Effect of Rwanda's membership of the East African Community (EAC) on export diversification

Alexis Kabayiza [1*]**, Eric Kabayiza** [2]**, François Ndwaniye** [1]**, Fidele Niyitanga** [1]

[1]Department of Rural Development and Agricultural Economics (RDAE), University of Rwanda, Rwanda
[2]Quality Assurance Unit, National Agricultural Export Development Board NAEB, Rwanda

ABSTRACT

Rwanda is a member of different regional economic blocs to boost its exports and export diversification. This study analyzed Rwanda's export diversification, performance after joining the East African Community (EAC). The study used data on Rwanda's export to the EAC countries from 2001 to 2016 extracted from COMTRADE database. A 4-digit level has been used to assess the increase in the number of products exported and the Herfindahl-Hirshman index (HHI) to measure the share and improvement of the top 5 exports products before and after joining the EAC. Results showed a decreasing in the volume of top 5 Rwandans exported products to EAC after joining the block. However, the observed increase in the export earnings from EAC was fueled by the specialization of selected export products and the introduction of new products lines into the Rwandan export mix. The Herfindahl-Hirshman index below 0.5 indicated that Rwandan exports into EAC are still highly concentrated; though there was a progressive reduction of the diversification index valuing from 0.5 to 0.3 of HHI. Custom union with EAC countries had a positive effect on observed improvement in HHI value since the coefficient of dummy EAC is positive. The Herfindahl's indices above 0.4 in most cases indicate that Rwanda export earnings from EAC are generated by a small number of products i.e. Rwanda has specialized in the limited number of products. However, membership into EAC reduced export concentration and increased the chances of exporting a wider variety of goods. This would call for an emphasis on policy promoting diversification of exports focusing not only to traditional cash crops tea and coffee but also on non-traditional export crops that are less affected by international market price volatility in order to support and reinforce the membership of Rwanda into EAC and the benefits derived from the membership.

Keywords: East African Community, export diversification, Rwanda

1 Introduction

Historically, Rwanda's major exports have been composed of tea, coffee, pyrethrum, tin and ores. The prices of these commodities are subject to fluctuation on the international market. As a result, these export commodities have not been able to cover Rwanda's export needs (MINECOFIN, 2000). From 1992-1998 coffee and tea constituted 80% of the total exports (IMF, 2000) and only 5 % of Rwanda's exports were exported to Sub-Saharan Africa while industrialized countries absorbed the bulk of Rwanda's exports (80%) and economies in transition importing the remaining. In 2002, Rwanda exported 106 out of more than 10,000 products to EU tariff classification. Only 13 products were exported to the USA and just 2 products to Japan (Republic of Rwanda, 2005). In 2014, Rwanda's exports of both goods and services amounted to US$1.3 billion (MINICOM, 2015) from $374 million in 2009 (BNR, 2016). The fact that Rwanda has been dependent on a few primary products for foreign trade made it vulnerable to external shocks such as commodity prices volatility and unpredictable declining terms of trade.

After the end of the genocide against Tutsi in 1994, Rwanda started to put in place institutional and policy reforms businesses. These included market-determined exchange rates, removal of price control, liberalization of domestic marketing, decontrolled interest rates, etc. (IMF, 2000). Through the Rwanda Vision 2020, Rwanda set an ambitious goal for the country to become a middle-income country by 2020 through transforming its subsistence economy into a knowledge-based economy (MINECOFIN, 2013). One of the strategy envisaged is a diversification of the economy through a proliferation of non-agricultural economic sectors.

The exports growth and diversification appeared as the main policy priority in different policy implementation framework such as Poverty Reduction Strategy Paper (PRSP) (MINECOFIN, 2002, 2007, 2013), Economic Development and Poverty Reduction Strategy (EDPRS 1, 2 and 3) as well as the National Export Strategy (MINICON, 2011). In terms of exports of goods and services, Rwanda targeted the diversification of its export basket through investment attraction and export promotion for traditional export sectors (tea, coffee, mining, tourism), emerging exports sectors (such as services like logistical services, ICT related services and new agriculture and processed goods) and future opportunities. The achievement has been remarkable. The economic growth in terms of real GDP increased from 5,783 to 10,166 USD billion in the period from 2010 to 2018. In addition, exports of major products increased at 11.9 from 2010 to 2017 (World Bank, 2018).

While results on Rwanda export performance show significant achievement, both exports to the rest of world and to regional economic blocs to which Rwanda is a member; studies on linkage between export diversification and trade liberalization in regional economic communities have provided mixed results. Some studies found that integration increases the export diversification while others showed that membership can have a positive impact on the export diversification only in the long run. (Beine and Coulombe, 2006), (Babatunde, 2006), (Farazi, 2011) and (Dingemans and Ross, 2012) observed that membership to an economic bloc may lead to a better export performance for one economic bloc and may not have a positive effect on the other. This gap in understanding the relationship between regional integration and export diversification generated questions as of what has happened to Rwanda as a member of EAC. This study aimed to analyze whether Rwanda membership into EAC was associated with the changes in the volume and the range of products exported into EAC.

2 Materials and Methods

2.1 Data sources, nature and use

The study used bilateral export data defined as Harmonized Commodity Description and Coding Systems (HS 1996) at the 4-digit level for Rwanda export products. These are the disaggregated trade data for 15 years (2001 to 2016) from COMTRADE database. Data were collected for Rwandan exports to all importing trade partners (Burundi, Kenya, Tanzania and Uganda) from EAC and to 15 other major trading partners of Rwanda chosen based on their regularity as an export destination for six consecutive years before 2007; the year Rwanda officially joined the EAC. The data only concerned exports to EAC and other important trading partners before and after integration into EAC. The data also include the top 15 importers of Rwandan products to estimate the number of exported products to major importing countries. In order to identify if export diversification was among trade potential that Rwanda can gain from its integration into EAC was first done through calculation of Herfindahl-Hirshman Index of Rwanda exports (HHI) then using the gravity model to assess the effect of EAC integration on export diversification.

2.2 Analysis

The change in the share of the top 5 exports products into EAC was assessed using the Herfindahl-Hirshman Index of Rwanda exports to the East African Community over the period ranging from 2001-2016. The formula used for determining the HHI index is as follows:

$$HHI = \sqrt{\sum_{i=1}^{n} \left(\frac{X_{ijt}}{X_{jt}} \right)^2} \qquad (1)$$

where, HHI = Diversification or concentration index of a country or country group, X_{ijt} = Value of export for country j in the product i in year t, X_{jt} = Total exports for country j in year t.

HHI took the value, ranging between zero and one. The highest value that Herfindahl-Hisshman indexes can take is one. This happens when the exports are made by one group of products and exported to one country trade partner. If the HHI index is 1 or very close to one, then exported products are very concentrated. However, if the exports are made by a large number of product groups or export to different market destinations, then the value of the Herfindahl-Hirshman index is closer to zero and the exports are diversified. Simultaneously, the share of the top 5 export products was calculated using the Harmonized System (HS-4) data at 4 digit-level of disaggregation. The share showed the level of dominance of the 5 largest export product lines in the total exports' basket of a country. The exports products were characterized as concentrated when the share of the percentage of 5 export product lines was higher while they were described as more diversified when the percentage was lower.

2.3 The empirical model

The following gravity model was estimated for determining major factors influencing diversification. The following Poisson regression model was estimated:

$$\begin{aligned} \text{Div}_{ijt} = exp \left(\hat{t} + \text{CB}_{ijt} + \text{DEAC}_{ijt} + \text{CL}_{ijt} + \text{C}_{ij} \right) \\ \times ln\text{GDP}_{it} \times ln\text{GDP}_{jt} \times ln\text{GDPpc}_{it} \\ \times ln\text{GDPpc}_{jt} \times ln\text{d}_{tij} \times \sum ijt \end{aligned}$$

$$(2)$$

where, Div_{ijt} means export diversification, an indicator of Rwanda exported products in line with its EAC trade partner j at a time or year t; $\hat{t}$ = Estimator representing time fixed effects; DEAC_{ijt} is a dummy variable which took the value of 1 when the export takes place at the time when Rwanda is a member of EAC and 0 otherwise; GDP_{it} and GDP_{jt} are the log of nominal GDP in US dollars respectively, for Rwanda and importing countries at time t; GDPpc_{jt} is the individual income influences their capacity to afford buying and producing different products; d is the geographical distance between Rwanda and importing country that cause friction of trade flows; CB = common boarder; CL = common language; C = colonizer power.

Sharing a border, having a common language, sharing a common colonizer are all dummy variables and are all either 0 or 1.

3 Results and Discussion

3.1 The trend in the number of exported products into EAC

An annual average of 56 exported products lines defined at HS 1996, 4-digit level, from 2001 to 2007, and 141 products lines from 2008 to 2016 was calculated. The results highlight a rapid and upwards increases in the number of products exported to EAC and a stagnant number of exports to non-EAC countries with Democratic Republic of Congo (DRC) as an exception. For individual countries, before joining EAC, Rwanda exported 60 exports products lines to Burundi, 30 products to Tanzania, 78 exports products lines to Uganda and around 56 products to Kenya on an annual basis. These exports products lines increased to become 165 in Burundi, 89 in Tanzania, 188 in Uganda and 99 in Kenya after joining EAC as summarized in Table 1. However, there has been an observable rise in the number of Rwandan exported products before and after joining the EAC block, this increase has not been consistent.

A decomposition of the rise in the number of exports products to EAC reveals that every year, new export products lines are introduced in the exports, but at the same time there are export products that are dropped from Rwandan export baskets to East African Community member countries during the period under consideration. The evolution of change in the number of export products can be explained by the number of newly introduced exports products into the Rwandan export products mix to EAC and the number of dropped exports products. The rate of change in the introduction of new export products into the Rwanda export mix has been higher than the change in dropping export products from the export baskets. In terms of export destination, the most importers from Rwanda were Burundi (172.5%), Tanzania (198.9%), Uganda (142.5%) and Kenya (79.1%)

The percentage of newly introduced export products decreased from 73.5% before joining the EAC to 63.5 % during the post EAC period while the average number of dropped exports expressed as a percentage also decreased on an annual basis from 55.5% before joining EAC to 52.5% after joining EAC. This drop-in export was also observed by Kamuganga (2012) when assessing whether intra-Africa regional trade would enhance the survival of exports in Africa. He observed that exports relationships die faster in Africa and only less than 20% of exports relationship survive after the first year of exports. This limited survival of export products lines was found by Nicita et al. (2013) to be linked to the lack of utilization of factor endowment that is abundant in exporting country. This would suggest that, in Rwanda, a survival of more than 30% of the total number of export product lines is a good performance.

Table 1. Average number of exported before and after Rwanda integration into EAC [†]

	Before in EAC	After in EAC	% change
Burundi	60.7	165.4	172.49%
Tanzania	30	89.7	199.00%
Uganda	77.9	188.8	142.36%
Kenya	55.6	99.6	79.14%

[†] Calculation is based on COMTRADE Data (HS 1996, 4-digit level)

Table 2. Factors influencing Rwanda products exported to EAC [†]

Num of lines	Coefficient	Std. Error	t	p>|t|
*ln*GDP Imp	523.24	29.91	18.09	0
*ln*GDPpc Imp	-324.68	27.67	-11.73	0
*ln*GDP Rw	-520.09	34.73	-14.98	0
*ln*GDPpc Rw	426.93	32.83	13	0
*ln*d	-210.93	6.32	-33.36	0
CB	86.75	2.38	36.31	0
CL	-36.99	1.7	-21.68	0
Com *C*	816.72	39.41	20.72	0
m EAC	27.46	2.1	13.02	0
Cons	-47.47	158.77	-0.3	0.765

[†] Calculation is based on COMTRADE Data (HS 1996, 4-digit level)

The regression analysis found out that the major factors of this change included the GDP of the importing country, GDP per capita of Rwanda, distance between Rwanda and the importing country, colonizing power and EAC membership. The poison regression analysis showed that coefficients for all variables used in the model are significant (Table 2). This means that an increase in GDP of the any EAC country importing Rwandan products stimulated an increase in the number of products that Rwanda export to that country. Sharing a common border with EAC country members has also influenced positively the number of products exported. Increase in export was explained by the increase in the number of new export products introduced into the Rwandan export mix as compared to dropped export mix.

The significant relationship between Rwanda membership into EAC and the number of export products lines defined as HS 1996, 4-digit level has confirmed the finding of the previous study that countries involved in regional integration exported more goods and to greater markets (Amurgo-Pacheco and Pierola, 2008). Furthermore, the coefficient for distance was negative, which implied that the shorter the distance from Kigali to the capital city of the importing country, the greater the number of products exported. The negative sign in the distance was expected since as the distance increase, the number of products is reduced as the transport cost increase much more. The analysis of shares in the value of the top 5 Rwandan export products into EAC before

and after integration helped to determine whether exports' earning came from the contribution of products or if it came from the limited number of the products. The assessing considered two different periods for the share in the value of the top 5 Rwandan exports to EAC for 2 years before and 2 years after Rwanda integration into EAC.

For all EAC destinations, Rwanda exports earning from the top five Rwandan products into EAC, annual exports earnings from all EAC exports destinations (Kenya, Burundi, Tanzania and Uganda) have been dominated by a few numbers of products defined as HS 1996 rev, 4-digit level (Table 3). It is shown by the number of export volumes decreased after Rwanda was integrated into EAC. The distribution of top 5 Rwanda exports showed a tendency of specialization and export growth an intensive margin since their share has been consistently above 50%. Earnings appear to be more concentrated in Kenya, where one product (tea) tends to generate more than 70% of total exports earnings both before and after Rwandan integration into EAC than in any other member country. For other countries, the top five exports products generated over 50% in each country before and after Rwanda integration into EAC.

Results also showed that exports revenues from each of EAC export destinations were increased when compared to the equivalent exported volumes that decreased in the number of products in the two periods before and after joining EAC. The increased export revenues, while volumes decreased, is explained

Table 3. Share of Rwanda top 5 export products into EAC countries before and after joining the community

Year	Category	Burundi	Uganda	Kenya	Tanzania
2002	Top 5 *vs.* Total number of products	13.90%	11.40%	19.20%	16.10%
	Value of top 5 *vs.* total value exports	71.60%	78.90%	98.50%	74.70%
2006	Top 5 *vs.* Total number of products	5.60%	7.60%	5.50%	17.90%
	Value of top 5 *vs.* total value exports	51.00%	65.95%	94.30%	82.60%
2010	Top 5 *vs.* Total number of products	3.80%	3.20%	4.30%	6.00%
	Value of top 5 *vs.* total value exports	47.80%	59.39%	96.10%	43.30%
2015	Top 5 *vs.* Total number of products	2.20%	3.00%	3.10%	5.70%
	Value of top 5 *vs.* total value exports	55.40%	66.90%	91.20%	79.30%

[†] Calculation is based on COMTRADE Data (HS 1996, 4-digit level)

by-products' specialization by Rwanda right after integrating into EAC. A similar trend was observed in Latin America countries where Dingemans and Ross (2012) found no change in member countries' exports between the period before joining free trade agreements and after joining the free trade agreements but the revenues were increased in the post period.

3.2 The measure of diversification index for Rwanda exports products into EAC

From 2001 to 2016, exclusion of Kenya, the HHI for Rwanda export products to EAC countries tended to consistently have a value below 0.5 for all EAC countries except Kenya and Democratic Republic of Congo (DRC) from 2001 to 2016. The value of HHI for Kenya appears to be highest in EAC and remained above 0.5 throughout the considered period. For other Rwanda traditional trading partners, the value of HHI appears in most cases to be above 0.5.

The calculated HHI illustrated in Fig. 1 and Fig. 2 for Rwandan exports products has enabled to separate Rwandan trading partners into categories. The EAC countries and Democratic Republic of Congo (DRC) can be grouped into the same categories and appears to have the lowest HHI value below 0.5 while the remaining sampled countries (extra EAC) can be grouped in the category of HHI above 0.5. The extra-EAC countries include traditional export partners of Rwanda like UK, Belgium, Hong Kong and China etc.

Based on the value HHI calculated for Rwandan exported products from 2001 to 2016, Kenya can be grouped into the countries with HHI above 0.5. The calculated HHI unmasks the fact that the core of Rwandan exports earnings tends to be generated by a limited number of commodities exported to its trading partners, both for EAC countries and traditional trading partners except for Democratic Republic of Congo (DRC). Among EAC country's exports, Kenya seems to have a high level of specialization with the HHI >0.4 compared to other EAC country members.

Rwanda' HHI calculated for its exports to the region was less than 0.4.

There has been a reduction in the value of HHI for Rwanda exported products in each country. This reduction normally depended on the introduction of new products that affect or reduce the share of products, which had previously a large share in exports. The average concentration index for the Rwandan export product to each member of EAC shows that the HHI was reduced from an average of 0.50 before joining EAC, i.e., up to 2007 to an average of 0.45 after joining EAC up to 2016. The same index has reduced from 0.699 to 0.639 for Rwandan exports to the rest of the world. This shows an almost similar decrease in HHI, which has been 8.6% for the rest of the world (ROW) and 8.7% for the HHI for Rwanda exports to EAC countries. This would mean that after joining EAC, Rwandan index of export concentration, reduced 8.7% for its exports in EAC trading partners with a reduction of 8.6% of its exports to other trading partners. This implies that a gradual reduction in the concentration of Rwandan exports products destined to EAC countries.

In general, from 2001 to 2016, the calculated average of HHI indices for both Rwandan exports to EAC and the ROW has been on a progressive decrease but did fluctuate much since it stayed below 0.57 and did not go below 0.37 as summarized in Fig. 3. It also shows that the level of HHI has been continuously low for the Rwandan exports to EAC than that of Rwandan exports to the rest of the world (sampled 15 countries) from 2001 to 2016.

The results also show that joining EAC customs unions has enabled Rwanda to reduce the level of exports concentration and to embark on the process of diversification of its exported products into EAC through this diversification has been limited (Fig. 3). This is explained by the reduction in the value of HHI for Rwanda exported products in each country and this reduction normally depends on the introduction of new products that affect or reduce the share of products which had previously a large share in exports.
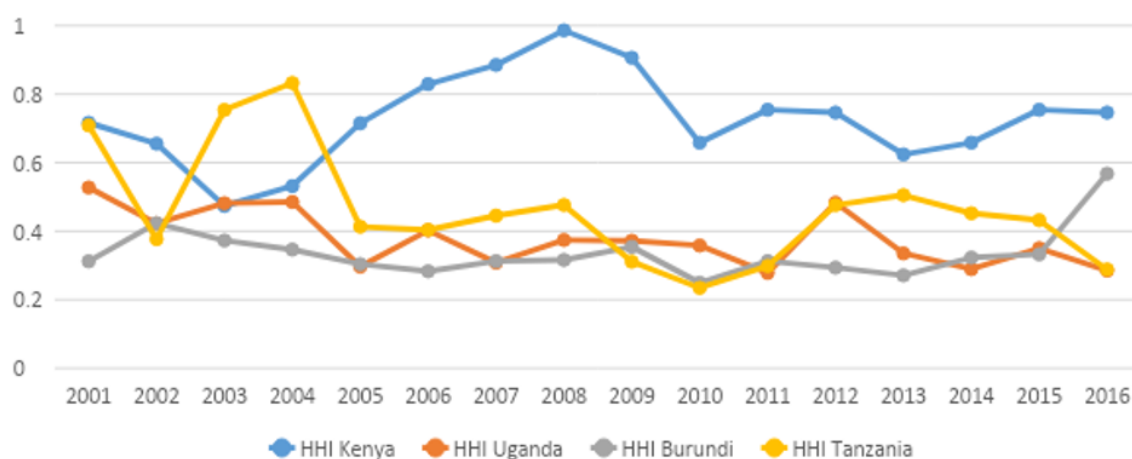
Figure 1. Herfindhal-Hirshman index for Rwanda' exports into EAC
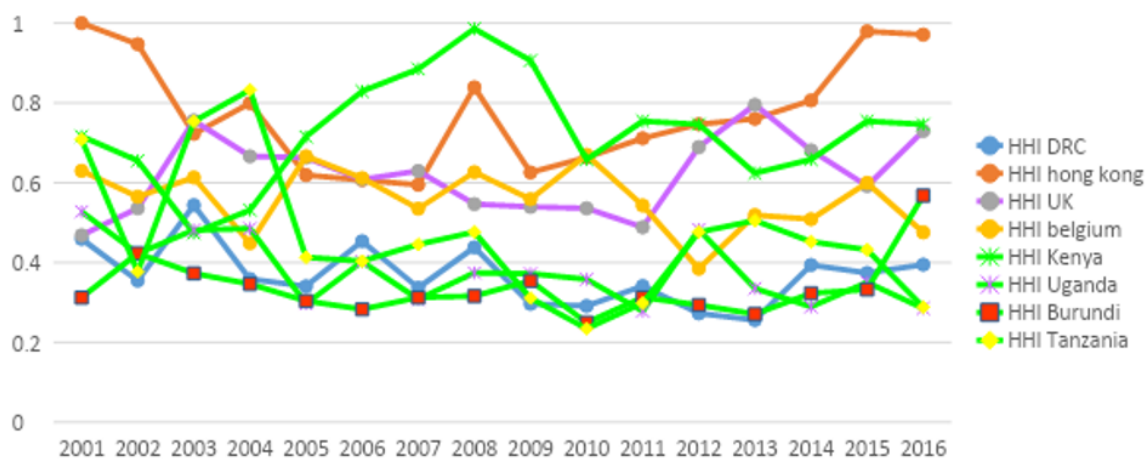
Figure 2. Comparison of calculating Herfindhal-Hirshman index for exports to EAC countries compared to other training partners
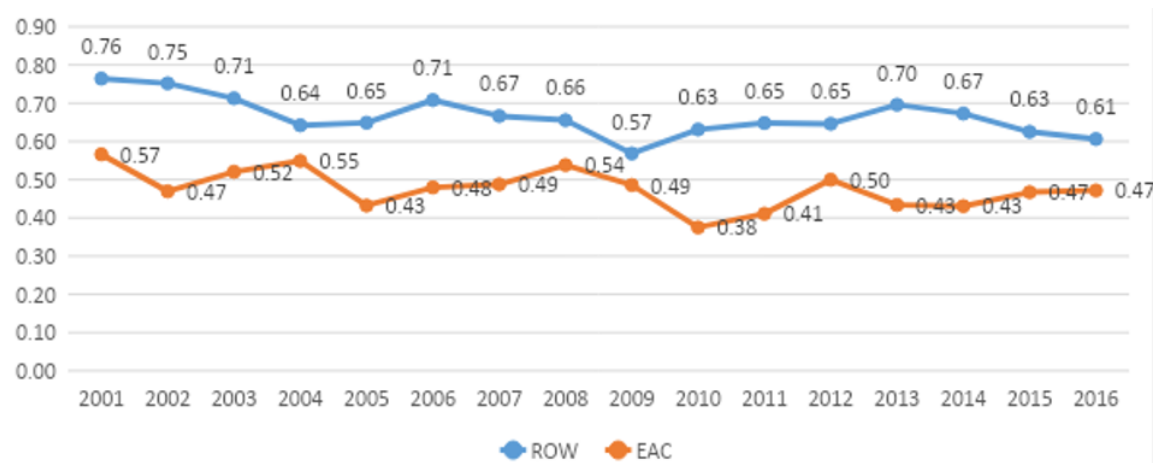
Figure 3. Average calculated HHI for Rwanda Exports to EAC and other trading partners (HS 1996, 4-digit level)

Table 4. Regression analysis for HHI value for Rwandan exported products into EAC

Herfindahl-Hirshiman index	Coefficient	Std. Error	t	p>|t|
lnGDP Imp	-1.366	0.121	-11.28	0
lnGDPpc Imp	1.204	0.128	9.4	0
lnGDP Rw	1.301	0.102	12.75	0
lnGDPpc Rw	-1.118	0.106	-10.48	0
lnd	0.248	0.023	10.64	0
CB	-0.251	0.008	-28.57	0
CL	-0.065	0.006	-10.36	0
Com C	-1.313	0.145	-9.03	0
m EAC	0.069	0.007	8.88	0
Cons	-1.011	0.585	-1.73	0.084

[†] Calculation is based on COMTRADE Data (HS 1996, 4-digit level)

The analysis of regression results of HHI (Table 4) showed that the coefficient for GDP for Rwanda, GDP per capita for importing country and the GDP for importing countries are positive and their p-value is significant which means they positively affect the value of HH. The coefficient of EAC membership is also positive and p-value is significant which implies that the EAC membership has significantly influenced the diversification of exports products from Rwanda to EAC countries. This means that signing a custom union with EAC countries had a positive effect on observed improved in HHI value since the coefficient of dummy EAC is positive. The Herfindahl's indices are in most cases above 0.4 which indicates that Rwanda export earnings from EAC are generated by a small number of products which means there is a specialization in the limited number of products.

However, membership into EAC positively influenced the reduction in the value of HHI, which means a reduction in export concentration and increases the chances of exporting a wider variety of goods. The same tendency was observed by Amurgo-Pacheco and Pierola (2008) who found that signing an FTA and therefore reducing the trade cost boost diversification and has a positive effect on the intensive margin.

4   Conclusion

Rwanda has chosen to increase the volume of exports through diversification and specialization of the exported products by joining regional economic blocks as a priority and strategy to increase foreign exchange. It is so far a member of COMESA, EAC, ECASS, and CEPGL for the same reason. This study aimed to analyze whether Rwanda membership into EAC was associated with the changes in the volume and in the range of products exported into EAC. It used panel data from COMTRADE. The findings show that there has been an increase in the number of exported products from Rwanda to EAC resulting from the introduction of new export products lines into the Rwandan export mix. The EAC membership significantly influenced the improvement in the number of exported products and thus the diversification of Rwandan exported products to EAC. The top five Rwanda exported products to EAC consistently contributed above 50% of Rwanda export earnings from EAC. The Herfindahl-Hirshman index for Rwandan exported products to EAC countries and other major export destination countries shows that Rwandan exports to EAC will continue to specialize with progress toward diversification. This continuation should be supported with the reinforcement of policy promoting diversification of exports focusing not only on traditional cash crops such as tea and coffee but also on non-traditional export crops such as horticultural crops; vegetables and fruits that are less affected by international market price fluctuation.

Acknowledgments

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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