11. UK trade with Africa after Brexit

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1. INTRODUCTION

The economic performance of Africa over the last 20 years tells a story of success: aggregate GDP tripled, surpassing $2 trillion (World Bank 2019), and annual growth averaged around 5 per cent between 1999 and 2018, leaving behind the so-called 'lost decades' (1980–2000).[1] GDP growth, however, has not yet resulted in similar increases in international exchanges, leaving room for trade opportunities with several countries that may look at Africa as a new promising market (Giovannetti 2019). Sub-Saharan African countries (SSA) are trying to increase their low intra-regional trade, and the 2019 ratification of the African Continental Free Trade Agreement represents an important step in this direction (see Woolfrey et al. 2019). China has recently increased its share of exports, reaching on quarter of total SSA imports, and so has India (which more than tripled its exports to SSA since the year 2000). For reasons linked to the UK exit from the European Union (Brexit) and the consequent need to substitute intra-EU trade, also the UK (and possibly the EU) looks with increased interest to SSA. The emphasis on SSA in the public discourse by both the Brexit-era Prime Ministers, Theresa May and Boris Johnson (Paduano 2020), suggests that the region is likely to play a role in the British attempt to reconfigure its economic network worldwide. The extent to which this will happen, as well as the advantages for individual SSA countries, will depend on the ability of both British and African negotiators to define in a very short period new UK-SSA trade agreements, since the existing EU-SSA ones will no longer apply to the UK (UK Government Foreign Office 2018, 2019).[2]

This chapter investigates whether and how SSA countries could benefit from Brexit in terms of increased trade. Recent studies, stressing different aspects of the complex political and economic relations, do not bring definite results, also pointing to the fact that only some countries are beneficiaries of EU preferences. On the one hand, a slowdown of the European and UK economy due to Brexit might negatively impact SSA (Hove and Wakeford 2016; Wheatley

2017; Nicita et al. 2019). On the other hand, post-Brexit reconfigurations of trade agreements might provide new business opportunities and some countries might take advantage from the UK-EU diversion of trade (Mattoo et al. 2017). Brexit could also increase the bargaining power of African countries against the UK, helping them to achieve even better economic treatment than under the current Economic Partnership Agreement (EPA) in force with the EU. In such an uncertain policy framework, the African Continental Trade Agreement partnership is likely to play in favour of African countries, making them stronger if they decide to bargain jointly.[3] On the contrary, it is very unlikely for the UK to obtain a better treatment than the one granted so far to the EU (Gaynor 2018). African negotiators could push for a revision of the Rules of Origin, which regulate trade with the EU, as much as the limitation to agricultural trade set by the EU's Common Agricultural Policy. Also, they could press for protection for their infant industry, reducing the exposure to European competition (Kohnert 2018b, 2019; Westcott 2018).[4] The reconfiguration of the system of agreements regulating trade and investments between the UK, the EU, and the African Union might therefore lead a massive reconfiguration of trade patterns, with winners and losers.

To empirically quantify the possible impacts of Brexit on UK-SSA trade, we first describe the UK-SSA trade relations and assess the existence of unexploited trade opportunities (section 2). Second, we estimate the possible impacts of Brexit under different scenarios (section 3) and describe how UK-SSA trade might look after Brexit (section 4). We then discuss our results and conclude (section 5). Our analysis shows that there is a large unexploited trade potential between UK and SSA. But, although Brexit might contribute to take advantage of such trade opportunities, the increase in trade under the most likely scenarios is rather limited; furthermore, trade is likely to remain concentrated in the already more connected economies, South Africa and Nigeria. Even the full trade liberalization assumed under our best-case scenario is not enough to fully realize the trade potential of African countries. Furthermore, it would take time to fully unfold this potential. Overall, our findings suggest that the opportunities Brexit could generate for and in SSA are unlikely to benefit the UK. Other players such as China and India are likely to emerge as the major winners in the new scramble for Africa.[5]

2. UK-SSA TRADE BEFORE BREXIT

Here we describe the main dynamics of the UK-SSA trade relations in the last decade. Data show that trade links between UK and SSA countries have weakened over time. A comparison with predicted trade flows from a gravity model reinforces this interpretation and stresses the existence of untapped trade potential with many SSA countries even before Brexit.

2.1 Main Trade Patterns and Trends

SSA's exports, despite an increasing diversification in the past 10–15 years, are highly concentrated on oil and minerals, and on a small set of specific products: textiles, clothing and footwear, and some agricultural products (cotton and vegetable oils). Furthermore, SSA countries are still not well integrated into global value chains, with a ratio of parts and components in total imports that has remained almost stable since the 1980s. Also, its overall share of world trade remains small (just over 2.2 per cent).

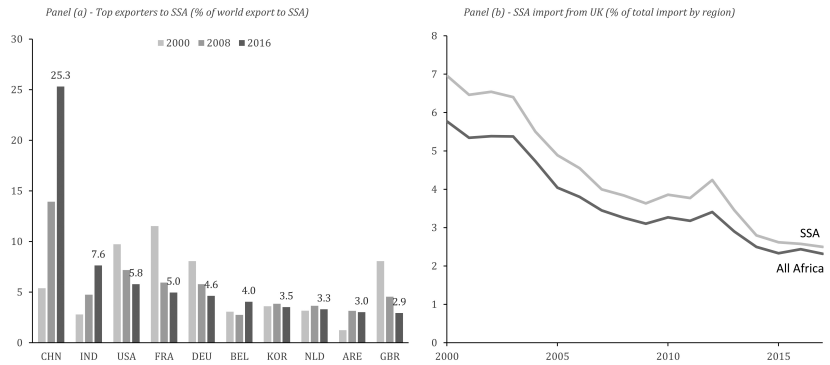
Current SSA trade patterns are still largely shaped by its colonial experience (from which it inherited most of the existing physical and political infrastructure) and subject to different forms of agreements. Such a framework is reflected in a strong dominance of extra-continental trade over intra-regional exchanges (as Byiers et al. 2019 put it: "Multiple memberships, multiple reasons"). The signature of the African Continental Free Trade Agreement (AfCFTA) in 2018 marked a historical result for the whole African continent, highlighting the recent efforts of the region towards a less fragmented trade network, higher economic integration and a more balanced economic structure (i.e. less concentrated on the extractive and agricultural sectors). Similarly, the trade and investment relationship with non-African countries is also regulated by a multitude of different forms of agreement, which range from general systems of preferences (GSP) and duty-free treatments for LDCs (based on bilateral negotiations), to multilateral preferential access treaties (such as the USA's African Growth and Opportunity Act – AGOA – or the Economic Partnership Agreements – EPAs – with the EU).[6]

In the current situation, the UK represents one of the most important trading partners for SSA countries, which in turn have always been looking back with a favourable eye. In recent years, the UK has manifested its intention to strengthen its regional economic linkages. Several UK firms have invested extensively in SSA (fDIMarket 2019), especially in the energy sector, and recent events and several official declarations seem to suggest an increasing interest for SSA and for the bilateral UK-SSA trade. However, these positive attitudes and announcements do not find a close match in actual data.

The AfCFTA has not yet triggered new trade and SSA regional trade is still low compared to extra-SSA exchanges. Geographical and institutional conditions remain the major limitations to maintenance of well-established commercial relationships in the region (Coulibaly and Fontagné, 2006; Storeygard 2016).[7]

In addition, the increase in the trade share of 'new' partners (such as China and India) coincided with a sharp decline of the trade flows from developed countries. Such a decline was particularly remarkable for the former top colonial powers in the region, France and especially the UK, whose relative

importance decreased substantially over the considered period, passing from around 8 per cent in 2000 to less than 3 per cent in 2017.[8] Figure 11.1 shows the evolution of the relative importance of the SSA top 10 trading partners (panel a), and the trend of SSA import share from the UK (panel b) in the period 2000–2016.



Source: Authors' computation based on BACI dataset.

Figure 11.1 UK export penetration in SSA

SSA only marginally contributes to UK total imports, which are also highly concentrated on a few (relatively) large actors. The top 10 SSA exporters to the UK accounted for roughly 95 per cent of total UK imports from SSA in 2016 but, with the exclusion of South Africa, none of the remaining top SSA importers places itself higher than the 45th position in the overall UK importers ranking. It is worth noticing that the top five SSA countries from which the UK imports (see Table 11.1) are resource-rich countries. This pattern is consistent with the UK's investing strategy in SSA, which focuses on energy and extractive (oil and especially non-oil) sectors and the idea that trade and FDI are complements. Nonetheless, the SSA share of UK imports, despite remaining low, has been increasing over the past 20 years (from less than 2 per cent to just above 3 per cent in 2017 (CEPII 2019a).

More than 80 per cent of UK's export to SSA consists of manufacturing products, compared to less than 20 per cent of imports from the continent (mostly intermediate inputs). The share of UK agricultural imports from SSA has slightly increased, while imports of more sophisticated manufacturing products decreased (down to slightly more than 17 per cent in 2016 from around 30 per cent of total SSA-to-UK exports in 2000; see CEPII 2019b).

Table 11.1 UK imports from top trading partners in SSA, current US$ million

Country	Aggregate import	Rank	Manufacturing import	Rank	Agricultural import	Rank
			2000			
South Africa	6230.55	(14)	1353.13	(29)	296.87	(11)
Mauritius	442.03	(52)	437.61	(46)	3.26	(83)
Ghana	361.87	(57)	153.25	(59)	21.25	(52)
Kenya	276.61	(61)	34.59	(85)	241.64	(13)
Zimbabwe	163.81	(72)	112.95	(66)	48.17	(34)
			2008			
South Africa	9986.47	(15)	2116.26	(32)	525.02	(12)
Nigeria	1437.55	(44)	124.06	(74)	6.5	(86)
Angola	937.12	(56)	5.07	(130)	0	(164)
Mauritius	688.58	(64)	682.59	(46)	2.12	(98)
Kenya	548.52	(69)	72.06	(81)	474.72	(16)
			2016			
South Africa	10012.58	(16)	1301.52	(39)	631.8	(11)
Nigeria	1136.41	(46)	72.00	(71)	2.09	(105)
Côte d'Ivoire	410.55	(66)	228.15	(60)	159.78	(32)
Kenya	386.79	(67)	25.82	(98)	359.55	(16)
Angola	330.29	(69)	8.03	(117)	0	(154)

Notes: The table reports the bilateral UK import flows from its top 5 SSA trading partners, together with their relative global ranking. Bilateral Manufacture and Agricultural imports with the related ranking with respect to the rest of the world are also reported in columns (3) to (6). All values are expressed in current US$ million.
Source: BACI dataset 2019.

2.2 A Structural Gravity View

The apparently reduced importance of the UK in SSA raises the question of whether trade is in line with what one would predict given the country's characteristics. If this is not the case, as it seems from the declining SSA UK trade, then the UK and SSA structurally undertrade. This would imply that there might exist unexploited opportunities, also independently from Brexit. In this (and the next) section, we show that there is some 'missing trade' with

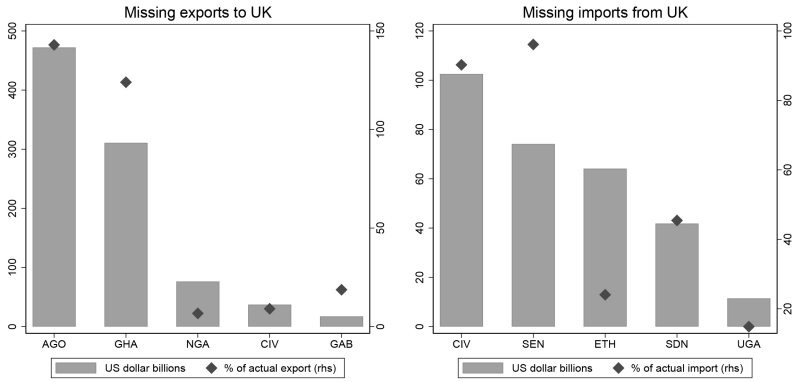
the UK for several SSA countries. We obtain potential trade flows exploiting the predictions from a gravity model (based on GDP, geographical and cultural distance, and trade policy variables).

We confine our analysis to 2016, the year of the Brexit referendum. In this way, we reduce the possibility that our estimates capture part of, or are biased by, possible changes in the trade patterns generated by the result of the Brexit vote itself. Nonetheless, our estimates are comparable to previous quantifications of the effect of Brexit, as obtained via structural gravity (see for instance Oberhofer and Pfeffermayr 2018; Sudtharalingam et al. 2018).

The model we propose performs adequately, explaining almost 90 per cent of the overall variability in world trade bilateral flows (i.e. R-squared = 0.896).[9] Interestingly, most of the predicted flows from/to SSA overestimate the actual trade with the UK (a notable exception is South Africa). We find that there is some structurally 'missing' trade, i.e. that the UK and SSA countries trade less than the gravity predicts. This 'missing trade' must be attributed to factors other than GDP, geography and culture, and signals an untapped trade. In Figure 11.2, we report the top five countries by 'missing export to' and 'missing import from' the UK. According to gravity factors only, Angola's exports to the UK should be almost 1.5 times higher, and those of Ghana about 1.25 times higher. Similarly, imports of Côte d'Ivoire and Senegal from the UK should be about 2 times higher. The presence of missing trade (or export potential) can be attributed to the presence of trade barriers and other non-structural obstacles not accounted for in our gravity model. Brexit and other policy changes may operate to shrink or widen such trade gaps.

3. A COUNTERFACTUAL SCENARIO-BASED APPROACH

To assess the impacts of Brexit on the UK-SSA trade, we proceed in three steps. First, based on the above structural gravity model, we compute the trade elasticities to trade policy variables (namely free trade agreements and tariffs) and employ them to quantify the variation in trade flows under counterfactual changes in trade costs and trade policy variables. Second, we devise four possible counterfactual changes in the UK's trade policy, in order to quantify a range of potential Brexit-induced trade effects for SSA. We focus on two main scenarios named for simplicity: (1) Soft Brexit and (2) Hard Brexit. To give a measure of how large the interval of the possible effects might be, we also add a feasibility interval ranging from the best-case scenario (Free Trade Brexit) to the worst-case scenario (Protectionist Brexit). We describe our scenario building in detail below. As a third step, we calculate counterfactual trade flows under the different scenarios. This simple exercise allows us to identify which countries are more likely to lose or gain more from Brexit.



Note: AGO = Angola; GHA = Ghana; NGA = Nigeria; CIV = Ivory Coast; GAB = Gabon; SEN = Senegal; ETH = Ethiopia, SDN = Sudan; UGA = Uganda. The solid bar represents the trade volume (exports or imports in the left and the right-hand panel respectively) expressed in billion US$ (Primary Y-scale). The darker dots represent the missing share of actual exports/ imports (in panel a and b respectively), expressed in percentage of the relevant flows (Secondary Y-scale).
Source: Authors' computation based on CEPII data.

Figure 11.2 Top five SSA countries by missing export to or missing import from the UK

We complement the analysis with a graphical comparison of the intermediate counterfactual scenarios, to investigate whether and to what extent Brexit affects the underlying structure of the UK-SSA-EU trade network. Our approach simplifies Anderson et al.'s (2018) estimates of the trade diversion effect of borders, and is close to Kohl (2019), who adopts a similar approach to estimate the effects of the Belt and Road Initiative.

3.1 Scenario Building

The four scenarios, ranked from the more optimistic (best case) to the more pessimistic, capture a range of possible consequences of Brexit on trade through trade policy changes, and differ (a) in the presence/absence of free trade agreements (the dummy); and (b) in the level of the average bilateral tariff (the variable).[10] By construction, our methodology leaves out all other

factors not explicitly included in the analysis, as well as all the possible indirect general equilibrium effects.

1. *Free Trade Brexit*: represents the (unrealistic) best-case scenario. The UK, which because of Brexit can no longer be part of existing FTA/EPA signed as part of the EU, is able to sign without any negotiation or delay an FTA with all SSA countries and all bilateral tariffs are removed.
2. *Soft Brexit*: UK remains in the previously signed FTA/EPA (or equivalent agreements are signed) and existing bilateral tariffs towards SSA are reduced by 30 per cent.
3. *Hard Brexit*: UK is no longer part of the previously signed FTA/EPA but the existing bilateral tariff scheme remains unchanged.
4. *Protectionist Brexit*: represents the (unrealistic) worst-case scenario. The UK is no longer part of the existing FTA/EPA and increases bilateral tariffs by 20 per cent.

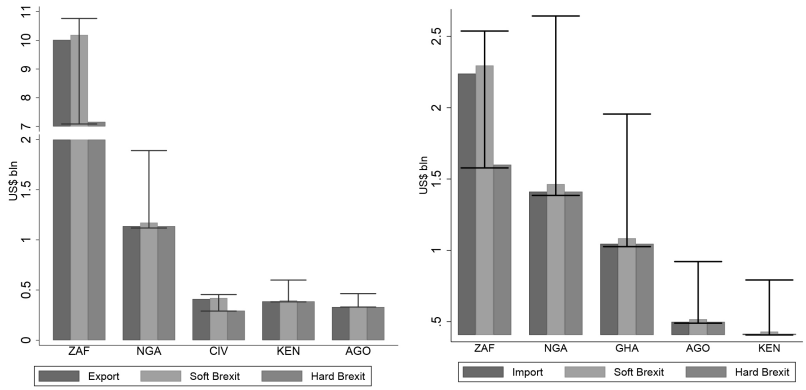
All scenarios also imply the introduction of a tariff between the 'exiting' UK and the rest of the EU, which for the analysis we set equal to the one granted to the USA.[11] In terms of the above gravity model, we construct four counterfactual vectors of the trade policy variables, one for each counterfactual scenario, and we compute the variation in bilateral trade due to the assumed changes in trade policy.

4. UK-SSA TRADE AFTER BREXIT

On aggregate, trade flows between the UK and SSA do not show substantial changes in response to Brexit. However, results are heterogeneous, largely depending on the degree of integration of each individual country in the trade network and, in particular, with the UK. The effects of Brexit may entail either small increases in trade with many countries, provided that new trade agreements replace the existing ones (signed with the UK in the EU) or, in a more pessimistic case, large reductions in trade for some countries, namely South Africa and Ivory Coast if the UK and SSA countries do not sign new agreements. In any case, the post-Brexit estimated trade networks tend to maintain their core structure under the different scenarios, suggesting that Brexit alone is unlikely to significantly alter the trade patterns, at least in the short run. Our analysis suggests that large gains occur only in the unlikely case that new zero-tariff free trade agreements are immediately signed with several SSA countries.

4.1 Changes in Trade Flows of SSA Countries

Figure 11.3 reports the 2016 UK's top five SSA trading partners according to our gravity prediction in the two more realistic scenarios against the predicted actual exports (reported in darker grey). The two 'extreme' scenarios are represented as whiskers, as they indicate the limits of the range of possible outcomes. Interestingly, trade patterns do not change substantially in either (realistic) scenario. The figure shows that all SSA countries may obtain small trade increases in case of Soft Brexit (+0.6 per cent on average, with a span of 0.1–3.4 per cent, for exports; +3.6 per cent on average, with a span of 2.25–3.84 per cent, for imports), while South Africa (which would lose the preferential rates accorded by the EU to the Southern African Development Community – SADC) and Ivory Coast might incur substantial losses in case of Hard Brexit (about –28.5 per cent for export and import).[12]



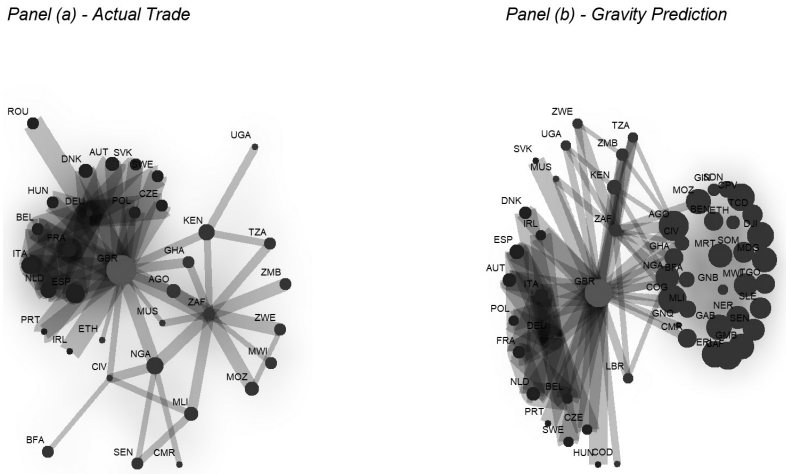
Note: ZAF = South Africa; NGA = Nigeria; CIV = Ivory Coast; KEN = Kenya; AGO = Angola; GHA = Ghana.
Source: Authors' computation based on CEPII data.

Figure 11.3 Export to and import from the UK under different scenarios

4.2 A Trade Network Perspective

Looking at the network structure of UK-SSA trade helps understand the differences between actual and predicted trade. The network is constructed by applying a region-based threshold to exclude minor trade flows (i.e. those below 1 per cent of the total trade of each region: UK to SSA; UK to EU; intra-EU; intra-SSA). Just 8 out of 44 potential UK-SSA connections (light

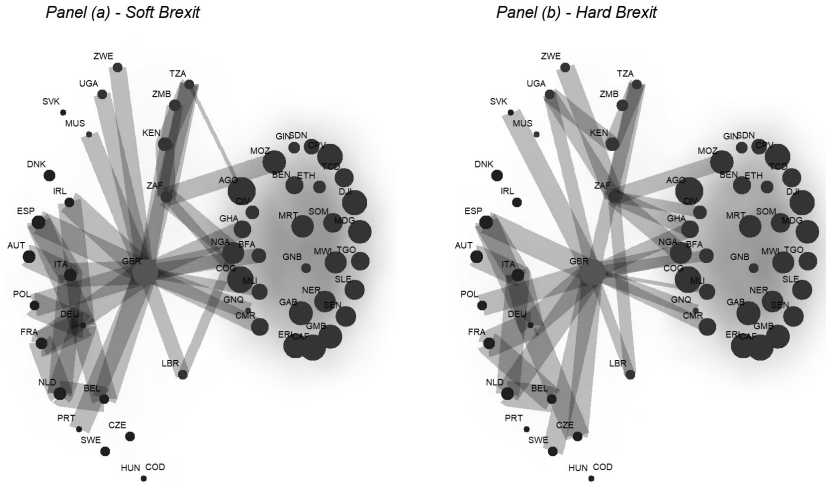
grey shade) overcome the 1 per cent UK trade threshold in the actual network. While South Africa, the largest UK trading partner in SSA, is also the central hub in the region, many other countries tend to trade very little with each other. Countries like Angola, Ghana and Mauritius trade to a significant extent just with South Africa: yet their trade flows with the UK are sufficiently large to exceed the block-threshold (whose value is larger than the value of the SSA regional threshold). Ethiopia, on the other hand, does not seem to trade with the rest of SSA, but has relatively large trade flows with the UK. As a comparison, let us consider the UK-EU sub-network (in darker shade). The EU clearly appears well connected both in the actual and predicted trade networks, with minor differences between the two. A closer inspection shows that the main differences between the two sub-networks occur in the intensity of the trade links (i.e. the thickness) rather than in the structure of the networks.



Note: Network representation of the UK-centred trade network in the EU (in dark grey) and SSA (in light grey). Each graph only reports those flows that are larger than a 1% threshold of the respective total regional trade. Country-node size is proportional to the number of export trade flows shown. (The networks are constructed using the statistical software R and the visualizations are performed according the Kamada-Kawaii algorithm.)
Source: Authors' computation based on CEPII data.

Figure 11.4 Pre-Brexit scenario: UK-EU-SSA 2016 trade network

The network structures in the two intermediate (and realistic) scenarios reproduce very similar patterns to the ones discussed for the actual trade patterns (Figure 11.4). On the one hand, the ties with the EU do not fade away, though they weaken in response to the increase in the tariff rates. This is consistent



Note: Predicted top flows in the two intermediate Brexit scenarios. The central dot represents the UK. Node size refers to the number of significant trade flows in each region. The size of the fans and the intensity of the cloud surrounding SSA indicate the predicted trade volume from the gravity model.
Source: Authors' computation based on CEPII data.

Figure 11.5 Counterfactual scenarios

with the limited impact Brexit is expected to have on EU-UK trade (relative to the size of the trade flow) and the empirical regularities of gravity. Figure 11.5 compares the structure of the predicted trade network in case of a Soft and a Hard Brexit scenario (panel a and b respectively). It seems to suggest that the increase in tariffs is likely to affect the welfare of both UK and EU citizens, without altering substantially the trade relationship (in line with Estrin et al. 2018; Sudtharalingam et al. 2018).[13] Interestingly, also the UK-SSA network remains largely unchanged in its structure, with respect to the real predicted trade scenario. The most notable difference involves the relative position of each country in the related regional network, as proxied by the size of the respective dot. For instance, Zimbabwe (ZMB) gets closer to the UK and farther away from the centre of the SSA network. On the other hand, Kenya (KEN) and Burkina Faso (BFA) appear more connected to the rest of SSA countries in the Soft Brexit scenario, compared to the baseline. Nigeria (NGA), on the other hand, becomes more central in the Hard Brexit scenario, probably for the structure of its trade, concentrated on mineral products (93 per cent in 2017).

5. CONCLUDING COMMENTS

Our findings suggest that the direct effects of Brexit are not likely to benefit SSA as much as the Brexit narrative has suggested, even without considering the severe impacts the recent COVID-19 pandemic had globally. From our scenario-based counterfactual analysis, we conclude that the increase in trade between the UK and SSA countries due to Brexit is likely to be, if any, very limited (see Figure 11.4). The most likely outcomes entail either small gains for several SSA countries (e.g. a Soft Brexit triggers increases of less than 1 per cent export and about 3.5 per cent for imports on average), or significant losses in those cases in which the existing trade agreements with the EU are not immediately replaced after Brexit (e.g. South Africa and Ivory Coast trade with the UK might decline by more than 28 per cent). Brexit does not help filling the gap between potential and actual trade (the so-called missing trade) in most cases (see Figure 11.3), with these figures likely to worsen in response to the deterioration of the international trade resulting from the pandemic and the China-US disputes. The EU-UK trade possibly lost after Brexit – a reduction estimated in the order of US$30+ billion by Coke-Hamilton (2019) – is not likely to be diverted towards SSA. Considering geographical factors as well as the different sectoral specialization of SSA and the EU, this conclusion is not surprising. Overall, the short-run Brexit effect is unlikely to be large enough to overcome the structural gravity forces or existing comparative advantages.

According to our analysis, SSA may obtain large gains in terms of trade volumes only in the unlikely case in which a free-trade-no-tariff scenario is realized in the very short run; a possibility that implies not only the continuation of existing agreements, but also the immediate implementation of completely new ones. While this might constitute an interesting long-run policy objective, it does not seem to be likely in the current situation. The overall impact of Brexit on SSA will depend on the terms of the withdrawal agreement with the EU. The next months will be crucial to lift the veil of uncertainty surrounding the type of Brexit that will materialize after 2020. SSA should do its best to raise its bargaining power towards the EU and the UK, standing together and pushing forward regional integration. The AfCFTA was an important step towards the long-standing goal of African economic integration, but there is still a long way to go before an integrated continental market exists (Woolfrey et al. 2019). Whatever the impact of Brexit, SSA countries can aim at enhancing the intra-African trade or strengthen their linkages with other regions, namely emerging countries in Asia. Against this background, projects such as the Chinese Belt and Road Initiative are likely to trigger interesting developments.

NOTES

1. After the recent 'crises', but before the COVID-19 pandemic, GDP increased by 3.2 per cent in 2018, and 3.3 per cent in 2019 (IMF 2020). Aggregates and averages mask a high heterogeneity; yet, most African economies have been resilient and gaining momentum. The COVID-19 crisis is, however, undermining the estimates and increasing uncertainty.
2. At the same time, the global and national response to the current COVID-19 pandemic will be crucial for the ability of SSA countries to step up. Four out of the five most harshly hit countries are members of the African Commonwealth (South Africa, Nigeria, Ghana and Kenya). Not only do these countries represent four of the largest economies in the continent, but they are important partners for the UK. This additional source of distress sheds additional uncertainty on the future impacts of Brexit on African development (Kohnert 2020).
3. The UK might reinforce its Aid for Trade activism (Gaynor 2018), using ODA to strike better deals with its African least developed partners, and might even use its position as leading investor (even though the bulk of British FDI concentrates in the energy sector) to press for privileged access to African markets (Kohnert 2018a). The recent move to put the Department for International Development under the Foreign Secretary sounds like a step in this direction, despite the fact that most of the efforts are currently being spent on continuity agreements, extending the same terms of the existing EU-EPA (Abrahams 2020).
4. This point is particularly dear to the Government of Tanzania, which long maintained a stalemate during the EPA renewal bargaining.
5. The recent bargaining of the first trade agreement between the US and Kenya suggests a US renewed interest in the continent (González 2020). Such interest appears to be also supported by the US cooperation strategy, with the international trade and investments targeting the PROSPER programme promoted by USAID. Yet, the overall trade balance between SSA and the US indicates a slow but steady disengagement of the country from the continent (US Census Bureau 2020).
6. For instance the European 'Everything But Arms' (EBA) agreement, which applies to LDCs encompassing 34 (out of 48) countries in sub-Saharan Africa, allows all imports to the EU duty-free and quota-free (DFQF) – i.e. completely free access except for armaments.
7. These factors exacerbated the limits of the colonial infrastructure, usually oriented towards the former colonial power rather than within the region (Bonfatti and Poelhekke 2017).
8. Interestingly, the trade share deterioration hides the limited increase in UK-related trade volume to the region.
9. We estimate a simplified gravity model of trade (following the theoretical and empirical work of Anderson 1979; Anderson and van Wincoop 2003; Yotov et al. 2016; Anderson et al. 2018), by means of Poisson-Pseudo Maximum Likelihood (Santos-Silva and Tenreyro, 2006, 2011). Our model includes several measures of geographic and cultural distance, to take into account the forces shaping international trade patterns. Trade data come from the BACI database (CEPII 2019a). Data on tariffs come from the WB-TRAINS database, and have been used for estimating the baseline (actual trade scenario), as well as to define the counterfactual tariffs in the alternative scenarios. The results (not shown) are available upon request from the authors.

10. As noted above, the two extreme and unrealistic cases are useful as a feasibility interval.
11. An alternative could have been to equal the after-Brexit tariff scheme to the one granted (reciprocally) to Norway. However, the special treatment accorded to Norway does not seem possible for the UK, given that all goods shipped to the country need to undergo the exact same rules they should if they were part of the EU. As the EU laws constitute one of the main arguments supporting Brexit, we considered such a scenario unlikely.
12. The UK is currently part of the EU-SSA EPA, which explains why the countries involved are also the only ones who would lose substantially from a no deal Brexit.
13. Despite the fact that the EU will remain the partner who will lose more from Brexit in absolute terms (as suggested by recent UNCTAD projection: see Coke-Hamilton 2019), its welfare losses are expected to be negligible. Thanks to both the size and the structure of the internal common market, the EU will be able to absorb much of the shock. Oberhofer and Pfeffermayr (2018) estimate the UK loss in terms of export towards the EU to be between 7.2 per cent and 45 per cent of the pre-Brexit level (from an initial loss of 5.9–38.2 per cent in terms of imports from the EU-27). The decrease of exports towards the EU is unlikely to even up with an equivalent increase of exports towards the SSA countries, and the effects on welfare are likely to be substantial. Both results are consistent with and offer an interpretation of the predictions of our model, which do not suggest a massive diversion of UK exports towards SSA. The most notable changes concern the shift in the European network itself, with Germany, Italy and the Netherlands substituting the UK.

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