

Growing Stronger Together – Enhancing Export Competitiveness via Deeper Integration of the East African Community

Wai Kit SI TOU
United Nations Economic Commission for Africa

Abstract

Structural trade deficits are a key challenge for many African countries, especially for those without rich natural resources. To reduce the trade imbalance and sustain rapid economic growth, countries are in need of a robust export strategy. Based on a new line of research, this study analyses the productive capabilities of the five Partner States of the East African Community (EAC)¹ (i.e. Burundi, Kenya, Rwanda, Tanzania and Uganda) through the lens of product space. The analysis shows that the structure of product space governs the evolution of exports. More importantly, it identifies products that have a high potential to boost export performance and create a virtuous cycle of prosperity, thereby informing the development of strategic sectors. Comparing the productive capabilities of the five Partner States with the EAC as a whole, this study indicates that deeper regional integration helps create opportunities for new product development as well as enhance the competitiveness of existing industries, and unveils how countries could benefit from regional production strategy.

JEL Classification: F15, F63, O11, O14

Keywords: regional integration, product space, exports diversification, structural transformation, economic development

I. Introduction: The Product Space Framework

Traditional theory suggests that economic development and the ability to produce different products of a country are determined by the endowments of a number of factors such as land, labour and capital. The factor-based growth models assume that the existing product mix of a country has little or no effect on its economic prospect, and production can be easily adjusted to reflect changes in the relative price of factors.

Recent research, however, argues that the productive structure of a country is constrained by specific capabilities that serve as inputs for other industries and are unlikely to be accumulated in the absence of the products that demand them. That is to say, the ability to produce certain goods or services depends on the capabilities embedded in the mix of products that is currently making. This suggests that structural transformation is not merely a consequence of changes in the relative price of factors according to standard trade theory. More importantly, research shows that existing production does not only reflect the capabilities that a country has, but can also be used to predict its ability to produce as well as its economic development in the future (Hausmann and Rodrik, 2003; Hausmann and Klinger, 2006 and 2007; Hausmann, et al., 2007 and Hidalgo and Hausmann, 2009).

The new line of research provides an instrument called 'Product Space' to analyse the productive capabilities embedded in the mix of products. The product space is a network

¹ The EAC is a regional intergovernmental organisation of six Partner States, comprising Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda. The EAC is home to 150 million citizens, with a land area of 1.82 million square kilometres and a combined Gross Domestic Product (GDP) of US\$ 146 billion at current prices in 2015 (EAC, 2016). Due to data limitation, analysis on South Sudan is not included.

presentation of all exported products. The linkages between different products are mapped by identifying the similarities of know-how required to produce them, as reflected by the probability that a pair of products is co-exported. For example, cheese and curd are closely linked to milk, cream and butter, rather than aircraft parts, and construction materials are related to the processing of minerals more than with textiles.

The structure and dynamic of the product space demonstrate that countries are more likely to develop and export a product that is close by the products that it already exports, which can be measured by the 'distance' between products (from similar to completely different capabilities, ranging from 0 to 1), suggesting path dependency of economic diversification (Hidalgo, et al., 2007 and Hausmann and Hidalgo, 2011). Identifying the strength of linkages between products helps both policymakers and the private sector to recognize where there may be opportunities to move into new products and/or sectors with a reasonable prospect of success.

Under the product space framework, the economic complexity of a country can be quantified by the Economic Complexity Index (ECI) based on the level of diversification and sophistication of exports. The corresponding measure for products is the Product Complexity Index (PCI), with a smaller value for less complex product that many countries can produce. Compared to the conventional growth-related indicators, including years of schooling, credit to GDP ratio, the Worldwide Governance Indicators and the World Economic Forum's Global Competitiveness Index, ECI has a higher explanatory and predictive power on economic growth. In fact, ECI is more than export-oriented growth, trade openness and export diversification. Controlling variables such as increase in the real value of exports, exports to GDP ratio and Herfindahl-Hirschman Index, the positive relationship between ECI and current income level as well as future economic growth remains robust (Hausmann, et al., 2013).²

The remainder of the paper is organized as follows. Section II provides some background on the trade structure of the EAC. Section III presents the product space analysis, identifies the opportunities for product development, as well as discusses the potential benefits of deeper regional integration. Section IV concludes.

II. Background: Trade Structure of the EAC

Before analysing the productive structure via product space, this section highlights several salient characteristics of the EAC's trade structure. Over the past decade, the EAC underwent a substantial expansion in goods trade, with the value of exports and imports rising by more than 60 per cent to around US\$ 13.5 billion and US\$ 31.6 billion in 2016 respectively, yet slower than the increase of GDP which doubled during the same period. Its economic performance remains impressive in recent years, expanding at an annual average rate of 5.6 per cent between 2012 and 2016 - much higher than the world and African averages.³ Having said that, the underperforming exports, evidenced by the structural trade deficits, has been a key constraint to growth. While the trade composition is little changed compared to the situation a decade ago, EAC's export remains dominated by primary commodities, placing

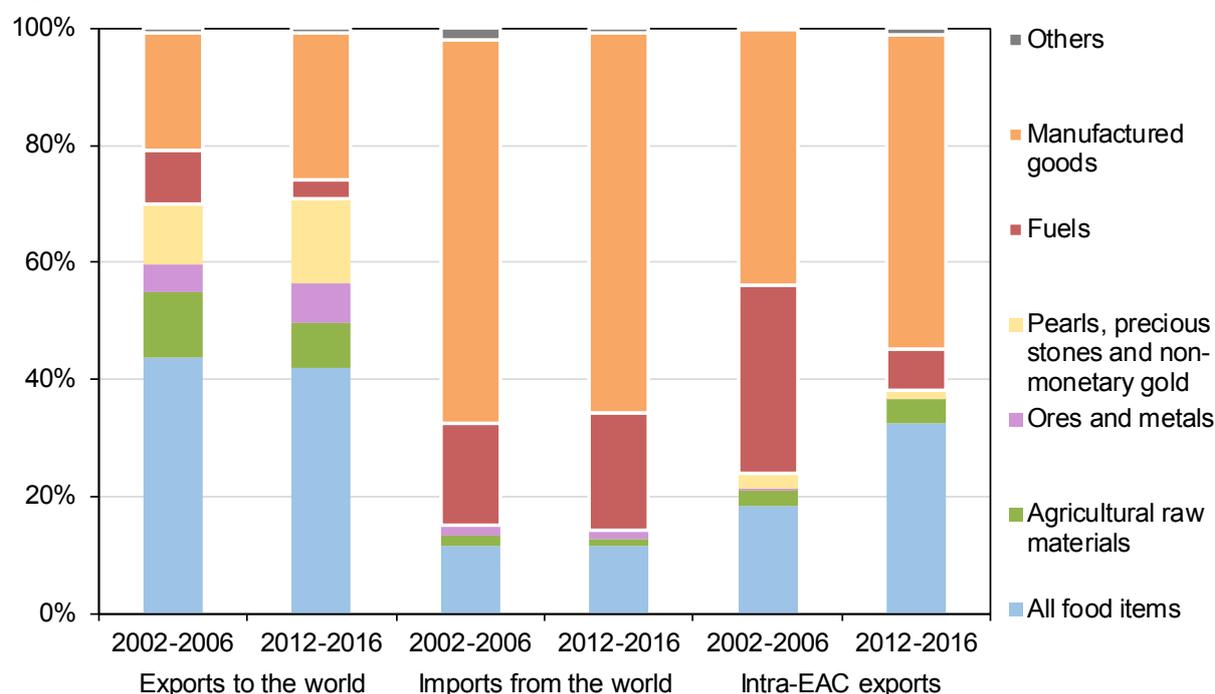
² There are, however, several limitations of applying the product space framework. Firstly, trade data is used as a proxy as production data are not available for a large number of countries, products and years. Secondly, trade data covers only goods but not services nor non-tradable activities. Lastly, the product classification may not be detailed enough to exhaust the critical differentiations of all the products.

³ Author calculations based on national statistics and World Economic Outlook Database, October 2017 (IMF, 2018).

countries in the lower rungs of global value chains and highly vulnerable to commodity price shocks.⁴ This, together with the heavy reliance on capital and consumer goods imports, reveals the weakness of the productive structure (Figure 1). Indeed, the trade deficits have been largely due to the substantial net imports of manufactured goods.

Compared with the composition of exports to the world, the regional trade shows a very different picture, with manufactured goods accounting for over half of the intra-EAC exports, indicating the importance of intra-regional trade for industrial development and the enormous opportunity for country that can produce in these industries (Figure 1). While the shares of intra-EAC exports and imports stayed largely stable at around 20 per cent and 6 per cent respectively over the past decade, the proportion of manufactured goods within intra-EAC exports increased visibly. Although the level of intra-regional trade is far below that of other regional blocks like the Asia-Pacific Economic Cooperation and the European Union, the EAC has the highest share of intra-regional trade among the major Regional Economic Communities (RECs) in Africa and is close to the level seen among Association of Southeast Asian Nations countries (UNCTADstat, 2018). In fact, the EAC is the top performing RECs on regional integration in Africa, with distinctively high score in trade integration (ARII, 2018). Regional trade integration is a cornerstone of EAC policy and Partner States are expected to benefit from enhanced trade flows and improved production efficiency in the community, especially via trade in intermediate goods that helps strengthen regional value chains.

Figure 1: Composition of EAC's Goods Trade by Main Products



Source: Author calculations based on UNCTADstat (2018).

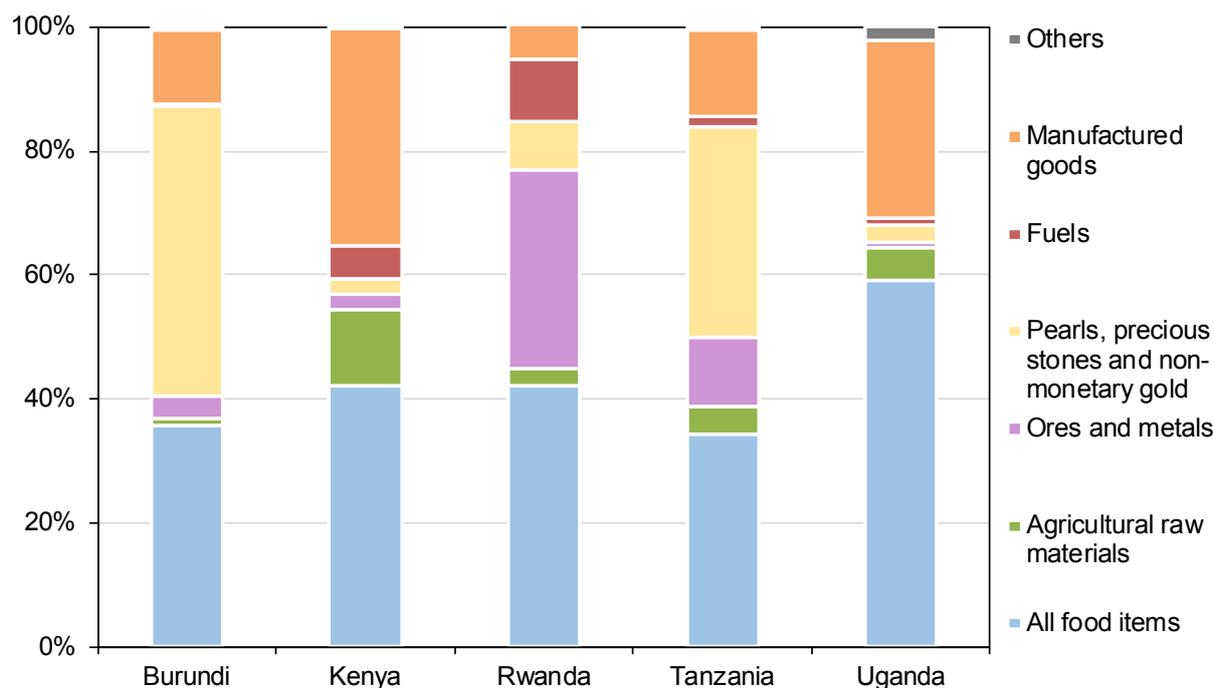
Within the EAC, the exports composition of the five Partner States is rather similar. Primary commodities represent a significant proportion of goods exports to the world, with some countries exporting more ores and metals and some having a larger share of pearls, precious stones and gold exports. The remarkable proportion of manufactured goods exports in Kenya

⁴ Analysis suggests that commodity dependence is negatively associated with human development, and it should be understood as a fundamental development challenge to be addressed as part of the broader development strategies (FAO and UNCTAD, 2017).

and Uganda, which has been increased steadily over the past decade, suggests a more sophisticated productive structure (Figure 2).⁵

⁵ Figure A1 of the Appendix provides the detailed breakdown of goods exports in 2006 and 2016 which indicates a more diversified and complex productive structure of Kenya, Tanzania and Uganda.

Figure 2: Composition of Goods Exports by Main Products, 2012-2016 Average



Source: Author calculations based on UNCTADstat (2018).

III. Application of the Product Space

III.1 Analysis of the Productive Capabilities

Exports composition provides insights about a country's economic structure and growth potential. According to Hausmann, et al. (2013), the amount of embedded knowledge that a country possesses is expressed in the diversity and ubiquity of the products that it makes. From the macro perspective, ECI measures the economic complexity of a country and it helps explain economic development and even predict growth. Specifically, countries with higher ECI have more diversified and sophisticated exports, and are more likely to enjoy faster economic growth compared with countries with the same income level.⁶ In this context, Uganda, Tanzania and Kenya have a relatively high level of complexity given their income level and are expected to be among the top ten fastest growing countries to 2025, though a significant fraction of growth is due to rapid population growth (CID, 2017).⁷

The product space visualizes the productive capabilities that a country possesses. Figures 3 to 7 present the product space of the five Partner States of the EAC in 2006 and 2016, with highlighted nodes indicating the products exporting with revealed comparative advantage (RCA)⁸ larger than one and the size of nodes being proportional to country exports.⁹ To

⁶ Both the ECI and PCI are normalized measures with mean zero and standard deviation of one. They have no absolute interpretation but are for ranking countries and products according to their complexity.

⁷ Due to data limitation, Burundi and Rwanda are not included in the CID's growth projections.

⁸ The RCA is an index that indicates the relative advantage or disadvantage of a country in a certain class of goods or services as evidenced by trade flows. Balassa's RCA is used which is defined as the proportion of the country's certain exports divided by the proportion of world exports under consideration. A country is an effective exporter of a product if it exports more than its "fair share" (i.e. $RCA > 1$).

⁹ Given the relatively small trade size of Burundi and Rwanda as well as the limitation of detailed trade data, the figures are subjected to a large degree of error and thus should be interpreted with caution.

facilitate discussion, products are grouped based on their connectedness and a label is shown at the bottom of the figures.

The product space is highly heterogeneous, with the weakly connected peripheral products (mostly primary commodities) locating on the outer edges of the space and a core of closely connected products (mainly manufactured products and machinery) clustering in the center of the network. It is evident that the complexity of products is positively related to the connectedness (Hausmann, et al., 2013). As such, if a country produces goods in the denser part of the product space, it is easier to expand the production to more complex products because the set of acquired capabilities can be easily redeployed, which in turn increases the opportunities for further diversification. In other words, structural transformation is more challenging for countries specializing in peripheral products. Thus, it is not surprising to see that the development of the manufacturing sector has been lagging behind in the five countries, as evidenced by the stagnant or even declining share of manufacturing value added over the past decade, given the peripheral and sparse productive structures in 2006, especially for Burundi and Rwanda (Figures 3 and 5). While economic complexity increases as countries expand their productive capabilities and start making more complex products, the level of economic complexity of the five countries remains low over the past decade despite more notable improvement in Uganda.

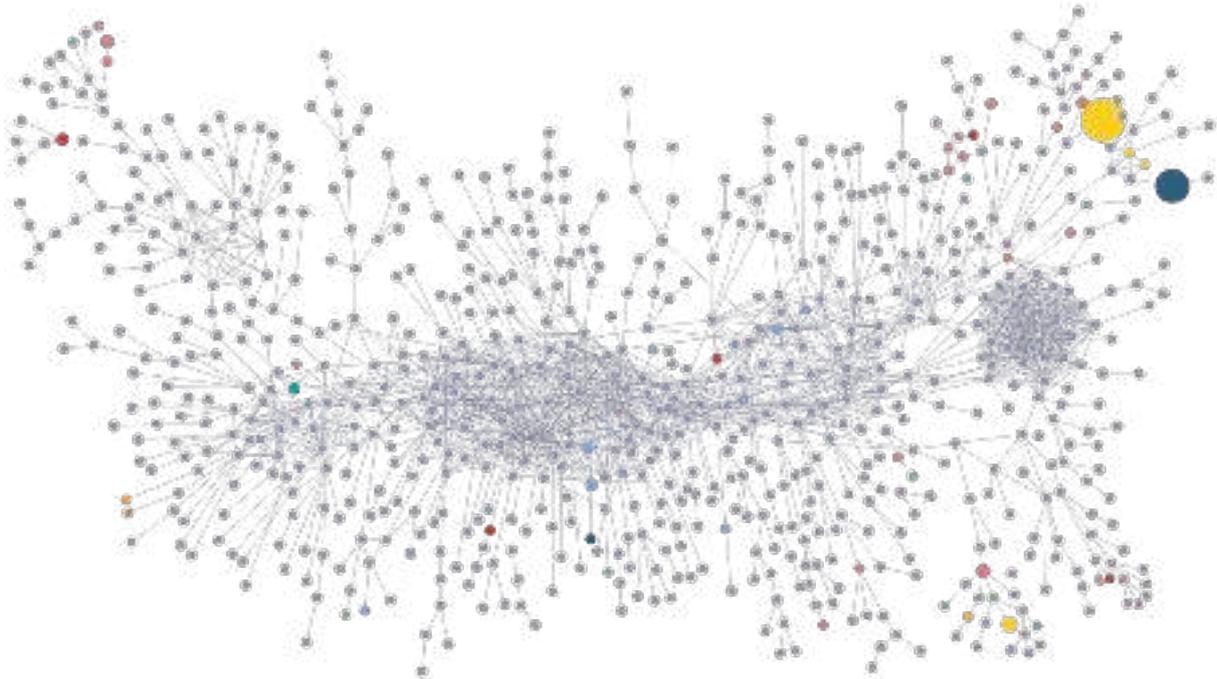
For a closer look at the individual countries, there are not many products with RCA in Burundi. Most of them are food and animal products for food (highlighted in yellow, e.g. coffee, tea, fruits and vegetables) as well as a significant amount of gold exports (highlighted in dark blue), locating in the top and bottom right corners of the product space and weakly connected to other products. The productive structure is little changed between 2006 and 2016 (Figure 3). The situation is similar in Rwanda, yet its more diversified product structure enables a gradual expansion of products which covers numerous manufactured goods (highlighted in red, e.g. cement, leather and fabrics) in 2016 (Figure 5). Having said that, its export remains highly concentrated in a few type of products, with lubricating petroleum oils, ores, gold, tea and coffee accounting for around two-thirds of total exports in 2016. In stark contrast, Kenya, Tanzania and Uganda have RCA in a much larger set of products. Apart from the significant presence in many of the agricultural products and manufactured goods which some of them are commonly found in Burundi and Rwanda, there are a number of more complex products including chemicals (highlighted in purple, e.g. soaps and essential oils) and machinery (highlighted in light blue, e.g. rolling mills, and construction and mining machinery) (Figures 4, 6 and 7). It is noted that Kenya's exports also populate the more densely connected textile products in the center right of the product space (highlighted in green, e.g. different types of outwear).

Table 1 summarises the number of exports with RCA and provides information on the corresponding share of total exports in 2016. The productive structure is the least diversified in Burundi given the merely 27 products (out of the total of around 800 different products under Standard International Trade Classification Revision 2 (SITC2) at the 4-digit disaggregation) with RCA which account for more than 98 per cent of the total exports, whereas the other four countries have RCA in more than 80 products. Analysed by product category, all the five countries are highly specialized in food and live animals products, as well as crude materials except Burundi for the latter. While Rwanda exports a notable amount of mineral fuels and lubricants, gold represents 60 per cent of Burundi's total exports and around 30 per cent and 25 per cent of the total exports of Tanzania and Uganda respectively. Regarding the more sophisticated products, Tanzania stands out in terms of manufactured goods classified chiefly by materials (e.g. fabrics and glass), whereas Kenya have potential to better leverage the various miscellaneous manufactured articles. Exports on chemicals, and machinery and transport equipment are still too small for all the five countries to be

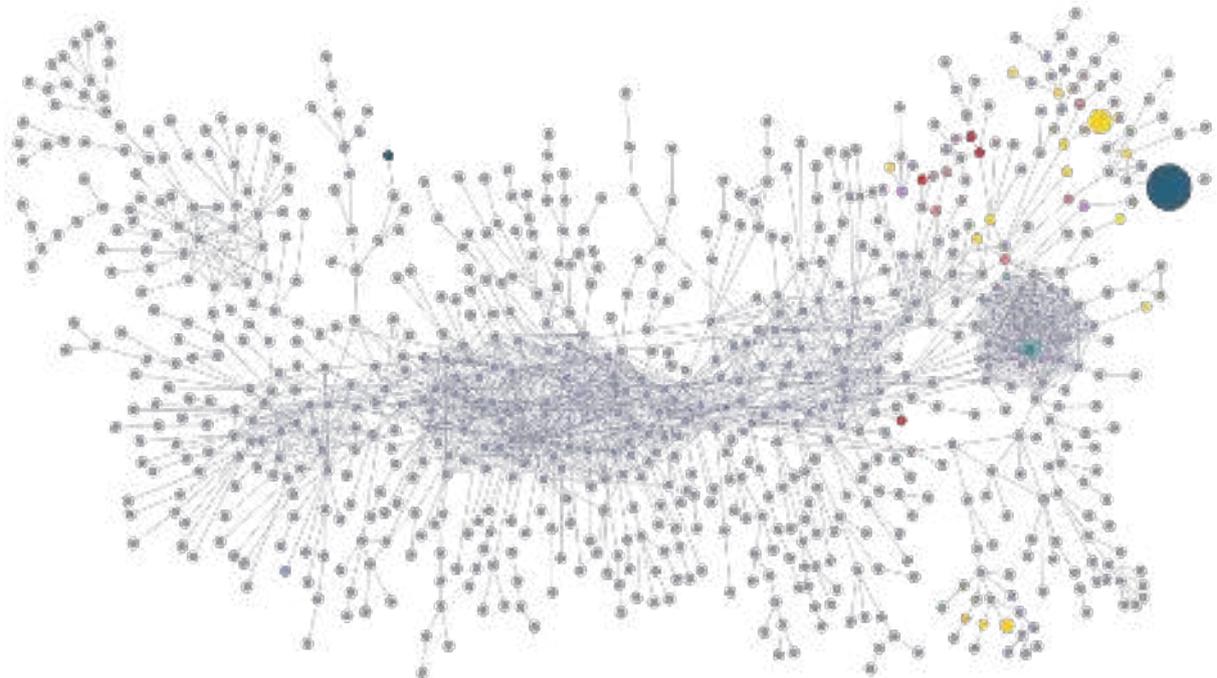
considered as competitive exporters, yet they point to some emergent sectors better connected to the center of the product space which would promote products diversification.

Figure 3: Product Space of Burundi in 2006 and 2016

Burundi in 2006



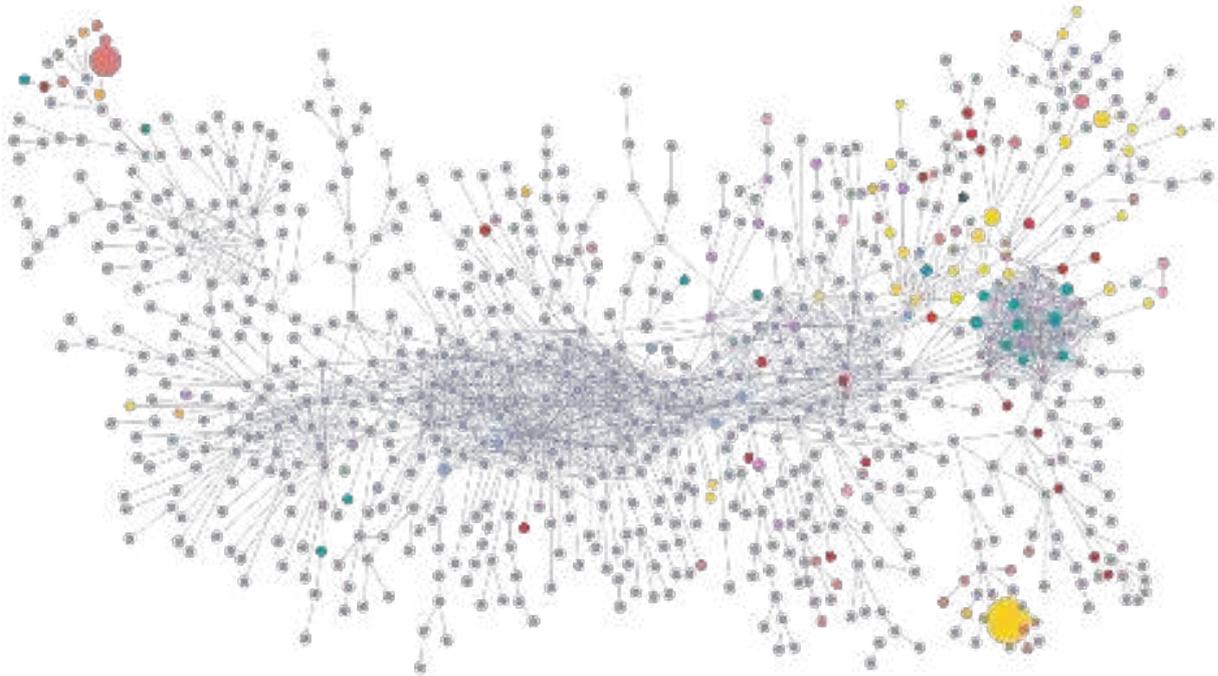
Burundi in 2016



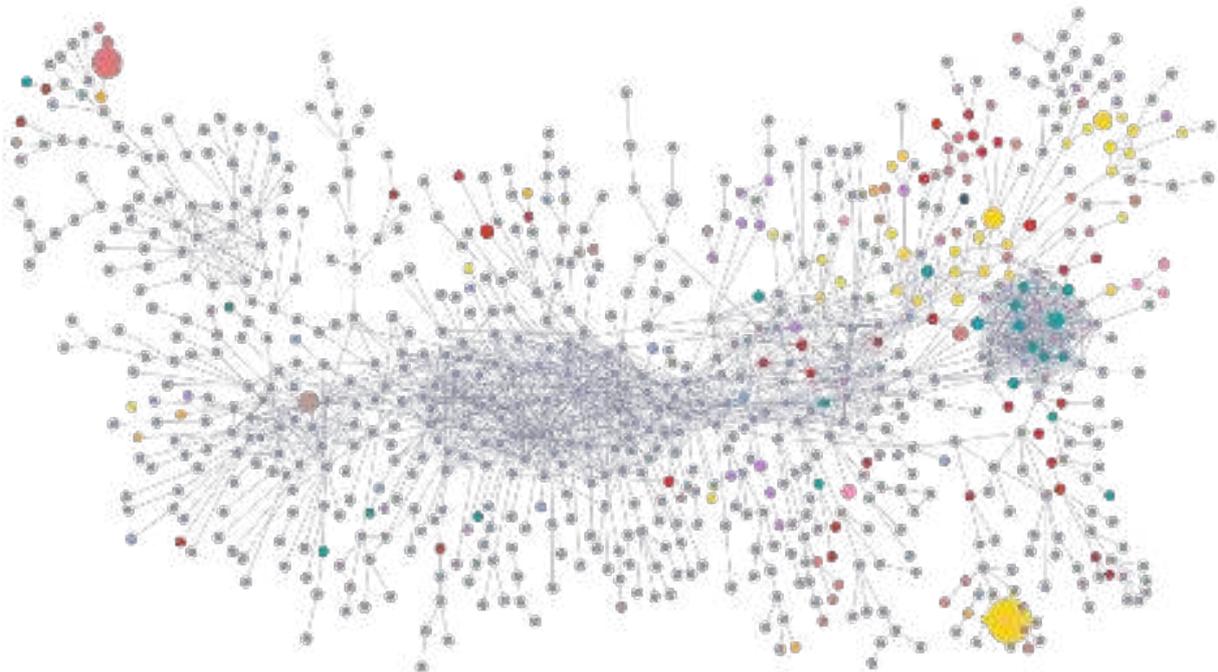
Source: CID (2018).

Figure 4: Product Space of Kenya in 2006 and 2016

Kenya in 2006



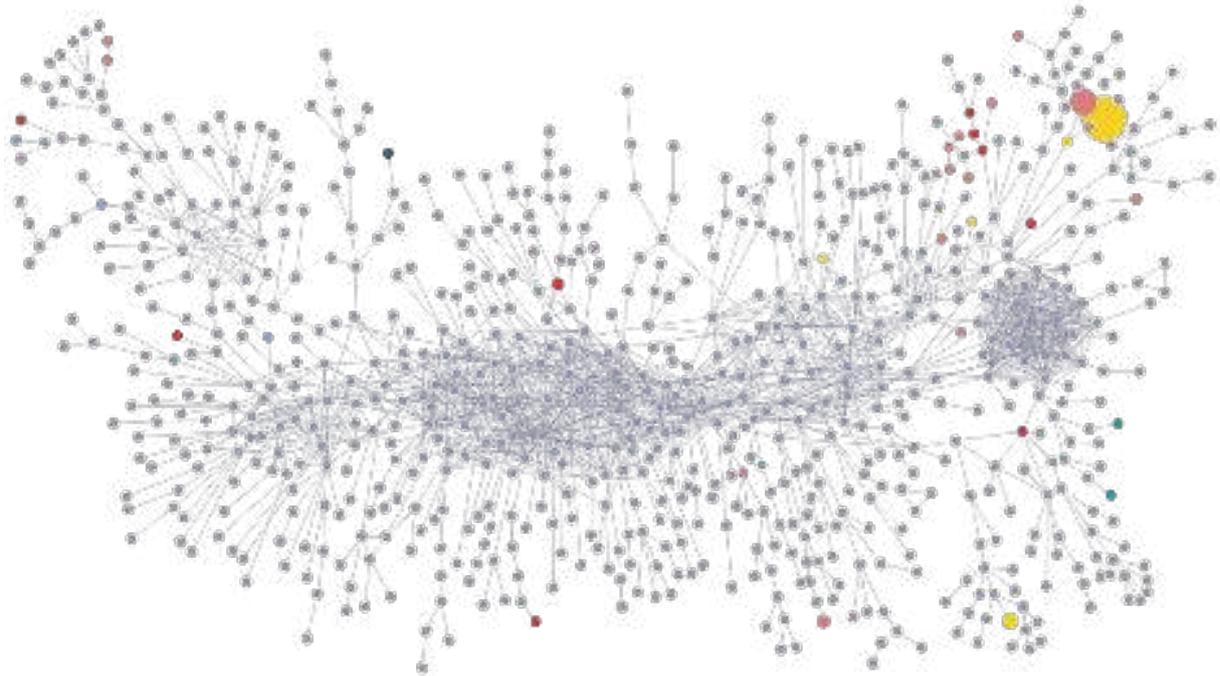
Kenya in 2016



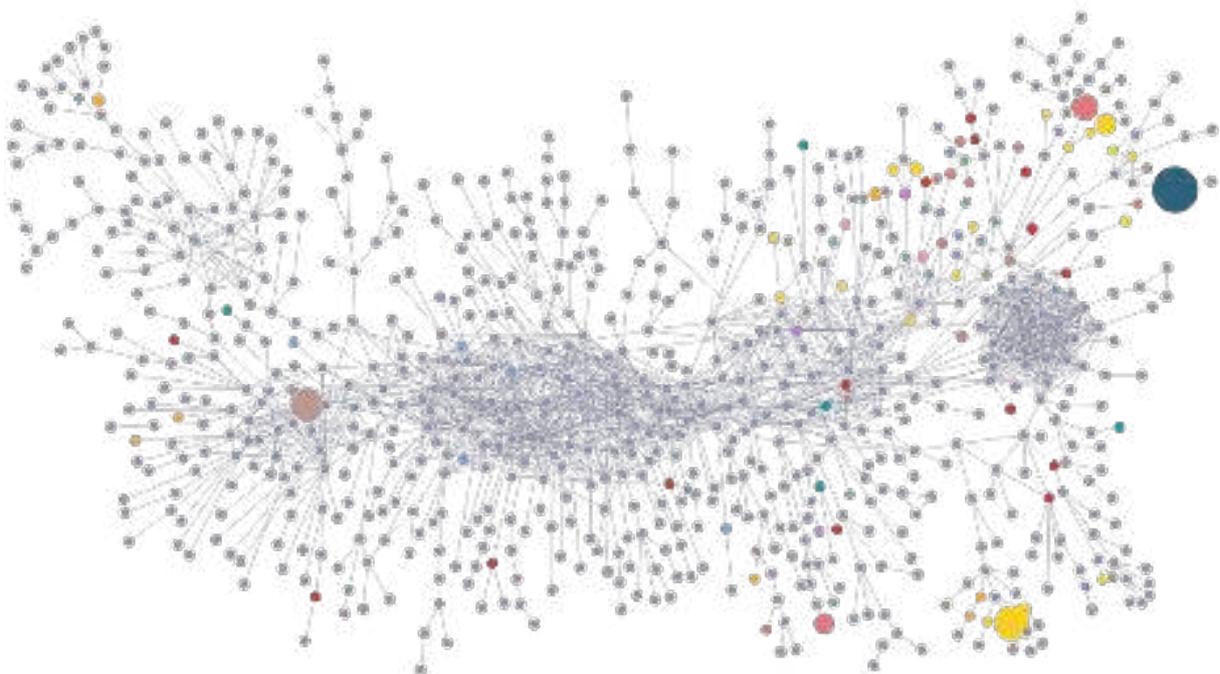
Source: CID (2018).

Figure 5: Product Space of Rwanda in 2006 and 2016

Rwanda in 2006



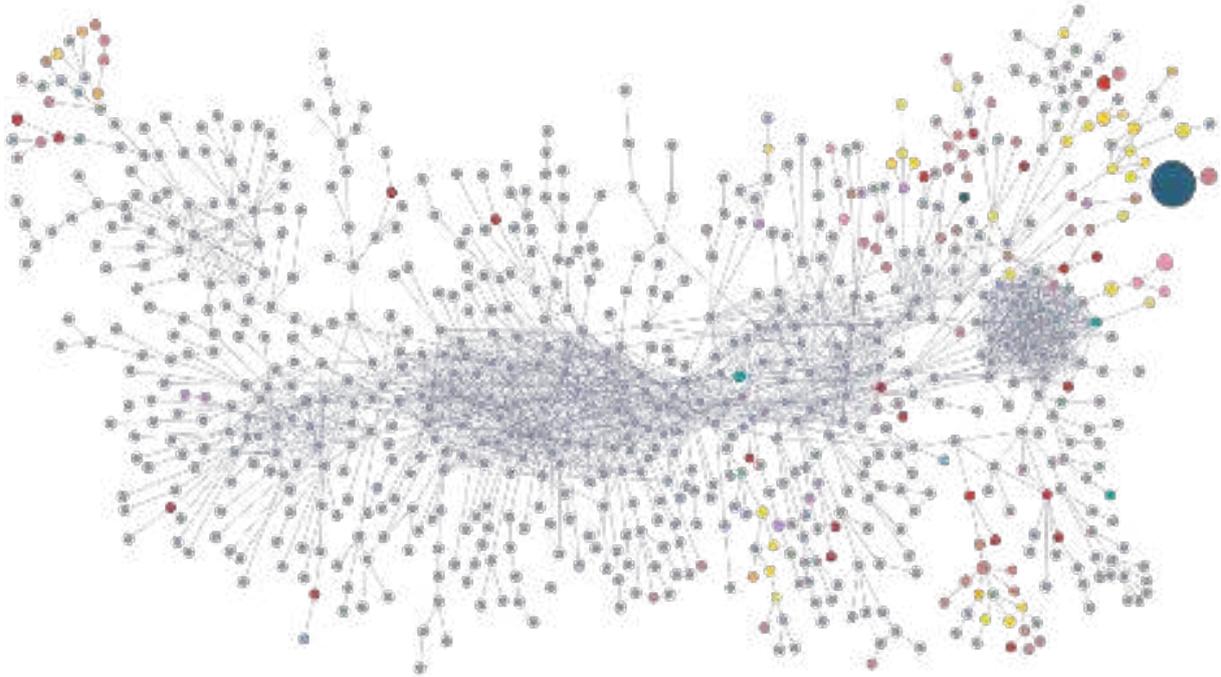
Rwanda in 2016



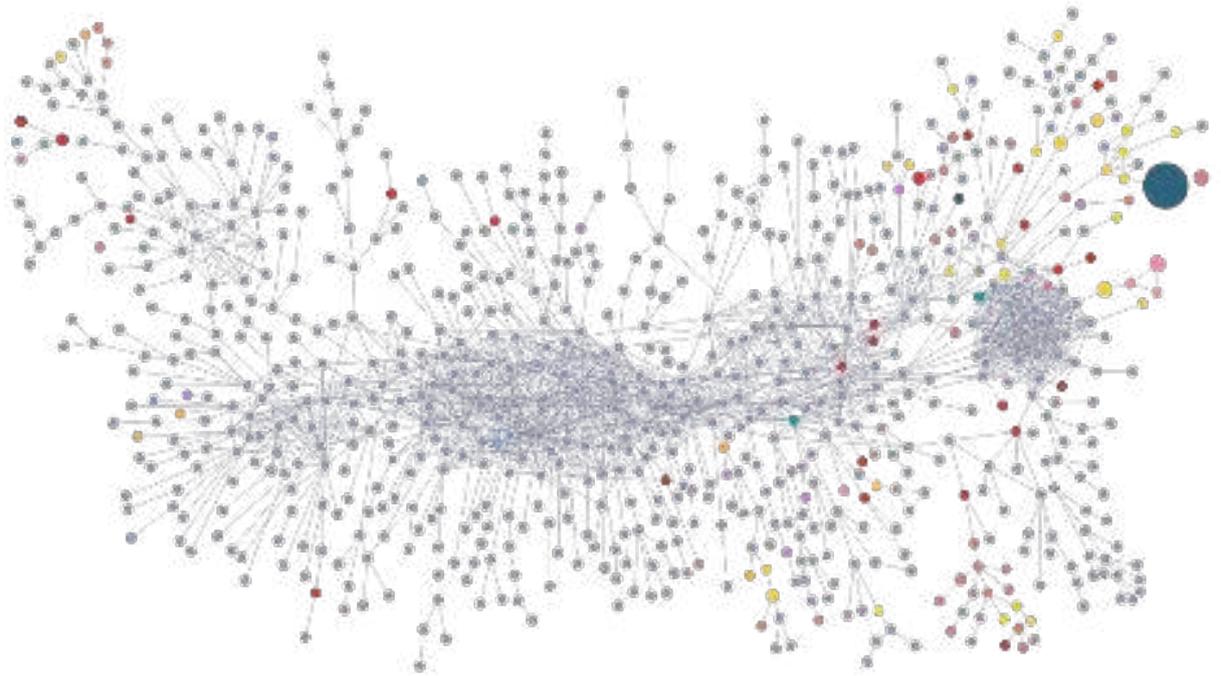
Source: CID (2018).

Figure 6: Product Space of Tanzania in 2006 and 2016

Tanzania in 2006



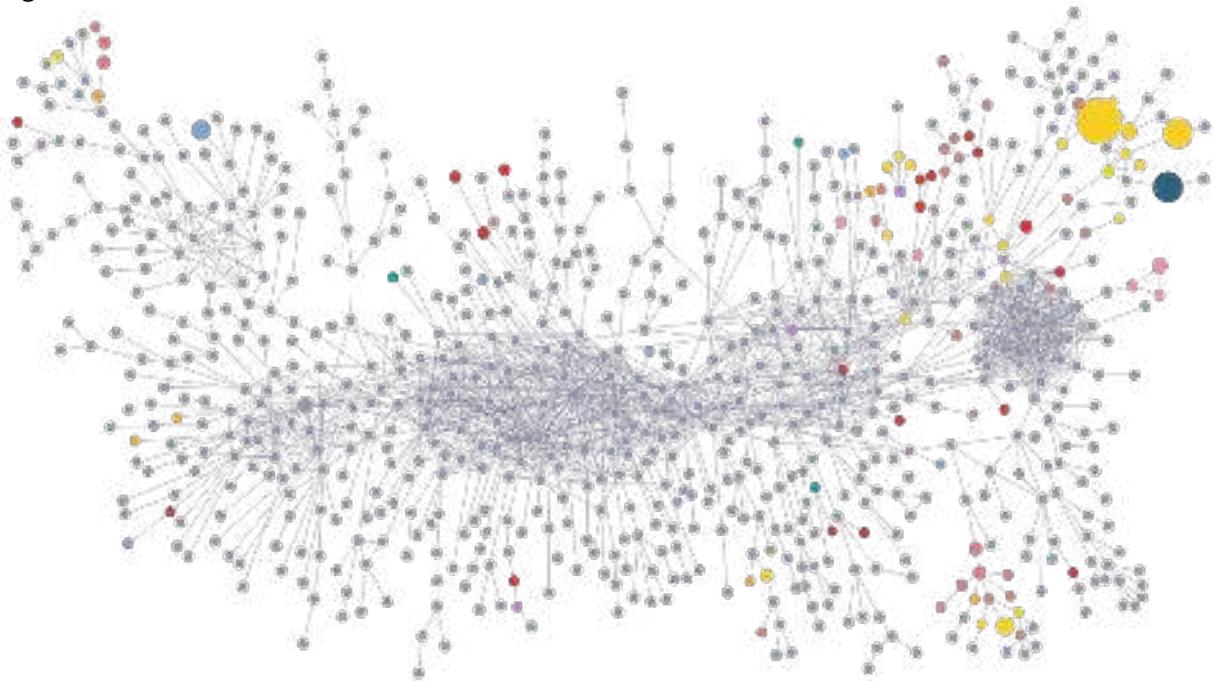
Tanzania in 2016



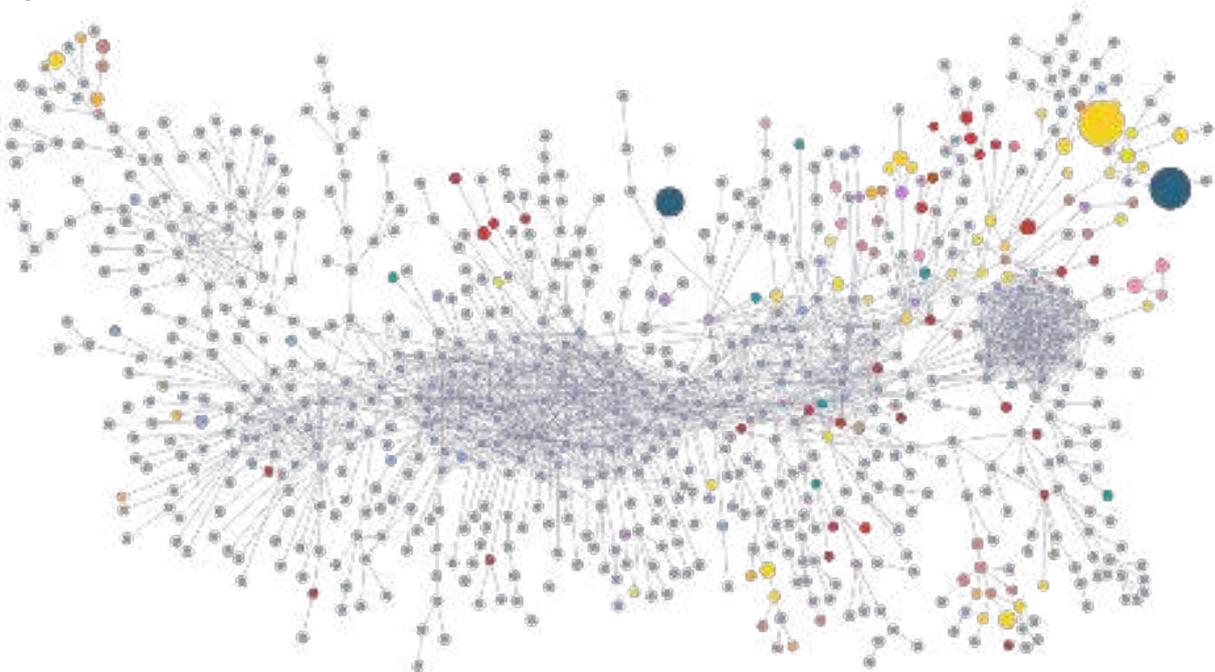
Source: CID (2018).

Figure 7: Product Space of Uganda in 2006 and 2016

Uganda in 2006



Uganda in 2016



Source: CID (2018).

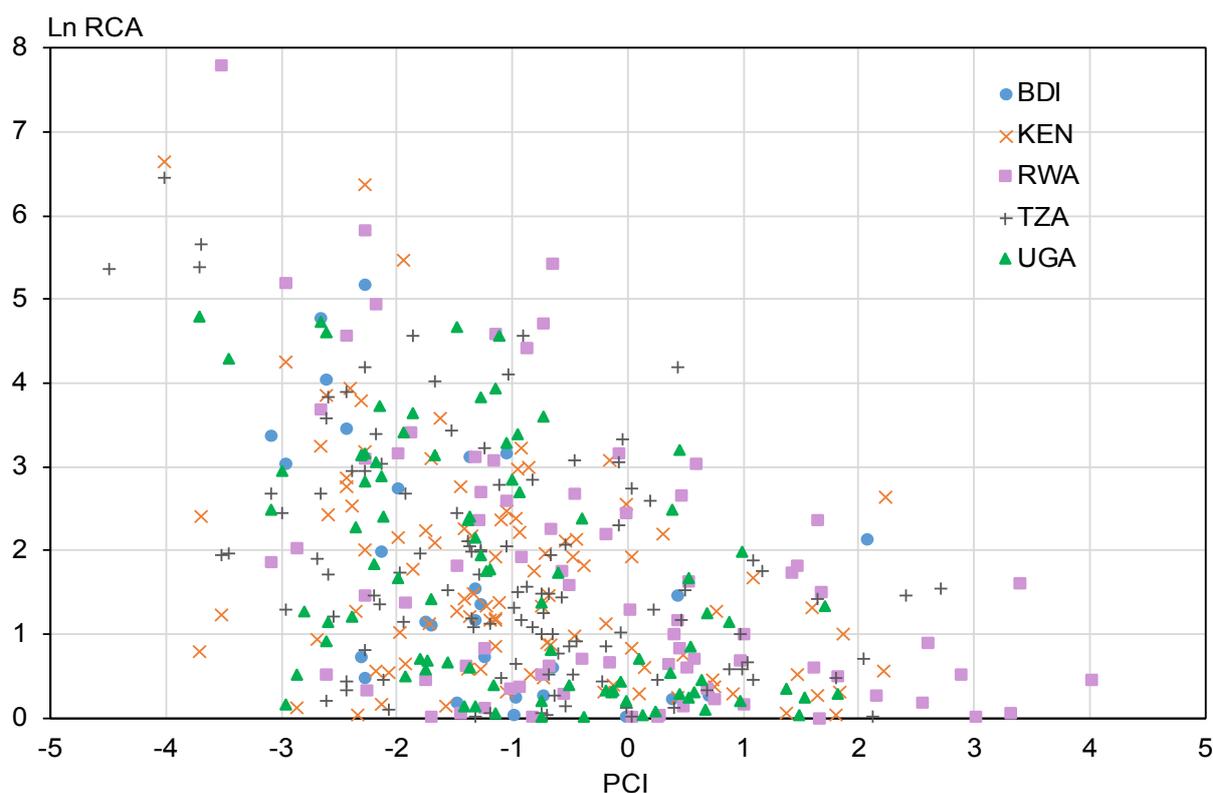
Table 1: Summary of Exports with RCA, 2016

Product Category	Number of exports with RCA (share of total exports)				
	Burundi	Kenya	Rwanda	Tanzania	Uganda
Food and live animals	13 (34.3%)	24 (47.4%)	23 (35.6%)	26 (26.6%)	27 (46.0%)
Beverages and tobacco	0	4 (1.4%)	2 (0.5%)	5 (6.4%)	5 (3.1%)
Crude materials, inedible, except fuels	5 (1.6%)	22 (22.9%)	11 (16.0%)	29 (13.0%)	20 (8.7%)
Mineral fuels, lubricants and related materials	0	0	1 (16.7%)	2 (0.4%)	0
Animal and vegetable oils, fats and waxes	1 (0.02%)	6 (0.6%)	7 (4.1%)	5 (0.4%)	6 (1.7%)
Chemicals and related products	2 (1.6%)	7 (2.0%)	4 (0.8%)	9 (1.4%)	6 (2.1%)
Manufactured goods	4 (0.9%)	15 (2.7%)	18 (3.0%)	25 (13.1%)	16 (7.1%)
Machinery and transport equipment	0	4 (1.8%)	8 (1.4%)	4 (0.2%)	2 (0.1%)
Miscellaneous manufactured articles	1 (0.01%)	14 (9.3%)	6 (0.6%)	4 (1.5%)	3 (0.1%)
Gold	1 (60.0%)	0	1 (13.3%)	1 (29.8%)	1 (24.9%)
Total	27 (98.4%)	96 (88.2%)	81 (91.9%)	110 (92.7%)	86 (93.9%)

Source: Author calculations based on CID (2018).

Analysis at the product level indicates the concentration of similar exports with low complexity. shows that products with higher RCA generally have lower complexity, as reflected by the negative relationship between RCA and PCI. In fact, most of the exports with RCA have negative PCI and they accounted for around 98 per cent, 82 per cent, 86 per cent, 85 per cent and 91 per cent of total exports in Burundi, Kenya, Rwanda, Tanzania and Uganda respectively. Moreover, the list of products with RCA is similar among the five countries. Out of the 400 exports with RCA, less than 60 per cent of them are unique. For example, more than half of the exports with RCA in Rwanda could be found in the other four countries and these products make up more than two-thirds of Rwanda's total exports in 2016. While neighboring countries with intense trade are expected to specialize in different industries to exploit their comparative advantage and benefit from the gains of trade, the similar exports pattern suggests that countries are more affected by the knowledge exists in their neighborhood (Bahar, Hausmann and Hidalgo, 2014).

Figure 8: Products' Revealed Comparative Advantage Versus Product Complexity Index, 2016



Source: Author calculations based on CID (2018).

To supplement, tables A1 to A5 of the Appendix list out the top 20 goods exports of the five countries by exports share.¹⁰ Echoing the above observations, most products have relatively low complexity and some of them are commonly presented in different countries (e.g. coffee, tea, gold and ores), which partly explain the relatively small share of primary commodities in regional trade. It is also noted that the top few products generally have shorter distance, i.e. with similar capabilities as the existing productive knowledge.

III.2 Avenues for Prosperity: Identifying Product Development Opportunities

Further to the indication of productive capabilities that a country possesses, the product space helps identify products that have a high potential to boost economic development and create a virtuous cycle of prosperity.¹¹ As it is easier for countries to develop products that could make use of the existing capabilities, the potential of which countries acquire productive capabilities and open new links to products depends on the abundance of products that are near the current set of productive knowledge. The total value of new productive opportunities can be measured by the Complexity Outlook Index (COI), which is based on the distance between the existing product mix and the products that the country is not making, weighted by the complexity of these products. It is evident that the COI has a positive impact on the growth of ECI (Hausmann, et al., 2013). While the ECI of Kenya,

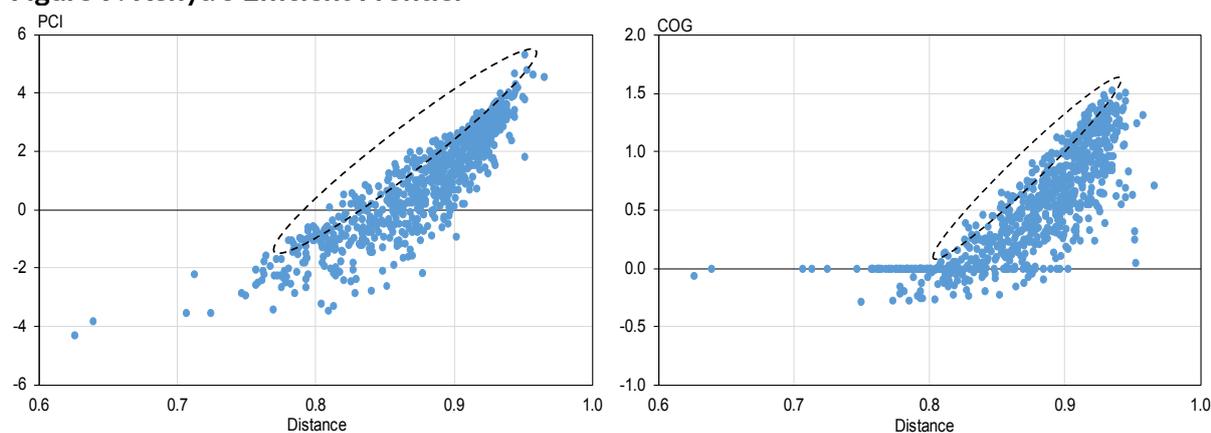
¹⁰ Strictly speaking, some of the exports should be classified as re-exports. For example, Rwanda exports teas to Kenya and the teas are sold through the Mombasa auction. Having said that, the list of top exports is actually similar to the net exports.

¹¹ The product space approach is not the same as the conventional suggestion of moving up production chains as the productive knowledge involved between products in a production chain could be very different.

Tanzania and Uganda are comparable in 2016, Tanzania is expected to have a higher increase in economic complexity given its larger COI.¹²

At the product level, the Complexity Opportunity Gain (COG), which is calculated as the change in COI if a country were to make a new product, is used to quantify the potential benefit in opening diversification opportunities by developing a particular product. Higher COG implies that a product is in the vicinity of more products and/or of products that are more complex. Ideally, a country should diversify into new products that have the highest PCI or COG but the shortest distance. Yet more complex products and those with higher opportunity gain are generally more distant and thus more difficult to be developed. Without loss of generality, Figure 9 illustrate the trade-off and efficient frontier in the case of Kenya.

Figure 9: Kenya's Efficient Frontier



Source: Author calculations based on CID (2018).

Taking into account the trade-off, the preferred products would lie in the top left corner of the figures highlighted by the dashed line. In other words, they are the more complex products and those with the higher opportunity gain given a specific distance. Furthermore, the frontier products could be selected according to four criteria. Firstly, products with PCI below the average PCI of a country's exports with RCA are eliminated. Secondly, products with COG less than or equal to zero are removed. These two conditions ensure that the products to be developed would help improve the complexity of a country's exports. Thirdly, products too distant from the current capabilities are eliminated and the threshold is set at the median distance of the products without RCA. Lastly, the frontier products are those on the left of a diagonal cut off line joining the two points that represent the intersection of the 25th and 75th percentiles of distance and PCI (or COG) of the remaining products. These products can be viewed as having the optimal balance in opening diversification opportunities.

Tables A6 to A10 of the Appendix list out the top 20 frontier products (i.e. products that are farthest away to the left of the cut off line) according to the trade-off between distance and opportunity gain of the five countries.¹³ Apart from the agricultural products, there are

¹² Figures in this and the next subsections are calculated based on UN Comtrade and CID (2018). Only a core set of countries is included to avoid distortion from the fluctuating exports of relatively small countries.

¹³ Compared to PCI, COG gives a more comprehensive measurement of the potential benefit of developing a new product. Having said that, the two set of top 20 frontier products are largely similar. It should be noted that the product space approach is entirely supply side based which assumes no constraints on the demand side. The sets of products are only illustration of one of the many strategies that helps open diversification opportunities. Meanwhile, the products are subject to feasibility check

various types of chemicals and related products as well as manufactured goods. Take Rwanda as an example, the first major product category our analysis identified is processed agricultural products, such as cereal grains, jams, sausages and cheese, which could make use of local agricultural output. Secondly, it is advisable to consolidate the emerging industry of metal and wood articles, including packing containers, cask and drums, as well as construction materials. To further push the productive boundary to more complex clusters, chemical products, such as varnishes, lacquers, phenoplasts and medicaments, represent an enormous opportunity, especially in the regional market.

Given the alike exports composition of the EAC countries, the analysis points to a similar set of frontier products (with less than 50 unique products out of the 100). Yet they are with substantially different distances to the countries' current productive capabilities, with Kenya, Tanzania and Uganda generally having the greatest ease of developing the products while Burundi finding it most difficult. In fact, the commonly shared list of product suggests that countries could benefit from economies of scale based on a regional export strategy with commercialization and production operating at a regional level.

Apart from the selection criteria discussed above, there are various ways to balance the trade-off and pick a list of products that meets the developmental objectives of a country. Different weightings on the distance, PCI and COG could be set to reflect the desired strategy. For instance, between the objectives of creating more jobs and better jobs in Uganda, the strategy of parsimonious transformation focuses on developing products closer to the current set of capabilities which creates more jobs for lower-skilled workers, whereas the strategic bets emphasize on more sophisticated products even they are with greater distance (Hausmann, et al., 2014).

In addition, market opportunities serve as an important reference to match products to different destinations. Given the key constraints in Rwanda (e.g. scarcity of land and natural resources), Hausmann and Chauvin (2015) proposed to target the global markets by developing products with lower complexity and transportation costs, while supply the more complex and higher transport cost products that are imported intensively by the neighboring countries to tap the regional market. Moreover, in-depth analysis on the latent comparative advantage based on factor endowments (e.g. Growth Identification and Facilitation Framework) and binding constraints on economic activity (e.g. Growth Diagnostics) help identify in detail the promising sectors for investment (Lin and Xu, 2016 and Hausmann, et al., 2005). If the list of products neatly fit into a few sectors from the industrial development perspective, a strong sectoral-focus to industrial strategy may be advisable.

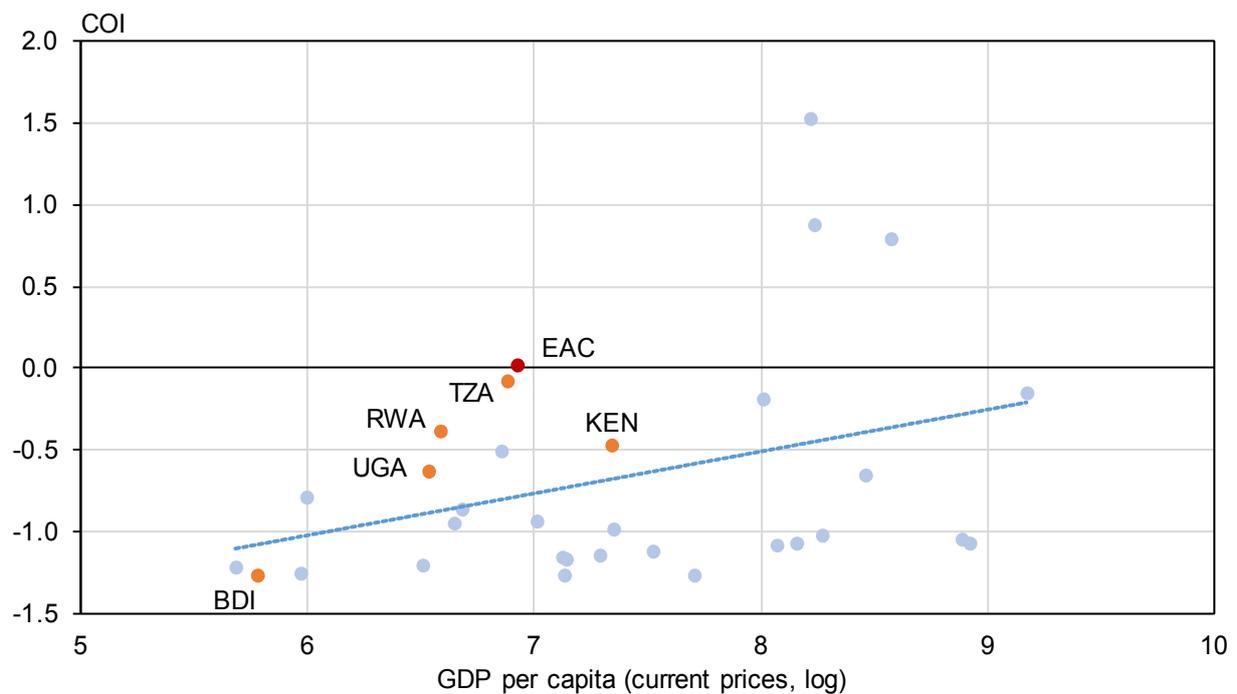
III.3 Potential Benefits of Deeper Regional Integration

To formulate a comprehensive export strategy, it is crucial to take into account the regional context. Regional integration has been one of the top agenda of African countries. As one of the fastest growing regional economic blocs in the world, the EAC has achieved encouraging progress. Regarding trade, the EAC Customs Union became operational in January 2005 and the EAC Common Market Protocol entered into force in July 2010. Against this background, this subsection investigates the potential benefits of an integration of the productive structures of the five Partner States of the EAC and its implications on export strategy. Instead of emphasizing on the promotion of intra-regional trade from a conventional perspective, it reveals the effect of deeper regional integration on the opportunities of product development which is closely related to the economic growth prospect.

based on the specific country context as well as its developmental goals.

To conduct the product space analysis, exports to the world by the five countries are aggregated at the product level and intra-regional exports are removed to avoid double counting, thereby creating a single economic bloc. On a macro level, presents the COI of 31 African countries, together with the EAC, against GDP per capita. Kenya, Rwanda, Tanzania and Uganda are on the left hand side of the trend line, indicating that they have higher values of new productive opportunities given their income levels, and thus are expected to have higher increase in economic complexity as well as better economic growth prospect. Compared to the five Partner States, the EAC stands out with higher potential of acquiring new productive capabilities than any of its members on their own.

Figure 10: Complexity Outlook Index Versus GDP Per Capita, 2016

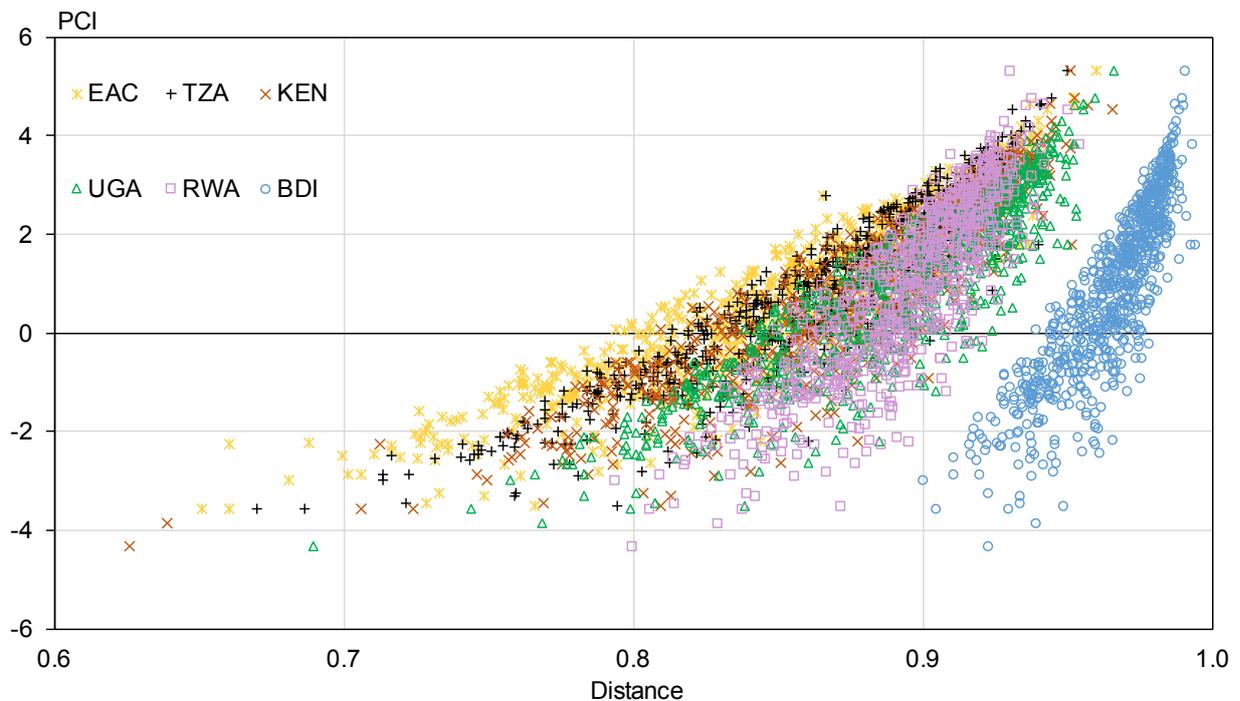


Source: Author calculations based on CID (2018) and IMF (2018).

The potential benefits of deeper regional integration are more vivid at the product level. Figure 11 compares the productive capabilities of the five Partner States with the EAC via the PCI and distance plot of all the products under SITC2. In line with previous analyses, products are most distant away from the productive structure of Burundi, suggesting a more challenging case of exports diversification. The average distance of the products descends from Burundi to Rwanda, following by Uganda, Kenya and Tanzania, and finally to the EAC which is best positioned in the product space and has the largest likelihood of success in producing a great diversity of sophisticated products. Indeed, the EAC has a higher number of exports with RCA and a more diversified exports composition.¹⁴

¹⁴ As for the top 20 frontier products in the EAC, they are quite similar to that of Uganda and Tanzania, but with shorter distance and higher opportunity gain (Table A11 of the Appendix).

Figure 11: Comparison of Productive Capabilities, 2016



Source: Author calculations based on CID (2018).

Compared to the five Partner States, almost all the products are closer to the combined productive structure of the EAC. This indicates the notable degree of complementarity among the five countries, despite exhibiting similar exports composition and product specialization. As a larger economic bloc, new product development is much more feasible. In fact, deeper regional integration has the potential not only to create opportunities for new product development, but can also enhance the competitiveness of existing industries. The decrease in distance, which signifies an increase in the probability of developing a product successfully, is more substantial for products with lower complexity and closer to the existing productive capabilities. Table 2 lists out the top 20 products with the largest average reduction in distance. The products cover various types of fibres which suggest the potential of developing a competitive textile industry. While it is easier for countries to become globally competitive in new industries after gaining competitiveness domestically and among neighboring countries in an incubation period of diversification in production, the enhancement of productive capabilities and the larger market of the EAC have compelling implications for regional integration and its benefits.

Table 2: Top 20 Products with the Largest Average Reduction in Distance, 2016

Rank	Product Code	Product Name	Change in distance	PCI	Exports Share	RCA
1	2655	Manila hemp, raw or processed but not spun, its tow and waste	-0.451	-4.332	0.009%	103.487
2	2654	Sisal, agave fibres, raw or processed but not spun, and waste	-0.209	-3.854	0.340%	629.330
3	2659	Vegetable textile fibres, nes, and waste	-0.176	-2.248	0.009%	21.559
4	2681	Wool greasy or fleece-washed of sheep or lambs	-0.138	-2.229	0.029%	1.487
5	2640	Jute, other textile bast fibres, nes, raw, processed but not spun	-0.137	-3.553	0.236%	144.648
6	6545	Fabrics, woven of jute or other textile bast fibres of heading 2640	-0.118	-2.492	0.022%	17.857
7	6513	Cotton yarn	-0.115	-2.404	0.131%	1.531
8	2225	Sesame seeds	-0.112	-3.565	1.424%	124.409
9	751	Pepper of "piper"; pimento of "capsicum or pimenta"	-0.108	-2.218	0.063%	2.074
10	2631	Raw cotton, excluding linters, not carded or combed	-0.107	-2.857	0.549%	8.248
11	8459	Outerwear knitted or crocheted, not elastic nor rubberized; other, clothing accessories, non-elastic, knitted or crocheted	-0.105	-1.588	0.572%	1.366
12	360	Crustaceans and molluscs, fresh, chilled, frozen, salted, etc	-0.105	-2.276	0.278%	1.111
13	422	Rice, semi-milled or wholly milled	-0.104	-1.768	0.224%	2.051
14	2633	Cotton waste, not carded or combed	-0.104	-1.845	0.005%	1.806
15	2652	True hemp, raw or processed but not spun, its tow and waste	-0.102	-1.497	0.018%	15.167
16	9710	Gold, non-monetary (excluding gold ores and concentrates)	-0.102	-2.970	20.253%	9.807
17	577	Nuts edible, fresh or dried	-0.100	-2.448	4.112%	27.062
18	6597	Plaits, plaited products for all uses; straw envelopes for bottles	-0.098	-1.837	0.004%	1.330
19	2632	Cotton linters	-0.097	-2.543	0.001%	1.259
20	742	Mate	-0.096	-2.164	0.000%	0.000

Source: Author calculations based on CID (2018).

Empirically, it is evident that distance is a significant and robust determinant of the evolution of exports. Consider the following equation for the EAC Partner States (with subscript c)¹⁵ with exports at products level under SITC2 (with subscript p) from 1962 to 2016 (with subscript t). Based on a dynamic panel data model estimated using system-GMM with the lagged dependent variable as instruments and robust standard error, the result shows that the decrease in distance has a substantial positive effect on the RCA (Table 3).¹⁶

$$RCA_{c,p,t} = \alpha RCA_{c,p,t-1} + \beta distance_{c,p,t} + \mu_{c,p} + \varepsilon_{c,p,t}$$

Table 3: Regression Result of the Evolution of Exports

	$RCA_{c,p,t}$
$RCA_{c,p,t-1}$	0.803***
$distance_{c,p,t}$	-62.373***
Observations	160,293

Note: *** denotes significant at 1%.

Source: Author calculations based on CID (2018).

Instead of a hypothetical combination of all the exports of the five countries with intra-regional trade being discounted, it is expected that the economic bloc could better leverage the productive capabilities of its members. Under the best scenario, each product of the EAC would have the maximum RCA among the five countries, if not even higher due to synergy and knowledge exchange. That is to say, the benefits of regional integration would be much more promising with better exchange of productive knowledge and the support of appropriate regional development strategy.

IV. Conclusion

Based on the product space framework, this study has reviewed the productive structures of Burundi, Kenya, Rwanda, Tanzania and Uganda between 2006 and 2016. Compared to the traditional trade and growth theories, the product space provides a new perspective regarding the implications of productive capabilities embedded in the mix of production on exports diversification and economic growth. The peripheral and sparse productive structures characterized by products of low complexity, especially for Burundi and Rwanda, provide an explanation for the lagging behind development of the manufacturing sector over the past decade. Analysis at the product level further indicates the excessive concentration of similar exports (e.g. food and live animals products), which justifies the relatively small share of primary commodities in regional trade.

Apart from the analysis of productive capabilities that a country possesses, the product space reveals the opportunities for product development. In view of the alike exports composition of the EAC countries, a similar set of frontier products is identified, suggesting that countries could benefit from economies of scale based on a regional export strategy. While the lists of products are only illustration of one of the many strategies that helps open diversification, the products are subject to in-depth feasibility examination based on the specific country context as well as its developmental goals.

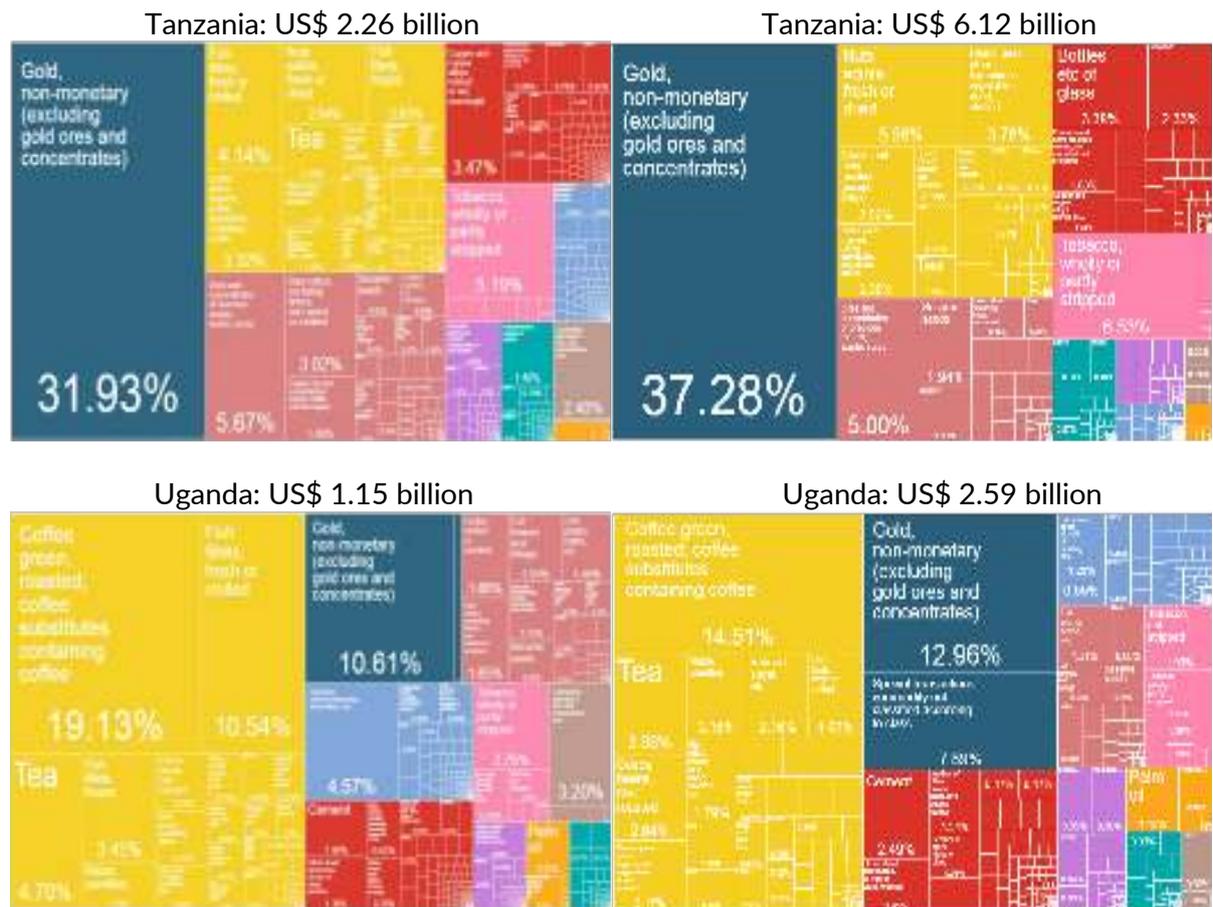
¹⁵ Due to data limitation, only Kenya, Rwanda, Tanzania and Uganda are included in the regression.

¹⁶ The results are similar if RCA is replaced by the value of exports.

More importantly, it is evident that the EAC stands out with higher potential of acquiring new productive capabilities than any of its members on their own, indicating better economic growth prospect as an economic bloc. Despite exhibiting similar product specialization, there is a notable degree of complementarity among the productive structures of the five countries, especially for the textile industry. In fact, most products are closer to the combined productive structure of the EAC, suggesting that deeper regional integration does not only create new opportunities of product development, but can also enhance the competitiveness of existing industries.

This study can be extended to other RECs with comparison of the potential benefits of deeper regional integration. Nevertheless, it should be noted that countries may have different development priorities and plans which make a common regional approach challenging and a cooperative implementation even harder. The barriers and restrictions that limit the movement of goods, services, capital, people and information are only signs of the misalignment of underlying interests. To unite countries and foster regional integration, it is crucial to design arrangements with well internalised incentives for cooperation that ensure mutual benefit.

Figure A1: Composition of Goods Exports in 2006 and 2016 (Con't)



Source: CID (2018).

Table A1: Burundi's Top 20 Goods Exports, 2016

Rank	Product Code	Product Name	Exports Share	RCA	PCI	Distance
1	9710	Gold, non-monetary (excluding gold ores and concentrates)	60.0%	29.1	-3.082	0.908
2	711	Coffee green, roasted; coffee substitutes containing coffee	23.7%	118.0	-2.650	0.928
3	741	Tea	7.8%	176.3	-2.282	0.935
4	2879	Ores and concentrates of other non-ferrous base metals	1.0%	20.8	-2.967	0.920
5	5541	Soaps, organic products and preparations for use as soap	0.9%	23.7	-1.046	0.937
6	579	Fruit, fresh or dried, nes	0.8%	3.2	-1.749	0.927
7	5513	Essential oil, resinoid, etc	0.7%	22.5	-1.364	0.932
8	545	Other fresh or chilled vegetables	0.7%	3.0	-1.709	0.925
9	6116	Leather of other hides or skins	0.6%	56.9	-2.603	0.918
10	812	Bran, sharps and other residues derives of cereals	0.4%	31.5	-2.433	0.929
11	2924	Plants and parts of trees used in perfumery; in pharmacy; etc	0.3%	15.7	-1.985	0.923
12	571	Oranges, mandarins, etc, fresh or dried	0.3%	4.7	-1.313	0.936
13	6651	Bottles etc of glass	0.3%	4.3	0.437	0.954
14	9310	Special transactions, commodity not classified according to class	0.2%	0.1	0.452	0.969
15	2820	Waste and scrap metal of iron or steel	0.2%	1.3	0.697	0.957
16	7781	Batteries and electric accumulators, and parts thereof, nes	0.2%	0.7	1.993	0.981
17	548	Vegetable products roots and tubers, nes, fresh, dried	0.2%	7.4	-2.138	0.922
18	544	Tomatoes, fresh or chilled	0.1%	2.1	-1.235	0.941
19	542	Beans, peas, other leguminous vegetables, dried, shelled	0.1%	1.6	-2.269	0.924
20	574	Grapes, fresh or dried	0.1%	1.3	-0.962	0.946

Source: Author calculations based on CID (2018).

Table A2: Kenya's Top 20 Goods Exports, 2016

Rank	Product Code	Product Name	Exports Share	RCA	PCI	Distance
1	741	Tea	25.6%	579.3	-2.282	0.783
2	2927	Cut flowers and foliage	15.4%	234.5	-1.938	0.791
3	711	Coffee green, roasted; coffee substitutes containing coffee	5.1%	25.6	-2.650	0.764
4	545	Other fresh or chilled vegetables	4.8%	22.2	-1.709	0.779
5	2879	Ores and concentrates of other non-ferrous base metals	3.4%	70.1	-2.967	0.753
6	579	Fruit, fresh or dried, nes	2.5%	9.3	-1.749	0.773
7	8439	Womens, girls, infants outerwear, textile, not knitted or crocheted; other outer garments of textile fabrics, not knitted, crocheted	2.4%	6.8	-1.143	0.789
8	8423	Men's and boys' outerwear, textile fabrics not knitted or crocheted; trousers, breeches and the like	2.3%	10.6	-1.097	0.788
9	589	Fruit prepared or preserved, nes	1.9%	19.9	-0.852	0.793
10	542	Beans, peas, other leguminous vegetables, dried, shelled	1.8%	23.9	-2.269	0.785
11	577	Nuts edible, fresh or dried	1.7%	11.2	-2.587	0.760
12	7224	Wheeled tractors (other than those falling in heading 74411, 7832)	1.6%	14.1	2.228	0.901
13	9310	Special transactions, commodity not classified according to class	1.5%	0.4	0.452	0.895
14	5417	Medicaments (including veterinary medicaments)	1.5%	0.6	2.244	0.884
15	8459	Outerwear knitted or crocheted, not elastic nor rubberized; other, clothing accessories, non-elastic, knitted or crocheted	1.3%	3.1	-1.718	0.763
16	2926	Live plants, bulbs, etc	1.3%	19.4	-0.953	0.805
17	8451	Outerwear knitted or crocheted, not elastic nor rubberized; jerseys, pullovers, slip-overs, cardigans, etc	1.1%	3.2	-1.150	0.787
18	6114	Leather of other bovine cattle and equine leather	0.9%	9.2	-0.943	0.807
19	980	Edible products and preparations, nes	0.9%	2.1	0.486	0.822
20	1222	Cigarettes	0.8%	6.8	-0.478	0.812

Source: Author calculations based on CID (2018).

Table A3: Rwanda's Top 20 Goods Exports, 2016

Rank	Product Code	Product Name	Exports Share	RCA	PCI	Distance
1	3345	Lubricating petroleum oils, and preparations, nes	16.7%	5.8	-0.574	0.873
2	741	Tea	14.8%	335.3	-2.282	0.852
3	9710	Gold, non-monetary (excluding gold ores and concentrates)	13.3%	6.4	-3.082	0.813
4	2879	Ores and concentrates of other non-ferrous base metals	8.9%	181.9	-2.967	0.832
5	711	Coffee green, roasted; coffee substitutes containing coffee	8.0%	39.9	-2.650	0.839
6	2876	Tin ores and concentrates	4.3%	2415.6	-3.518	0.861
7	422	Rice, semi-milled or wholly milled	3.3%	30.5	-1.880	0.862
8	460	Meal and flour of wheat and flour of meslin	2.7%	83.4	-0.873	0.852
9	4312	Hydrogenated animal or vegetable oils and fats	2.1%	98.7	-1.137	0.854
10	4242	Palm oil	1.4%	7.6	-2.870	0.856
11	812	Bran, sharps and other residues derives of cereals	1.1%	95.7	-2.433	0.841
12	470	Other cereal meals and flour	1.1%	111.8	-0.727	0.850
13	11	Animals of the bovine species (including buffaloes), live	1.0%	20.9	0.589	0.878
14	6612	Cement	0.9%	14.9	-1.280	0.844
15	2112	Calf skins, raw, whether or not split	0.8%	224.7	-0.657	0.853
16	7810	Passenger motor vehicles (excluding buses)	0.8%	0.2	2.366	0.910
17	2690	Old clothing and other old textile articles; rags	0.7%	23.5	-0.085	0.876
18	8510	Footwear	0.6%	0.7	-0.236	0.893
19	5541	Soaps, organic products and preparations for use as soap	0.5%	13.5	-1.046	0.846
20	2924	Plants and parts of trees used in perfumery; in pharmacy; etc	0.5%	23.8	-1.985	0.840

Source: Author calculations based on CID (2018).

Table A4: Tanzania's Top 20 Goods Exports, 2016

Rank	Product Code	Product Name	Exports Share	RCA	PCI	Distance
1	9710	Gold, non-monetary (excluding gold ores and concentrates)	29.8%	14.5	-3.082	0.719
2	577	Nuts edible, fresh or dried	7.0%	45.9	-2.587	0.744
3	1212	Tobacco, wholly or partly stripped	5.9%	96.0	-1.856	0.768
4	2890	Ores and concentrates of precious metals, waste, scrap	5.7%	61.1	-1.039	0.788
5	542	Beans, peas, other leguminous vegetables, dried, shelled	4.9%	66.5	-2.269	0.747
6	6651	Bottles etc of glass	4.1%	66.0	0.437	0.831
7	813	Oilcake and other residues (except dregs)	3.6%	17.3	-0.829	0.809
8	6672	Diamonds (non-industrial), not mounted or set	2.9%	3.7	-0.984	0.809
9	711	Coffee green, roasted; coffee substitutes containing coffee	2.9%	14.5	-2.650	0.750
10	2225	Sesame seeds	2.5%	218.5	-3.714	0.685
11	6673	Precious and semi-precious stones, not mounted, set or strung	1.5%	24.9	-1.245	0.789
12	752	Spices, except pepper and pimento	1.0%	29.8	-2.187	0.756
13	342	Fish, frozen, excluding fillets	1.0%	7.2	-1.791	0.775
14	8219	Other furniture and parts thereof, nes	0.9%	1.6	1.085	0.852
15	741	Tea	0.8%	19.0	-2.282	0.754
16	2631	Raw cotton, excluding linters, not carded or combed	0.8%	11.7	-2.998	0.721
17	344	Fish fillets, frozen	0.7%	8.2	-1.378	0.785
18	2690	Old clothing and other old textile articles; rags	0.6%	21.4	-0.085	0.823
19	343	Fish fillets, fresh or chilled	0.6%	16.2	-1.110	0.792
20	812	Bran, sharps and other residues derives of cereals	0.6%	49.0	-2.433	0.752

Source: Author calculations based on CID (2018).

Table A5: Uganda's Top 20 Goods Exports, 2016

Rank	Product Code	Product Name	Exports Share	RCA	PCI	Distance
1	9710	Gold, non-monetary (excluding gold ores and concentrates)	24.9%	12.1	-3.082	0.764
2	711	Coffee green, roasted; coffee substitutes containing coffee	22.9%	114.3	-2.650	0.783
3	721	Cocoa beans, raw, roasted	5.2%	73.1	-3.459	0.781
4	350	Fish, dried, salted or in brine; smoked fish	3.6%	106.5	-1.481	0.820
5	343	Fish fillets, fresh or chilled	3.4%	95.2	-1.110	0.817
6	6612	Cement	2.8%	46.5	-1.280	0.816
7	1212	Tobacco, wholly or partly stripped	2.3%	37.9	-1.856	0.809
8	2927	Cut flowers and foliage	2.0%	30.6	-1.938	0.795
9	2926	Live plants, bulbs, etc	2.0%	30.0	-0.953	0.824
10	542	Beans, peas, other leguminous vegetables, dried, shelled	1.7%	23.7	-2.269	0.790
11	6114	Leather of other bovine cattle and equine leather	1.5%	14.9	-0.943	0.827
12	2225	Sesame seeds	1.4%	120.9	-3.714	0.742
13	2631	Raw cotton, excluding linters, not carded or combed	1.3%	19.0	-2.998	0.781
14	440	Maize, unmilled	1.1%	5.7	-0.601	0.848
15	4312	Hydrogenated animal or vegetable oils and fats	1.1%	51.8	-1.137	0.822
16	6116	Leather of other hides or skins	1.1%	100.7	-2.603	0.792
17	5541	Soaps, organic products and preparations for use as soap	1.1%	26.8	-1.046	0.825
18	344	Fish fillets, frozen	0.9%	10.8	-1.378	0.820
19	341	Fish, fresh or chilled, excluding fillet	0.9%	6.0	-1.187	0.817
20	545	Other fresh or chilled vegetables	0.9%	4.1	-1.709	0.803

Source: Author calculations based on CID (2018).

Table A6: Burundi's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	2882	Other non-ferrous base metal waste and scrap, nes	0.029	0.939	0.022%	0.121
2	980	Edible products and preparations, nes	0.172	0.944	0.004%	0.011
3	2111	Bovine and equine hides, raw, whether or not split	0.164	0.944	0.000%	0.000
4	484	Bakery products	0.219	0.946	0.003%	0.014
5	5334	Varnishes and lacquers; distempers etc	0.655	0.959	0.000%	0.000
6	6996	Miscellaneous articles of base metal	0.779	0.963	0.000%	0.003
7	223	Milk and cream fresh, not concentrated or sweetened	0.388	0.952	0.000%	0.000
8	6421	Packing containers, box files, etc, of paper, used in offices	0.177	0.946	0.001%	0.007
9	481	Cereal grains, worked or prepared, not elsewhere specified	0.215	0.947	0.000%	0.000
10	730	Chocolate and other preparations containing cocoa, nes	0.511	0.956	0.000%	0.000
11	5542	Organic surface-active agents, nes	0.430	0.953	0.010%	0.052
12	224	Milk and cream, preserved, concentrated or sweetened	0.352	0.951	0.000%	0.000
13	251	Eggs, birds', and egg yolks, fresh, dried or preserved, in shell	0.096	0.944	0.000%	0.000
14	541	Potatoes, fresh or chilled, excluding sweet potatoes	0.075	0.944	0.000%	0.000
15	6924	Cask, drums, etc, of iron, steel, aluminium, for packing goods	0.510	0.956	0.058%	0.665
16	5821	Phenoplasts	0.793	0.965	0.000%	0.000
17	8931	Plastic packing containers, lids, stoppers and other closures	0.343	0.952	0.018%	0.057
18	8928	Printed matter, nes	0.889	0.968	0.001%	0.003
19	1110	Non-alcoholic beverages, nes	0.174	0.948	0.006%	0.044
20	6577	Wadding, wicks and textiles fabrics for use in machinery or plant	0.705	0.963	0.000%	0.000

Source: Author calculations based on CID (2018).

Table A7: Kenya's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	484	Bakery products	0.386	0.826	0.008%	0.042
2	6924	Cask, drums, etc, of iron, steel, aluminium, for packing goods	0.653	0.853	0.039%	0.446
3	5335	Glazes, driers, putty etc	1.124	0.893	0.018%	0.235
4	1110	Non-alcoholic beverages, nes	0.352	0.828	0.032%	0.234
5	5821	Phenoplasts	0.904	0.875	0.019%	0.201
6	2112	Calf skins, raw, whether or not split	0.137	0.811	0.001%	0.195
7	2511	Waste paper and paperboard, etc	0.461	0.839	0.041%	0.675
8	481	Cereal grains, worked or prepared, not elsewhere specified	0.370	0.834	0.010%	0.233
9	8424	Men's and boys' outerwear, textile fabrics not knitted or crocheted; jackets, blazers and the like	0.054	0.808	0.001%	0.025
10	6428	Articles of paper pulp, paper, paperboard or cellulose wadding, nes	0.632	0.857	0.014%	0.071
11	5417	Medicaments (including veterinary medicaments)	0.947	0.885	1.458%	0.646
12	583	Jams, jellies, marmalades, etc, as cooked preparations	0.248	0.826	0.009%	0.465
13	8422	Men's and boys' outerwear, textile fabrics not knitted or crocheted; suits	0.022	0.807	0.002%	0.063
14	6997	Articles of iron or steel, nes	0.966	0.887	0.016%	0.066
15	6417	Paper and paperboard, creped, crinkled, etc, in rolls or sheets	0.554	0.853	0.013%	0.351
16	6633	Manufactures of mineral materials, nes (other than ceramic)	0.990	0.890	0.015%	0.138
17	6911	Structures and parts of, of iron, steel; plates, rods, and the like	0.709	0.866	0.056%	0.197
18	6422	Correspondence stationary	0.707	0.866	0.003%	0.514
19	8932	Plastic sanitary and toilet articles	0.856	0.879	0.016%	0.682
20	6577	Wadding, wicks and textiles fabrics for use in machinery or plant	0.820	0.876	0.001%	0.014

Source: Author calculations based on CID (2018).

Table A8: Rwanda's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	5334	Varnishes and lacquers; distempers etc	0.667	0.878	0.019%	0.139
2	8931	Plastic packing containers, lids, stoppers and other closures	0.379	0.867	0.077%	0.242
3	6421	Packing containers, box files, etc, of paper, used in offices	0.209	0.862	0.082%	0.586
4	6924	Cask, drums, etc, of iron, steel, aluminium, for packing goods	0.533	0.876	0.021%	0.242
5	2111	Bovine and equine hides, raw, whether or not split	0.194	0.862	0.000%	0.000
6	481	Cereal grains, worked or prepared, not elsewhere specified	0.252	0.865	0.000%	0.000
7	583	Jams, jellies, marmalades, etc, as cooked preparations	0.093	0.859	0.000%	0.002
8	2820	Waste and scrap metal of iron or steel	0.439	0.873	0.159%	0.988
9	5821	Phenoplasts	0.804	0.889	0.000%	0.000
10	8928	Printed matter, nes	0.891	0.893	0.021%	0.106
11	6996	Miscellaneous articles of base metal	0.782	0.889	0.001%	0.013
12	8922	Newspapers, journals and periodicals	0.909	0.894	0.000%	0.000
13	142	Sausages and the like, of meat, meat offal or animal blood	0.602	0.882	0.000%	0.005
14	730	Chocolate and other preparations containing cocoa, nes	0.525	0.879	0.009%	0.055
15	5335	Glazes, driers, putty etc	1.034	0.900	0.022%	0.278
16	5417	Medicaments (including veterinary medicaments)	0.855	0.893	0.036%	0.016
17	240	Cheese and curd	0.393	0.874	0.000%	0.000
18	6424	Paper and paperboard cut to size or shape, nes	0.605	0.883	0.019%	0.288
19	251	Eggs, birds', and egg yolks, fresh, dried or preserved, in shell	0.135	0.864	0.006%	0.259
20	2511	Waste paper and paperboard, etc	0.337	0.873	0.001%	0.023

Source: Author calculations based on CID (2018).

Table A9: Tanzania's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	5334	Varnishes and lacquers; distempers etc	0.825	0.858	0.019%	0.136
2	5821	Phenoplasts	0.951	0.869	0.003%	0.031
3	6114	Leather of other bovine cattle and equine leather	0.079	0.797	0.064%	0.644
4	6996	Miscellaneous articles of base metal	0.920	0.867	0.019%	0.230
5	5542	Organic surface-active agents, nes	0.614	0.842	0.007%	0.033
6	8928	Printed matter, nes	1.027	0.877	0.081%	0.413
7	980	Edible products and preparations, nes	0.378	0.823	0.004%	0.010
8	8931	Plastic packing containers, lids, stoppers and other closures	0.540	0.837	0.040%	0.125
9	142	Sausages and the like, of meat, meat offal or animal blood	0.755	0.857	0.000%	0.000
10	223	Milk and cream fresh, not concentrated or sweetened	0.561	0.841	0.001%	0.007
11	6577	Wadding, wicks and textiles fabrics for use in machinery or plant	0.858	0.866	0.005%	0.115
12	2820	Waste and scrap metal of iron or steel	0.578	0.843	0.096%	0.601
13	1223	Tobacco, manufactured; tobacco extract and essences	0.290	0.819	0.000%	0.011
14	2511	Waste paper and paperboard, etc	0.488	0.836	0.013%	0.224
15	8922	Newspapers, journals and periodicals	1.032	0.882	0.000%	0.002
16	224	Milk and cream, preserved, concentrated or sweetened	0.518	0.839	0.000%	0.001
17	6421	Packing containers, box files, etc, of paper, used in offices	0.384	0.829	0.090%	0.647
18	620	Sugar confectionery and preparations, non-chocolate	0.203	0.814	0.003%	0.037
19	7239	Parts, nes of machinery and equipment of headings 72341 to 72346	1.012	0.882	0.038%	0.165
20	5417	Medicaments (including veterinary medicaments)	0.983	0.880	0.026%	0.011

Source: Author calculations based on CID (2018).

Table A10: Uganda's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	2112	Calf skins, raw, whether or not split	0.118	0.826	0.001%	0.254
2	5542	Organic surface-active agents, nes	0.570	0.864	0.165%	0.834
3	5821	Phenoplasts	0.916	0.888	0.001%	0.010
4	2882	Other non-ferrous base metal waste and scrap, nes	0.177	0.839	0.102%	0.566
5	5335	Glazes, driers, putty etc	1.139	0.904	0.018%	0.232
6	142	Sausages and the like, of meat, meat offal or animal blood	0.714	0.875	0.000%	0.002
7	6924	Cask, drums, etc, of iron, steel, aluminium, for packing goods	0.644	0.870	0.025%	0.284
8	980	Edible products and preparations, nes	0.321	0.849	0.018%	0.045
9	1110	Non-alcoholic beverages, nes	0.324	0.849	0.106%	0.765
10	6633	Manufactures of mineral materials, nes (other than ceramic)	0.984	0.894	0.013%	0.118
11	8931	Plastic packing containers, lids, stoppers and other closures	0.493	0.862	0.290%	0.920
12	583	Jams, jellies, marmalades, etc, as cooked preparations	0.228	0.844	0.000%	0.001
13	481	Cereal grains, worked or prepared, not elsewhere specified	0.354	0.853	0.000%	0.003
14	2820	Waste and scrap metal of iron or steel	0.538	0.865	0.003%	0.019
15	819	Food waste and prepared animal feed, nes	0.445	0.859	0.083%	0.423
16	484	Bakery products	0.360	0.854	0.025%	0.124
17	8928	Printed matter, nes	0.984	0.896	0.191%	0.978
18	2511	Waste paper and paperboard, etc	0.448	0.860	0.000%	0.000
19	8922	Newspapers, journals and periodicals	1.007	0.898	0.003%	0.115
20	620	Sugar confectionery and preparations, non-chocolate	0.127	0.839	0.004%	0.061

Source: Author calculations based on CID (2018).

Table A11: EAC's Top 20 Frontier Products, 2016

Rank	Product Code	Product Name	COG	Distance	Exports Share	RCA
1	5821	Phenoplasts	0.946	0.857	0.009%	0.091
2	8931	Plastic packing containers, lids, stoppers and other closures	0.600	0.821	0.045%	0.142
3	5334	Varnishes and lacquers; distempers etc	0.919	0.855	0.008%	0.057
4	612	Refined sugar etc	0.106	0.771	0.002%	0.031
5	5335	Glazes, driers, putty etc	1.136	0.879	0.004%	0.057
6	5542	Organic surface-active agents, nes	0.692	0.834	0.051%	0.257
7	2511	Waste paper and paperboard, etc	0.519	0.816	0.022%	0.359
8	819	Food waste and prepared animal feed, nes	0.534	0.818	0.044%	0.225
9	980	Edible products and preparations, nes	0.454	0.810	0.334%	0.816
10	6996	Miscellaneous articles of base metal	0.964	0.863	0.011%	0.135
11	6421	Packing containers, box files, etc, of paper, used in offices	0.472	0.813	0.010%	0.072
12	583	Jams, jellies, marmalades, etc, as cooked preparations	0.343	0.800	0.003%	0.126
13	484	Bakery products	0.452	0.811	0.023%	0.112
14	8422	Men's and boys' outerwear, textile fabrics not knitted or crocheted; suits	0.101	0.775	0.004%	0.139
15	620	Sugar confectionery and preparations, non-chocolate	0.283	0.794	0.013%	0.191
16	5417	Medicaments (including veterinary medicaments)	0.974	0.867	0.100%	0.044
17	6577	Wadding, wicks and textiles fabrics for use in machinery or plant	0.853	0.855	0.003%	0.059
18	8928	Printed matter, nes	1.070	0.878	0.098%	0.503
19	1110	Non-alcoholic beverages, nes	0.464	0.814	0.078%	0.564
20	142	Sausages and the like, of meat, meat offal or animal blood	0.798	0.850	0.009%	0.323

Source: Author calculations based on CID (2018).

References

Africa Regional Integration Index (ARII) (2018). Available at: <https://www.integrate-africa.org/rankings/regional-economic-communities/>

Bahar D., Hausmann R. and Hidalgo C.A. (2014). *Neighbors and the Evolution of the Comparative Advantage of Nations: Evidence of International Knowledge Diffusion?* Journal of International Economics 92(1), 111-123.

Center for International Development at Harvard University (CID) (2018). *The Atlas of Economic Complexity*. Available at: www.atlas.cid.harvard.edu (Accessed 27 February 2018)

_____ (2017). *The Atlas of Economic Complexity: International Growth Projections*. Available at: <http://atlas.cid.harvard.edu/rankings/growth-projections/>

East African Community (EAC) (2016). *East African Community Facts and Figures (2016) Report*.

Food and Agriculture Organization of the United Nations (FAO) and United Nations Conference on Trade and Development (UNCTAD) (2017). *Commodities and Development Report 2017: Commodity Markets, Economic Growth and Development*. Available at: http://unctad.org/en/PublicationsLibrary/suc2017d1_en.pdf

Hausmann R. and Chauvin J. (2015). *Moving to the Adjacent Possible: Discovering Paths for Export Diversification in Rwanda*. CID Working Papers No. 294. Available at: <https://growthlab.cid.harvard.edu/publications/moving-adjacent-possible-discovering-paths-export-diversification-rwanda>

Hausmann R. and Hidalgo C. A. (2011). *The Network Structure of Economic Output*. Journal of Economic Growth, 16(4), 309-342.

Hausmann R. and Klinger B. (2007). *The Structure of the Product Space and the Evolution of Comparative Advantage*. CID Working Paper No. 146. Available at: <https://growthlab.cid.harvard.edu/publications/structure-product-space-and-evolution-comparative-advantage>

_____ (2006). *Structural Transformation and Patterns of Comparative Advantage in the Product Space*. CID Working Paper No. 128. Available at: <https://growthlab.cid.harvard.edu/publications/structural-transformation-and-patterns-comparative-advantage-product-space>

Hausmann R. and Rodrik D. (2003). *Economic Development as Self-Discovery*. Journal of Development Economics 72, 603-633.

Hausmann R., Cunningham B., Matovu J., Osire R. and Wyatt K. (2014). *How Should Uganda Grow?* CID Working Papers No. 275. Available at: <https://growthlab.cid.harvard.edu/publications/how-should-uganda-grow>

Hausmann R., Hidalgo C. A., Bustos S., Coscia M., Simoes A. and Yildirim M.A. (2013). *The Atlas of Economic Complexity: Mapping Paths to Prosperity 2nd ed*. Cambridge: MIT Press. Available at: <https://growthlab.cid.harvard.edu/publications/atlas-economic-complexity-mapping-paths-prosperity>

Hausmann R., Hwang J. and Rodrik D. (2007). *What You Export Matters*. Journal of Economic Growth 12(1), 1-25.

Hausmann R., Rodrik D. and Velasco A. (2005). *Growth Diagnostics*. Available at: <https://growthlab.cid.harvard.edu/publications/growth-diagnostics-0>

Hidalgo C.A. and Hausmann R. (2009). *The Building Blocks of Economic Complexity*. Proceedings of the National Academy of Sciences of the United States of America 106, 10570-10575.

Hidalgo C. A., Klinger B., Barabási A. L., and Hausmann R. (2007). *The Product Space Conditions the Development of Nations*. Science, 317(5837), 482-487.

International Monetary Fund (IMF) (2018). *World Economic Outlook Database, October 2017 Edition*. Available at: <https://www.imf.org/external/pubs/ft/weo/2017/02/weodata/index.aspx> (Accessed 27 February 2018)

Lin J. and Xu J. (2016). *Applying the Growth Identification and Facilitation Framework to the Least Developed Countries: The Case of Uganda*. United Nations Committee for Development Policy Background Paper No. 32. Available at: http://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2016_32.pdf

United Nations COMTRADE Database (UN Comtrade) (2018). Available at: <https://comtrade.un.org/> (Accessed 27 February 2018)

UNCTADStat (2018). United Nations Conference on Trade and Development (UNCTAD). Available at: <http://unctadstat.unctad.org/EN/> (Accessed 27 February 2018)