452	5.935	9.108	5.841	3.04	2.732	3.417	3.168	4.656	5.097	3.587	4.242	4.999	9.675	8.82	7.553

(e) Other ores and metals (SITC 27 + 28)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Originating from Algeria																					
0.000	0.000	0.293	0.152	0.022	0.334	0.084	0.117	0.335	0.146	0.056	0.003	0.000	0.006	0.005	0.005	0.007	0.004	0.014	0.007	0.006	0.033
Originating from Angola																					
0.002	--	0.009	0.001	--	0.001	0.001	0.001	0.022	0.017	0.017	0.031	0.019	0.012	0.036	0.055	0.047	0.058	0.037	0.099	0.078	0.181
Originating from Egypt																					
58.64	46.91	37.58	33.27	21.47	25.78	24.54	13.73	8.867	8.245	5.275	8.066	6.211	9.201	8.782	12.39	4.848	3.118	4.608	2.348	1.430	1.883
Originating from Nigeria																					
20.55	5.989	13.01	1.224	1.042	2.141	1.583	2.503	1.313	2.558	2.139	2.621	2.431	1.841	3.375	4.526	3.712	4.276	2.259	1.973	2.642	13.65
Originating from South Africa																					
21.90	21.89	16.86	19.998	17.433	16.92	14.39	19.42	24.13	16.47	10.34	7.067	7.700	7.293	9.538	12.60	15.80	14.40	16.55	18.06	12.737	14.456

(f) Fuels (SITC 3)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Originating from Algeria																					
9.805	9.716	7.475	9.189	7.507	6.756	7.155	5.739	6.965	6.446	5.668	5.497	5.812	6.192	8.910	10.22	8.789	7.613	8.244	11.17	8.217	5.920
Originating from Angola																					
10.38	10.91	10.19	9.211	7.539	6.965	7.173	5.757	7.034	6.491	5.665	5.487	5.813	6.213	8.971	10.529	8.918	7.718	8.269	11.409	8.749	6.040
Originating from Egypt																					
0.599	0.403	0.94	0.158	0.579	0.85	1.049	2.421	4.429	3.897	3.871	3.58	4.468	4.312	6.091	5.717	6.244	5.66	4.383	7.383	5.891	2.991
Originating from Nigeria																					
7.71	9.882	8.278	8.807	7.217	6.064	6.539	4.899	6.559	5.624	4.962	4.825	5.163	5.024	5.568	6.479	5.717	5.388	7.495	10.15	7.225	3.141
Originating from South Africa																					
0.132	0.162	0.043	0.04	0.12	0.323	1.182	0.071	0.057	0.31	0.209	0.24	0.134	0.065	0.039	0.043	0.111	0.075	0.006	0.013	0.222	0.047

(g) Manufactured goods (SITC 5 to 8 less 667 and 68)

Years																					
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Originating from Algeria																					
0.000	0.148	0.356	0.000	0.006	0.034	0.002	0.002	0.009	0.004	0.002	0.003	0.003	0.006	0.009	0.040	0.023	0.018	0.003	0.032	0.082	0.006
Originating from Angola																					
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Originating from Egypt																					
0.114	0.25	0.32	0.42	0.54	0.27	0.22	0.28	0.18	0.15	0.14	0.15	0.08	0.10	0.14	0.21	0.16	0.18	0.21	0.15	0.12	0.134

	8	2	5	1	1	3	4	0	0	0	8	4	6	1	1	3	2	9	1	3	
Originating from Nigeria																					
0.01	0.029	0.020	0.012	0.023	0.062	0.054	0.103	0.044	0.073	0.057	0.040	0.027	0.016	0.029	0.044	0.028	0.051	0.024	0.012	0.015	0.033
Originating from South Africa																					
0.321	0.278	0.426	0.309	0.293	0.216	0.257	0.210	0.232	0.157	0.091	0.056	0.062	0.071	0.103	0.123	0.126	0.096	0.111	0.121	0.084	0.081

China-South Sudan revealed trade barrier indexes

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fuels (SITC 3)	5.509	5.825	6.222	8.995	10.558	8.986	7.739	8.286	11.464	8.785	6.081

Source: Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: < 1, Country **i** exports relatively more of commodity **k** to the rest of the world as compared to Country **j**. This indicates that there is possible discrimination against commodity **k** coming from Country **i** into Country **j**.
 = 1, Country **j** does not have discriminatory trade barriers against commodity **k** originating from County **i**.
 > 1, Country **j** is importing a lot of commodity **k** from Country **i** than expected. Commodity **k** originated from country **i** is possibly being given preferential treatment by Country **j**.
 --- = Statistical data is not available.

Table A-12: China-Africa trade complementarity from China’s perspective (2001-2022)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Years											
										2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
China-Africa																					
45.0	43.0	42.5	44.1	43.9	44.0	44.6	47.1	47.9	50.8	53.8	54.3	57.2	59.2	59.2	60.2	60.7	60.6	62.2	60.8	63.5	66.6
China-Algeria																					
22.2	20.4	20.7	24.3	23.7	24.6	27.3	30.2	31.5	35.3	38.5	38.5	36.8	38.4	32.7	33.0	35.5	37.3	40.8	40.7	42.6	44.9

China-Angola																						
21.4	19.4	17.6	16.9	18.8	19.7	--	21.9	--	--	--	--	--	--	22.4	22.4	22.9	27.7	25.5	23.9	25.1	30.7	
China-Egypt																						
39.9	36.9	39.3	39.1	36.6	34.4	38.5	49.0	47.5	51.1	54.9	55.6	56.2	60.6	56.0	55.1	59.0	59.3	61.2	60.2	62.1	64.5	
China-Nigeria																						
17.7	18.9	15.8	17.5	18.9	21.0	20.3	23.6	22.6	28.3	30.3	30.1	27.3	30.3	25.2	24.1	26.7	28.7	28.9	28.5	29.5	36.2	
China-South Africa																						
35.8	41.5	39.6	33.7	34.9	35.2	33.1	33.7	33.8	36.7	39.8	44.8	45.7	44.3	42.5	39.0	40.3	43.5	45.2	39.9	36.4	40.8	

Source: Own tables constructed using UNCTAD statistical data available at <http://www.unctad.org>

Notes: $TC_{ij} = 0$ if there is no overlap at all.
 $TC_{ij} = 100$ if imports and exports match perfectly
 --- = Statistical data is not available.