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The Impacts of India's Export to African Blocs: Panel Data Analysis

Debesh Bhowmik

(Retired Principal and Associated with Indian Economic Association and The Indian Econometric Society, Life member, Bengal Economic Association, Economic Association of Bihar)
E-mail: debeshbhowmik@rediffmail.com, debeshbhowmik269@gmail.com
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Abstract: The paper studied the impacts of India's export to the seven African trading blocs during 1995-2016 especially on GDP growth rate, FDI inflows, inflation rate, Real Effective Exchange Rate, import concentration index and openness of the blocs which directly or indirectly help to speed up the process of trade and financial integration of the African blocs taking data from UNCTAD through Bai-Perron model(2003), Fixed effect panel regression model ,the Hausman test (1978, Fisher(1932)-Johansen(1991) , Kao(1999) and Pedroni(1999) cointegration models. Vector Error Correction and Wald test(1943)were applied to test causality. The empirical results showed that the growth rate of India's export to seven African blocs namely, CEMAC, COMESA ,EAC,ECCAS,SACU, SADC and WAEMU have been increasing at the rate of 0.13-0.19 per cent per annum during 1995-2017 which have significant upward structural breaks . The fixed effect panel regression assured that one per cent increase in GDP growth rate,FDI inflows, inflation rate, of African blocs led to 0.101 per cent , 0.1185 per cent , 0.1839 increase in India's export to African bloc blocs but one per cent increase in openness ,REERand import concentration index in African blocs led to 3.586 per cent decrease , 1.15% decrease , 1.388 per cent decrease in Indian export to African blocs during 1995-2017. Panel cointegration showed that there are at least five cointegrating vectors among them. There are insignificant long run causalities from import concentration index and openness index of 7 African blocs to GDP growth rate and REER .There is short term causality from REER of the African blocs to Indian export to their blocs. And there are short term causalities [i] from import concentration of African blocs to GDP growth rate of African blocs,[ii] from openness of African blocs to inflation rate of African blocs, and [iii] from FDI inflows of African blocs to REER of African blocs respectively. This research may find out to formulate policies on macro variables how to accelerate trade and financial integration of African blocs with India.

Key words: African blocs, India's exports, panel cointegration, panel vector error correction, short run causality, long run causality,

JEL classification codes: C33, F14, F15, F40, P33

Introduction

There are almost 14 regional economic communities in Africa in which full economic union was satisfied in UMA, CEMAC, ECCAS, EAC, ECOWAS, CEPGAL, SADC and UEMOA, customs union was satisfied in COMESA,

SACU and UEMOA and free trade area was established in SADC and COMESA. The blocs are trying to hike their intra trade shares and macro convergence. Even they have been following Abuja Treaty of 1991 to form African Economic Community through six phases of targets in which 2023-28 is the sixth phase where complete political, economic and monetary union with a single currency and a pan African Parliament would be achieved. Economic Commission of Africa sets various targets in every field to realize the Obuja Treaty.The success stories of African blocs outweighed the failures during last two decades which were examined empirically by Bhowmik (2014) lucidly. The African Free Trade Zone (AFTZ), also known as the African Free Trade Area, was announced at the EAC-SADC-COMESA Summit in October 2008. In May 2012, the agreement was extended to include ECOWAS, ECCAS and AMU to operationalise an African Free Trade Zone by 2018. A breakthrough in Africa's journey towards regional and continental integration was achieved when the Heads of State and Government of COMESA-EAC-SADC met on 10 June 2015 in Sharm El Sheikh, Egypt, to launch the Tripartite Free Trade Area (TFTA). Even, the AfCFTA provides an important opportunity for the African countries in an increasingly globalised world. The elimination of tariffs in goods and services will help in boosting economic growth of the African countries, transform their economies and achieve sustainable development goals (SDGs).The integration agenda of SADC has also been strengthened through the Regional Indicative Strategic Development Plan which is a comprehensive 15-year strategic roadmap. This plan not only boosts regional economic integration but also leads to the addressing of the socio-economic issues in this region.

Indian Technical and Economic Cooperation, Team 9,and Pan Africa e-network aimed at building institutional and human capacity as well as enabling skills and knowledge transfer in the Indo-African ties.Indian businesses are active across geographic spaces and sectors in Africa.They are deeply engaged in agri-business,engineering,construction,film distribution, cement,plastics and ceramics manufacturing,advertising, marketing,pharmaceuticals and telecommunications respectively.The presence of India Inc. in the continent can be loosely divided into three categories ,namely,business set up by members of the diaspora,large state-owned for private MNCs and New SMEs set up investors in search of business opportunities.

Indo-African Framework for Strategic Co-operation identified significant areas of cooperation, such as,agriculture, infrastructure, health, blue economy and renewable energy. CII stressed the needs for Business to Government dialogue both in India and Africa which can fulfill three- fold

increase in Indo-African trade. In the 2015 Summit,PM Modi spelt out 10 principles that will continue to guide India's engagement with Africa.The main facets of India's African Strategy should be to [i] motivate and enable India Inc. to step up its trade and investment exchanges,[ii] impress upon stakeholders the need to make project management speedier and more effective and [iii] develop an ambitious plan to strengthen the people to people connect. Indo-African treaty is solely based on the greater emphasis on liberalisation of the Duty Free Trade Preferences Scheme for Least Developed Countries along with a dramatic increase in Indian investment which needs for flourishing India African Partnership to accelerate investment-led trade growth strategy. Above all, India's engagements in Africa are often alluded to as a 'win-win' situation characterised by transformative model of globalisation based on competition and collaboration as it seeks non-interference in sovereign affairs of the nation states. Even, India is not pessimistic towards free trade agreement with African blocs which are now abiding by the norms of AfCFTA.

Literature review

The paper incorporates some important and relevant literatures. Suresh Kumar (2005) wrote that the 25th anniversary of Southern African Development Community (SADC) reflects the enhanced cooperation and building a stronger economy in terms of India-SADC relations. CII includes Indo-SADC investments on: [i] New technology and agricultural research, [ii] Human capital and managerial skills produced by investments in schools, training, and on-the-job experience,[iii] Physical capital investments in rural infrastructure such as irrigation, dams and roads and[iv] Farmer support institutions such as marketing, credit, and extension services.Indo-South Africa derived an important initiative which is the commencement of talks for India – South African Customs Union (SACU) from Preferential Trade Agreement (PTA) eventually leading to a Free Trade Agreement (FTA). EAC Custom Union signed on 1st January 2005 and India looks forward to it. India will apply three-band Common External Tariff structure of 0%, 10% and 25%to goods imported into East Africa. The preferential treatment under COMESA and SADC shall continue to apply during the transition period.Singh(2007) thought that the growth in economic ties between India and West Africa seems dramatic because it started from a very low base; indeed, it is likely to flatten in the coming years. India can offer West Africa in important insights into agricultural expansion, clean water management and how to confront the growing threat of climate transformation. For their part, the region's political leaders would like their constituencies to believe that India and West Africa are making a joint effort to improve the well-

being of their peoples and societies. But the realities on the ground in the era of globalization and multilateralism are very different from this utopian view.

Mbekeani (2013) studied that the COMESA trade liberalization program started in July 1984. In 1992 the PTA was transformed into an FTA and it adopted a new program. The COMESA FTA was formed in 2000. The COMESA FTA allowed non-participant members to join when they were ready to reciprocate the terms of the arrangement. It did not provide for asymmetry of treatment between the least developed member states and relatively more developed members. COMESA has fairly liberal rules of origin compared to SADC. The COMESA Customs Union (CU) was launched in June 2009 which includes COMESA's Common Tariff Nomenclature (CTN) and common external tariff (CET). The COMESA CET is harmonized with the East African Community CET so that member states belonging to both CUs do not have to choose which one to remain in. As a result, COMESA and EAC have in effect moved closer to becoming a single CU. A COMESA Fund has been put in place to deal with revenue losses from lower trade taxes as a result of applying the CET. The fund has two windows: (i) an 'Adjustment Facility' which caters for revenue loss arising from implementing the trade liberalization programs and (ii) an 'Infrastructure Fund' which finances infrastructure projects in the region. COMESA's objectives include the establishment of a monetary union by 2025, harmonizing taxation and business legislation such as company laws, intellectual property rights and investment and competition policies.An important recent development is the launch of trade negotiations by the COMESA, EAC and SADC heads of state and governments. These will lead to the establishment of a COMESA-EAC-SADC free trade area (FTA) which was formally launched in August 2008.

Yadav (2014) showed that organizations like Confederation of Indian Industries (CII), the Associated Chambers of Commerce and Industry (ASSOCHAM), the Federation of Indian Chambers of Commerce and Industry (FICCI), and the Federation of Indian Exporter's Organization (FIEO) identified Africa as a thrust area and launched programmes to promote economic and business cooperation since mid-1990. FICCI has identified 8 countries in Africa as top priority for India's exports. Manmohan Singh announced a number of initiatives that included duty free trade preference scheme for 34 African countries; grants for projects in excess of 500 million dollars over next five to six years in areas of railways, IT, telecom and power. India also offered to double the credit extended to African nations from the current 2.15 billion dollars to 5.4 billion dollars over next five years. However for enduring partnership, efforts are needed to

consolidate the component of emerging dynamic knowledge partnership. The author noted a few steps like the following:

[i] Setting up India Africa knowledge commission.

[ii] India Africa public private consortium for creating infrastructure to promote innovative institutions like national, regional laboratories, IITs, IIMs etc.

[iii] India Africa studies on mapping indigenous knowledge system.

[iv] Joint workshops on developing data mining and data managing of indigenous knowledge.

[v] Joint incubator for ideas and sharing of infrastructure.

[vi] India Africa joint venture in research and development.

[vii] Asia Africa joint venture for promoting and marketing knowledge products.

The author also mentioned that REC's (Regional Economic Communities) are the building blocks and drivers of the integration process. There is a need that they be aligned with the processes of NEPAD (New Partnership for Africa's Development) and the AU (African Union). In fact, there is a need for both RECs and NEPAD to be complimentary. One is the engine of the AU programmes and the other is the driver for integration. India established a new India-Africa fund in 2003. The fund allocates up to $200 million in credits to various projects designed to promote African economic integration, within the framework of NEPAD.

Biswas (2015) believed that India's proactive engagement with theAfrican countries in the post-reform era resulted in the institutionalisation ofthe Africa-India Forum Summits ,2008,2011,and 2015 which would provide a framework for the establishment of a long-term and stable partnership of a new type, based on equality and mutual benefit, as well as ablueprint for India-Africa co-operation in political, economic, socialdevelopment, and other fields in the future.

Gakhar and Gokarn (2015) noted that India is the Africa's fourth-largest trading partner behind the EU, China and the US, and a significant investor across the continent. Like India, EAC countries are involved in RTAs with other African partners through regional arrangements, namely – Common Market for Eastern and Southern Africa (COMESA), Southern Africa Development Community (SADC), Cross-Border Initiative (CBI), Economic Community of the Countries of the Great Lakes (CEPGL). EAC stands to gain significantly by completing the trade and as well as infrastructure (railroads and ports, power and financial) integration within the bloc which will enhance their welfare manifold. It is argued that the export potential and investment attractiveness of the region can be further improved through

policy measures for enhancing the 'ease of doing business'. India, with its growing market size and steady import demand, can serve as a stable market for the bloc and offer it the required growth impetus. There exist considerable scope for expanding EAC-India trade in merchandise and services. Nevertheless, the actual trade in recent years has been below potential, especially from the perspective of EAC exports. The trade data suggests that since late nineties Indian export to EAC countries have increased considerably, while its imports are yet to take off. Finally, India's investment integration with Africa in general and EAC in particular in terms of FDI outflows need to be improved further.

Masawi (2017) studied thatIndia–Africa relations are part of the momentous South–South Cooperation, increasingly gaining ground over South–North Cooperation. Similar economic and development experience is hoped to nurture more meaningful and mutually rewarding partnerships. Globally, India and Africa are lobbying against unfair global institutions, for example United Nations reforms, including Security Council, as well as negotiations for climate change and the Doha Development Agenda. Overall, India engages Africa at three levels—through the African Union, Regional Economic Blocs, and bilaterally .In the same spirit, India convenes regular India–Africa Forum Summits (IAFS). Three such summits have happened so far—the first in April 2008 in New Delhi, the second in May 2011 in Addis Ababa, and the third in October 2015 in New Delhi. In the process, India committed significant funding towards capacity building and engaged African Union in a Joint Action plan to determine priority areas in the allocation of resources. A closer look at India–Africa relations reflected in the 2008, 2011, and 2015 .India– Africa Forum Summits showed a deeper commitment in the 2015 Summit, whichculminated in the India–Africa Framework for Strategic Cooperation—"Partners in Progress: Towards a Dynamic and Transformative Development Agenda." Further, the 2015 Forum Summit has brought six more additional areas of cooperation which are general areas of cooperation, trade and industry, agriculture, blue/ ocean economy, regional and other forms of cooperation and monitoring mechanism. A "formal monitoring mechanism" on agreed projects is also an indication of a more committed engagement that serves to learn and improve on process by evaluating progress.

Mishra (2018) tried to show that the AfCFTA will provide a number of opportunities for the Indian firms and investors to tap into a larger, unified, simplified and more robust African market. It is critical for India to view Africa not just as a destination for short-term returns but as a partner for medium and long-term economic growth. In terms of the possible trade diversion effects of the AfCFTA, a recent study of the Economic Commission

for Africa (ECA) projected that the African countries would be adversely affected by the signing of the Mega Regional Trade Agreements (MRTAs) due to erosion of preferences and increased competition in the MRTA markets. The best examples of MRTAs are the Trans-Pacific Partnership (TPP), the Transatlantic Trade and Investment Partnership (TTIP), and the Regional Comprehensive Economic Partnership (RCEP) which bring together Australia, Japan, China, India, Korea, New Zealand and ten countries of the Association of Southeast Asian Nations (ASEAN). If the RCEP is established, there will be an increase in intra-RCEP trade, as its member countries will be more inclined to trade amongst themselves. This will act as a detriment to third countries, i.e. India and African countries, whose export shares towards RCEP member countries will decrease. The total exports from Africa would decrease by about US$3 billion by 2022 as compared to a situation without MRTAs. A 2018 joint report by the UNECA and Confederation of Indian Industries (CII) also provides some key findings:

[i] Total African exports will decrease by US$3 billion if the MRTAs are established outside Africa, especially the RCEP.

[ii] African exports will increase by US$27.5 billion by 2022 if the AfCFTA is established in parallel with other MRTAs.

[iii] This surge in exports will be driven primarily by the increased intra-African trade which is expected to progress by US$40.6 billion (39.9 percent) while the African exports will decline everywhere else.

[iv] Indian exports to Africa will increase by US$5.7 billion (13.2 percent) if the MRTAs are established.

[v] Indian exports to Africa will increase by US$4.3 billion (10 percent) following the establishment of the AfCFTA.

[vi] A study clearly projected the negative impact of MRTAs, especially the RECP, on India-Africa trade. Africa's exports to India will decrease because there will be an increase in the intra-African trade. On the other hand, if the AfCFTA is established, India's exports to Africa could increase by US$4.3 billion (or 10 percent) by 2022 because it will provide the Indian industries and companies a larger, more unified market with less restrictive regulations. Since the trade balance between India and Africa is in favour of the African countries largely due to India's high demand for energy resources, crude oil and petroleum, then the establishment of AfCFTA augurs well for India-Africa trade and investment partnership.

[vii] India agrees to the AfCFTA in principle and supports its successful implementation. This has been reiterated in the 2015 Delhi

Declaration. However, India and Africa need to move in tandem to ensure that the full gains are realised. After the AfCFTA comes into force, it is expected not only to support industrialisation and structural transformation efforts in Africa but also offer a more visible and robust market for Indian firms and investors to access, thereby making Africa a top business partner for India.

Basu (2018) experienced a new outlook that India is diversifying the ways in which it can enhance economic cooperation and promote its diplomatic profile in Africa is significant. Recently India has extended 152 lines of credit to the tune of almost $8 billion to 44 African countries, for developing agriculture, infrastructure, clean energy, and manufacturing. The AfCFTA has been welcomed as promising for Indian enterprises and industries, while the idea of a separate free trade agreement has also been tossed around. Indian leaders are currently giving Africa a lot of space in their international travel agendas. Despite the existence of many regional economic communities in Africa, the continent has low level of intra African trade when compared to other trading blocs in Europe and Asia, and has remained marginalized in the global market.To uncover the main factors behind the low level of intra-regional trade in Africa and the contribution of the existing regional economic communities (taking four selected economic communities namely COMESA, ECOWAS, IGAD and SADC) in promoting trade in the continent the augmented gravity model was emphasised. The author stated that African countries should invest much on physical infrastructure to link neighboring countries, harmonize trade policies, and simplify custom procedures so that the existing regional economic communities would promote intra-regional trade. In addition to this, these countries should adopt and implement coherent and coordinated trade policies to promote intra-regional policies.

African Export-Import Bank and Export-Import Bank of India (2018) jointly studied the Indo-African trade, its scope, patterns, barriers, and recommended future prospects of trade. Their studies showed that India's exports to Africa grew by a CAGR of 14.3 percent after 2001 to reach US$23.8 billion in 2017, up from US$ 2.8 billion in 2001. Exports to Africa now account for 8.0 percent of India's total exports, and 4.6 percent of Africa's imports. During the same period, Africa's exports to India grew at a CAGR of 14.1 percent, increasing to US$36.0 billion in 2017, up from US$4.4 billion in 2001, with Africa now accounting for 8.0 percent of India's global imports and India now accounting for 8.7 percent of Africa's global exports. Over this period, Africa has enjoyed a trade surplus with India, peaking at US$18.6 billion in 2011 before narrowing to US$12.2 billion in 2017. India's export basket to Africa in 2017, was dominated by petroleum products, medicine

and pharmaceutical products, and road vehicles which together accounted for 38.8 percent of India's exports to Africa. Eastern Africa has become India's largest export destination among the African regions with its share increasing from 29.7 percent in 2001 to 34.5 percent in 2017. Over the same period, the share of Western Africa in India's exports to Africa fell from 28.2 percent to 22.6 percent. On the other hand, Africa's exports to India are dominated by the Western African region, whose share increased from 39.4 percent in 2001 to 44.9 percent in 2017. Eastern African countries has strengthened, increasing from a meagre US$0.9 billion in 2001 to US$11.6 billion in 2017, peaking at US$16.3 billion in 2014. India's total trade with Northern Africa has also increased, growing at a CAGR of 12.1 percent, from US$1.3 billion in 2001 to US$8.3 billion in 2017. India's trade with Southern African countries has increased from US$1.4 billion in 2001 to US$11.9 billion in 2017, peaking at US$12.3 billion in 2014. India's trade with Central Africa recorded steady growth before peaking in 2012, increasing at a CAGR of 15.3 percent from US$0.7 billion in 2001 to US$6.5 billion in 2017.

Purpose of the study

India's exports to several trading or regional blocs have many impacts on macro- economic variables. The same is true for African blocs also. This empirical research examined to explore the possible impacts on GDP growth rate, FDI inflows, inflation rate, Real Effective Exchange Rate, import concentration index and openness of the seven African blocs from 1995 to 2017 using econometric models in the time series as well as panel data. The empirical findings might be helpful to frame macro policy targets in the trade and finance of African blocs that can be beneficial to augment financial and economic integration.

Methodology and Source of data

This research has applied the methodologies from the various econometric models. The growth rates of India's exports to African blocs were computed by semi-log linear trend model. The structural breaks were calculated through Bai-Perron model(2003). Fixed effect panel regression model was used to calculate the significant relations among those variables of India's exports to seven African blocs,GDP growth rate, FDI inflows, inflation rate, Real Effective Exchange Rate, import concentration index and openness of the seven African blocs. After verifying the Hausman test (1978),the fixed effect panel regression model was accepted.Panel cointegration test was done through the Fisher(1932)-Johansen(1991) model, Kao model(1999) and Pedroni model(1999) respectively. Vector Error Correction was applied

through Johansen model (1988,1991).Long run causality was seen from the cointegrating equations and short run causality was verified by the Wald test(1943).

Following Herfinahl-Hirschmann index , the paper included the import concentration index formula as follows.

$$\text{import concentration index} = \sqrt{\sum_{i=1}^{N}\left(Mij \big/ Mj\right)^2 - \sqrt{\frac{1}{N}}} \Big/ 1-\sqrt{\frac{1}{N}}$$

where Mij is the value of import of product i by country j,

xj is the total value of imports of country j and N=number of products imported at 3 digit of the SITC revision 3

The data on India's exports to seven African blocs,GDP growth rate, FDI inflows, inflation rate, Real Effective Exchange Rate, import concentration index and openness of the seven African blocs from 1995 to 2017were collected from the UNCTAD (United Nations Conference on Trade and Development).

Econometric Observationsofthe Model (Observation-1)

India's export to seven African blocs namely, CEMAC, COMESA, EAC, ECCAS, SACU, SADC and WAEMU is not rosy but not disappointing because the trends of exports have been increasing during 1995-2017 which are significant at 5% level and are shown in Table 1 below.

Table 1: India's export to African blocs

India's exports to blocs	*Growth rates of exports*	*Period*	*Significant/insignificant*
1. CEMAC	0.1801 per cent per year	1995-2017	Significant at 5% level
2. COMESA	0.1379 per cent per year	1995-2017	Significant at 5% level
3. EAC	0.1576 per cent per year	1995-2017	Significant at 5% level
4. ECCAS	0.1774 per cent per year	1995-2017	Significant at 5% level
5. SACU	0.1594 per cent per year	1995-2017	Significant at 5% level
6. SADC	0.1916 per cent per year	1995-2017	Significant at 5% level
7. WAEMU	0.1601 per cent per year	1995-2017	Significant at 5% level

Source: Calculated by author

India's export to CEMAC in 1995 was 8844 thousand US dollar which stipulated at pick level of 715127 thousand US dollar in 2013 which dwindled

to 420877 thousand US dollar in 2017. COMESA was accounted 780806 thousand US dollar of Indian export in 1995 which reached at pick level of 13230810 thousand US dollar in 2014 and then stepped down to 8730353 thousand US dollar in 2017.India's export was 372646 thousand US dollar to EAC in 1995 which increased to 8831743 thousand US dollar in 2014 and then decreased to 4034485 thousand US dollar in 2017.India's export to ECCAS was 61728 thousand US dollar in 1995 which reached at pick level of 1551557 thousand US dollar in 2014 which fell to 1000251 thousand US dollar in 2017.Indian export to SACU was 314699 thousand US dollar in 1995 which at pick level of 6087738 thousand US dollar in 2013 and then decreased to 4302699 thousand US dollar in 2017.India's export to SADC was 370030 thousand US dollar in 1995 which increased to 15019841 thousand US dollar in 2014 and then fell to 9070446 thousand US dollar in 2017.India's export to WAEMU was 127766 thousand US dollar in 1995 which reached at pick level of 2582079 thousand US dollar in 2013 and then dwindled to 2549257 thousand US dollar in 2017.

India's exports to seven African blocs have the properties of structural breaks which are upward to all blocs whereEAC confirmed two breaks,ECCAS,SACU,COMESA and SADC confirmed three breaks and CEMAC and WAEMU showed four breaks respectively during 1995-2017.It is shown in Table 2.

Table 2: Structural breaks of India's export to African blocs

Structural breaks of India's exports to blocs	*Year of breaks*	*Nature*	*Period*	*Significant/insignificant*
1. CEMAC	1998, 2002, 2006, 2010	Upward	1995-2017	Significant at 5% level
2. COMESA	2000, 2003, 2013	Upward	1995-2017	Significant at 5% level
3. EAC	2006, 2011	Upward	1995-2017	Significant at 5% level
4. ECCAS	2002, 2005, 2008	Upward	1995-2017	Significant at 5% level
5. SACU	2002, 2005, 2010	Upward	1995-2017	Significant at 5% level
6. SADC	2000, 2005, 2010	Upward	1995-2017	Significant at 5% level
7. WAEMU	1998, 2001, 2005, 2011	Upward	1995-2017	Significant at 5% level

Source: Calculated by author

All the structural breaks of India's export to seven African blocs have been plotted in Figure 1 below where all upward structural breaks pointing years were clearly shown.

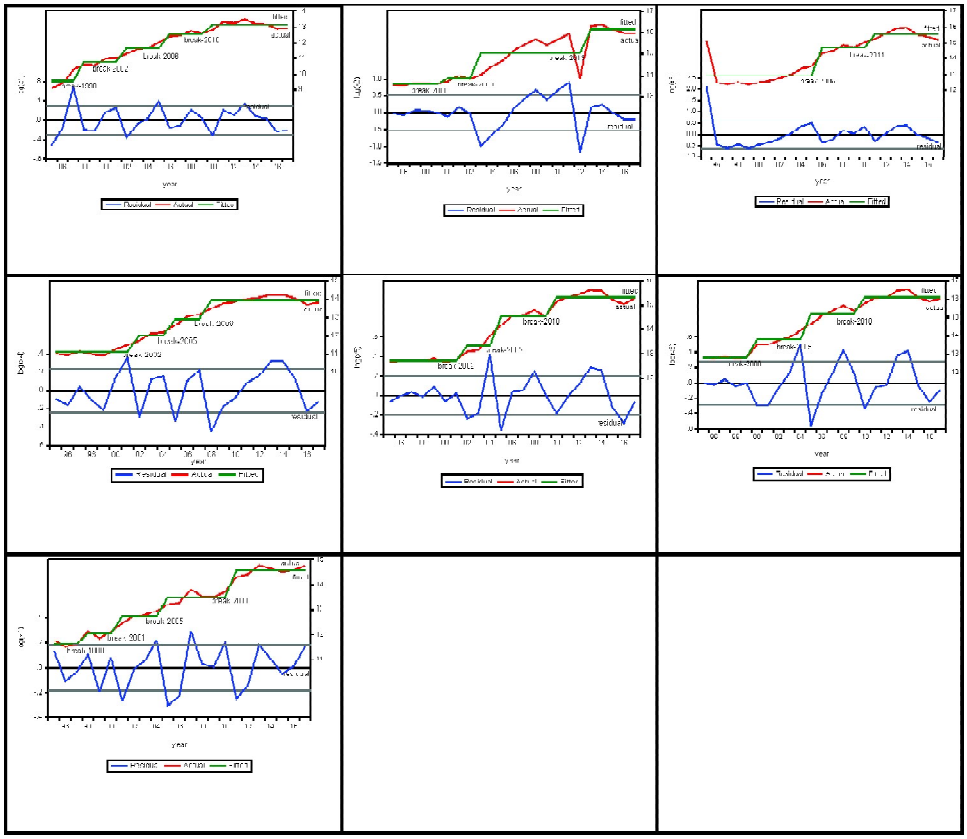

Figure 1: Structural breaks of India's exports to African blocs

Source: Plotted by author.

Econometric Observations of the Model (Observation-2)

The estimated random effect panel regression model is given below,

$$\text{Log}(x)=7.933249+0.0696\log(y_1)+0.24994\log(y_2)+0.6459\log(y_3)+1.1200\log(y_4)$$
$$\quad (4.39)^* \quad (2.55)^* \quad (12.86)^* \quad (10.52)^* \quad (3.59)^*$$
$$+0.01056\log(y_6)-1.0144\log(y_7)$$
$$\quad (0.054) \quad (-4.12)^*$$

R^2=0.49,F=25.08*, DW=0.46,*= significant at 5% level, where x= export of India to 7 African blocs,y_1=GDP growth rate of 7 African blocs,y_2=FDI inflows of 7 African blocs,y_3=Inflation rate of 7 African blocs,y_4=REER of African blocs,y_6=Import concentration index of 7 African blocs,y_7=Openness index of 7 African blocs.

For acceptance or rejection of the random effect model,the Hausman test was done whose Chi-Square(6)=263.347 (prob=0.00) which implies that

it is rejected.Therefore the fixed effect panel regression was applied whose estimated equation is shown below.

$$\text{Log}(x)=29.111+0.101837\log(y_1)+0.1185\log(y_2)+0.1839\log(y_3)-1.1525\log(y_4)$$
$$(12.85)^* \quad (3.38)^* \quad (5.22)^* \quad (2.34)^* \quad (-3.25)^*$$
$$-1.3887\log(y_6)-3.5863\log(y_7)$$
$$(-6.27)^* \quad (-11.87)^*$$

$R^2=0.857$,F=28.29*,DW=0.83,*=significant at 5% level

This estimated equation is a good fit where all the t values of the coefficients are significant.It implies that if other things are unchanged,[i] one per cent increase in GDP growth rate of African blocs led to 0.101 per cent increase in export of India to African blocs,[ii] one per cent increase in FDI inflows of African blocs led to 0.1185 per cent increase in Indian export to African blocs,[iii] one per hike in inflation rate of African blocs led to 0.1839 per cent expand in Indian export to African blocs,[iv] one per cent increase in REER of African blocs led to 1.15% decrease in India export to African blocs,[v] one per cent increase in import concentration of African blocs led to 1.388 per cent decrease in Indian export to African blocs,[vi] one per cent increase in openness of African blocs led to 3.586 per cent decrease in Indian export to African blocs during 1995-2017.All are significant at 5% level.In Figure 2,the fitted and the actual lines are plotted neatly and shown below.

Pedroni panel cointegration test (1999) with the assumptions of individual and group, within dimension and between dimensions of the

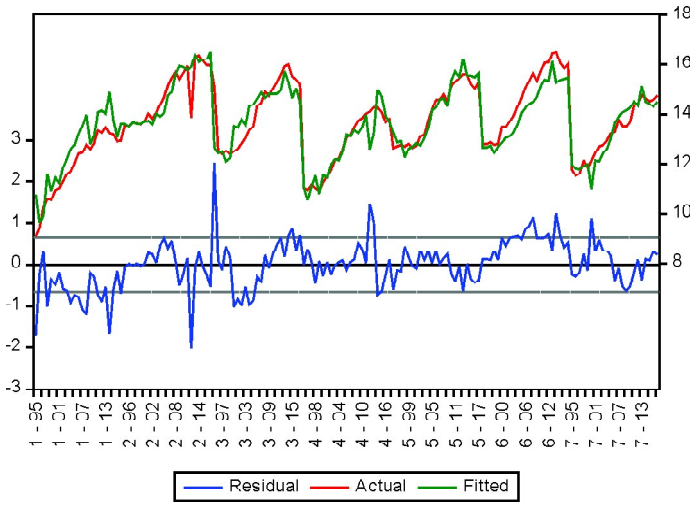

Figure 2: Fixed effect model

Source: Plotted by author

first difference series confirmed that H0=no cointegration is rejected in panel PP statistic, panel ADF statistic, group PP statistic and group ADF statistic and also Kao panel cointegration test (1999) of the first difference series suggests that ADF statistic for H0 is rejected. These results are systematically arranged in the Table 3 below.

Table 3: Pedroni and Kao panel cointegration test

Pedroni Residual cointegration test:H0:no cointegration (within dimension):Individual intercept				
(within dimension)	*Statistics*	*Probability*	*Weighted statistic*	*probability*
Panel v-Statistic	-1.752578	0.9602	-2.957355	0.9984
Panel rho-Statistic	1.482905	0.9310	1.622693	0.9477
Panel PP-Statistic	-7.728867	0.0000	-3.338640	0.0004
Panel ADF-Statistic	-8.633554	0.0000	-5.474398	0.0000
(between dimension)	statistic	probability		
Group rho-Statistic	1.981152	0.9762		
Group PP-Statistic	-6.042252	0.0000		
Group ADF-Statistic	-6.308022	0.0000		
Kao residual cointegration Test:H0=no cointegration				
	T statistic	probability		
ADF	-8.918536	0.0000		
Residual variance	0.320368			
HAC variance	0.086654			

Source: Calculated by author.

Johansen-Fisher unrestricted cointegration rank test assuming linear deterministic trend and first difference series of Indian export to African blocs, GDP growth rate, FDI inflows, inflation rate, REER, import concentration index, and openness index of African blocs during 1995-2017 confirmed at least five cointergrating equations as proved by Trace statistic and Max-Eigen statistic which are arranged in the Table 4 below.

Table 4: Johansen-Fisher panel cointegration test

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	*Fisher Stat.* (from Trace Test)*	*Probability.*	*Fisher Stat.* (from Max-Eigen test)*	*probability*
None	60.81	0.0000	60.81	0.0000
At most 1	378.9	0.0000	223.1	0.0000
At most 2	204.3	0.0000	134.8	0.0000
At most 3	95.36	0.0000	69.45	0.0000
At most 4	39.45	0.0003	36.62	0.0008
At most 5	15.02	0.3766	13.23	0.5088
At most 6	17.52	0.2296	17.52	0.2296

* Probabilities are computed using asymptotic Chi-square distribution
Source: Calculated by author.

Since the cointegration is established then VECM has been applied. The estimated equations of vector error correction model with five error correction terms during 1995-2017 having 7 cross sections and 140 observations have been shown below.

[1] $\Delta\log(x)=-0.0638EC_1+0.0283EC_2+0.00756EC_3+0.1102EC_4-0.3683EC_5-0.2958\Delta\log x_{t-1}$
(-2.098)* (1.084) (0.419) (1.237) (-1.83) (-3.41)*
$-0.0973\Delta\log x_{t-2}+0.01075\Delta\log y_{1t-1}-0.00485\Delta\log y_{1t-2}-0.00937\Delta\log y_{2t-1}-0.0057\Delta\log y_{2t-2}$
(-1.30) (0.426) (-0.263) (-0.609) (-0.35)
$+0.0706\Delta\log y_{3t-1}-0.09484\Delta\log y_{3t-2}+0.585\Delta\log y_{4t-1}+0.05701\Delta\log y_{4t-2}+0.496\Delta\log y_{6t-1}$
(0.24) (-0.49) (1.33) (1.26) (2.79)*
$+0.3907\Delta\log y_{6t-2}+0.225\Delta\log y_{7t-1}+0.2856\Delta\log y_{7t-2}+0.1893$
(2.24)* (0.498) (0.637) (4.14)*
R^2=0.252,F=2.132,AIC=0.792,SC=1.213,*=significant at 5% level

This is the estimated equation of the VECM of the target variable where EC_1 is negative and significant at 5% level which implies that there are long run causalities with $\Delta\log x$ and it tends to equilibrium. But its R^2 , F, are very low, yet $\Delta\log x$ is positively related with $\Delta\log y_{6t-1}$ and $\Delta\log y_{6t-2}$ and negatively related with $\Delta\log x_{t-1}$ and all other coefficients are insignificant.

The speed of adjustment of EC_1 is 6.38% per year.

[2] $\Delta\log(y_1)= -0.05021EC_1-0.5856EC_2+0.07646EC_3+0.0331EC_4+0.0782EC_5+1.3873\Delta\log x_{t-1}$
(-0.307) (-4.18)* (0.79) (0.069) (0.072) (2.98)*
$+0.3056\Delta\log x_{t-2}-0.2618\Delta\log y_{1t-1}-0.0798\Delta\log y_{1t-2}-0.21141\Delta\log y_{2t-1}-0.16584\Delta\log y_{2t-2}$
(0.76) (-1.93) (-0.80) (-2.56)* (-1.91)
$+1.8209\Delta\log y_{3t-1}-0.6995\Delta\log y_{3t-2}+3.2657\Delta\log y_{4t-1}-0.3481\Delta\log y_{4t-2}+1.0270\Delta\log y_{6t-1}$
(1.15) (-0.68) (1.38) (-0.144) (1.078)
$+1.0270\Delta\log y_{6t-2}-1.4559\Delta\log y_{7t-1}+1.3176\Delta\log y_{7t-2}-0.4305$
(3.42)* (-0.59) (0.54) (-1.75)
R^2=0.58,F=8.30,AIC=4.15,SC=4.56,*=significant at 5% level

This estimated equation is a good fit with high R^2 and F.EC_2 is significant here and $\Delta\log y_{1t}$ is significantly related with $\Delta\log x_{t-1}$, $\Delta\log y_{2t-1}$ and $\Delta\log y_{6t-2.}$ The speedof adjustment of EC_2 is 58.56% per year.

[3] $\Delta\log(y_2)= 0.4831EC_1-0.1484EC_2-0.7705EC_3+0.0186EC_4-2.1004EC_5+0.1286\Delta\log x_{t-1}$
(3.16)* (-1.13) (-8.52)* (0.041) (-2.08) (0.29)
$+0.0763\Delta\log x_{t-2}+0.0986\Delta\log y_{1t-1}-0.0084\Delta\log y_{1t-2}+0.3052\Delta\log y_{2t-1}-0.0522\Delta\log y_{2t-2}$
(0.20) (0.78) (-0.09) (3.95)* (-0.64)
$-1.1175\Delta\log y_{3t-1}+0.9722\Delta\log y_{3t-2}-1.1130\Delta\log y_{4t-1}+2.4180\Delta\log y_{4t-2}+1.7374\Delta\log y_{6t-1}$
(-0.75) (1.01) (-0.50) (1.07) (1.95)
$+1.0029\Delta\log y_{6t-2}+0.9330\Delta\log y_{7t-1}+0.4696\Delta\log y_{7t-2}+0.05469$
(1.15) (0.41) (0.20) (0.238)
R^2 = 0.505, F=6.46, AIC=4.01, SC=4.43,*=significant at 5% level

Here EC_3 is significant and its speed of adjustment is 77.05% per year but other coefficients are insignificant although R^2 and F are high.

[4] $\Delta\log(y_3)$= 0.0269EC_1-0.0024EC_2+0.0019EC_3-0.1454EC_4+0.1134EC_5-0.0385$\Delta\log x_{t-1}$
(4.53)* (-0.48) (0.55) (-8.38) (2.89)* (-2.28)*
+ 0.0020$\Delta\log x_{t-2}$-0.0030$\Delta\log y_{1t-1}$-0.00046$\Delta\log y_{1t-2}$+ 8.56E-05$\Delta\log y_{2t-1}$+0.001086$\Delta\log y_{2t-2}$
(0.13) (-0.61) (-0.129) (0.28) (0.34)
+0.7368$\Delta\log y_{3t-1}$-0.2449$\Delta\log y_{3t-2}$—0.0522$\Delta\log y_{4t-1}$-0.0579$\Delta\log y_{4t-2}$-0.047886$\Delta\log y_{6t-1}$
(12.83)* (-6.54)* (-0.60) (-0.65) (-1.38)
-0.0612$\Delta\log y_{6t-2}$+ 0.0799$\Delta\log y_{7t-1}$-0.2117$\Delta\log y_{7t-2}$+ 0.060949
(-1.80) (0.90) (-2.42)* (6.83)*
R^2=0.817, F=28.25, AIC=-2.47, SC=-2.07,*=significant at 5% level

In VECM-4,EC_1 and EC_5 are divergent significantly. $\Delta\log(y_3)$ is negatively significant with $\Delta\log x_{t-1,}$ $\Delta\log y_{3t-2}$ and $\Delta\log y_{7t-2}$ but positively significant with $\log y_{3t-1}$. The equation is a good fit.

[5] $\Delta\log(y_4)$= -0.0063EC_1+0.0039EC_2+0.0025EC_3+0.0499EC_4-0.1303EC_5+0.0109$\Delta\log x_{t-1}$
(-0.93) (0.69) (0.63) (2.53) (-2.92)* (0.53)
- 0.0014$\Delta\log x_{t-2}$-0.01008$\Delta\log y_{1t-1}$-0.0028$\Delta\log y_{1t-2}$-0.0096$\Delta\log y_{2t-1}$+0.0005$\Delta\log y_{2t-2}$
(0.86) (-1.80) (-0.70) (-2.81)* (0.14)
+ 0.0580$\Delta\log y_{3t-1}$+0.0313$\Delta\log y_{3t-2}$+0.3752$\Delta\log y_{4t-1}$-0.2123$\Delta\log y_{4t-2}$-0.0113$\Delta\log y_{6t-1}$
(0.89)* (0.73) (3.84)* (-2.12)* (-0.28)
-0.0046$\Delta\log y_{6t-2}$ -0.0035$\Delta\log y_{7t-1}$—0.0740$\Delta\log y_{7t-2}$ -0.005317
(-0.11) (-0.035) (-0.74)* (-0.52)
R^2=0.32, F=3.07, AIC=-2.22, SC=-1.79,* = significant at 5% level

In this estimated equation EC_5 is negative and significant and $\Delta\log(y_4)$ is positively significant with $\Delta\log y_{3t-1}$ and $\Delta\log y_{4t-1}$ and negatively significant with $\Delta\log y_{2t-1}$ $\Delta\log y_{4t-2}$ and $\Delta\log y_{7t-2}$ respectively but the equation is a bad fit.

[6] $\Delta\log(y_6)$= -0.03718EC_1+0.0175EC_2+0.0099EC_3+0.00405EC_4-0.0018EC_5+0.0492$\Delta\log x_{t-1}$
(-2.43)* (1.33) (1.09) (0.09) (-0.018) (1.13)
—0.0186$\Delta\log x_{t-2}$-0.0086$\Delta\log y_{1t-1}$-0.0134$\Delta\log y_{1t-2}$-0.0134$\Delta\log y_{2t-1}$+ 0.0037$\Delta\log y_{2t-2}$
(-0.49) (-0.68) (-1.30) (-1.74) (0.46)
+ 0.0071$\Delta\log y_{3t-1}$-0.1003$\Delta\log y_{3t-2}$+0.0020$\Delta\log y_{4t-1}$+ 0.2269$\Delta\log y_{4t-2}$-0.2653$\Delta\log y_{6t-1}$
(0.048) (-1.04) (0.009) (1.00) (-2.97)*
-0.1929$\Delta\log y_{6t-2}$ -0.0263$\Delta\log y_{7t-1}$+ 0.3263$\Delta\log y_{7t-2}$ +0.016803
(-2.20)* (-0.11) (1.45) (0.73)
R^2=0.238, F=1.97, AIC=-0.58, SC=-0.16,*=significant at 5% level

In this estimated VECM, the EC_1 is negative and significant which implies that it is moving to equilibrium, $\Delta\log(y_6)$ is significantly negatively related with $\Delta\log y_{6t-1}$ and $\Delta\log y_{6t-2}$ where the estimation is a bad fit.

[7] $\Delta\log(y_7)$= -0.0044EC_1-0.0067EC_2+0.0042EC_3-0.00465EC_4+0.0051EC_5+0.0150$\Delta\log x_{t-1}$
(-0.63) (-1.11) (1.01) (-0.22) (0.11) (0.75)
-0.0008$\Delta\log x_{t-2}$+ 0.0018$\Delta\log y_{1t-1}$-0.0037$\Delta\log y_{1t-2}$+0.0008$\Delta\log y_{2t-1}$-0.0031$\Delta\log y_{2t-2}$
(-0.50) (0.31) (-0.89) (0.25) (-0.85)
+ 0.0226$\Delta\log y_{3t-1}$—0.0341$\Delta\log y_{3t-2}$-0.0523$\Delta\log y_{4t-1}$+ 0.1343$\Delta\log y_{4t-2}$+0.0165$\Delta\log y_{6t-1}$
(0.33) (-0.77) (-0.51) (1.30) (0.40)
-0.0033$\Delta\log y_{6t-2}$ -0.0763$\Delta\log y_{7t-1}$-0.0693$\Delta\log y_{7t-2}$ + 0.015897
(-0.85)* (-0.73) (0.67) (1.51)
R^2 = 0.097, F=0.67, AIC=-2.15, SC=-1.73,*=significant at 5% level

This estimated VECM is a bad fit where $\Delta\log(y_7)$ is significantly negatively related with $\log y_{6t-2}$ although EC_1 is negative and insignificant which implies EC_1 is converging.

From the VECM, the five cointegrating equations are as follows,

[i] $Z_{1t-1}=EC_{1t-1}=1.00\log x_{t-1}+3.99\log y_{6t-1}+4.081\log y_{7t-1}-21.6198$
(2.53)* (2.157)*

[ii] $Z_{2t-1}=EC_{2t-1}=1.00\log y_{1t-1}+0.3123\log y_{6t-1}+2.4575\log y_{7t-1}-12.092$
(-0.305) (1.99)

[iii] $Z_{3t-1}=EC_{3t-1}=1.00\log y_{2t-1}+3.33327\log y_{6t-1}+2.1346\log y_{7t-1}-8.899$
(2.37)* (1.26)

[iv] $Z_{4t-1}=EC_{4t-1}=1.00\log y_{3t-1}+0.80035\log y_{6t-1}+0.1497\log y_{7t-1}-3.3537$
(1.99) (0.3109)

[v] $Z_{5t-1}=EC_{5t-1}=1.00\log y_{4t-1}+0.15957\log y_{6t-1}-0.07913\log y_{7t-1}-3.927$
(0.666) (-0.275)

* = significant at 5% level

Johansen-Fisher Panel Cointegration test confirmed five cointegrating equations which have estimated from the system equations. The equations are given below.

[i] $\Delta\log x_t$= -0.0638$\log x_{t-1}$+3.99$\log y_{6t-1}$+4.081$\log y_{7t-1}$-21.6198
(-2.098)* (2.53)* (2.157)*

[ii] $\Delta\log y_{1t}$= -0.0502$\log x_{t-1}$+3.99$\log y_{6t-1}$+4.081$\log y_{7t-1}$-21.6198
(-0.307) (2.53)* (2.157)*

[iii] $\Delta\log y_{2t}$=0.4831$\log x_{t-1}$+3.99$\log y_{6t-1}$+4.081$\log y_{7t-1}$-21.6198
(3.167)* (2.53)* (2.157)*

[iv] $\Delta\log y_{3t}$=0.0269$\log x_{t-1}$+3.99$\log y_{6t-1}$+4.081$\log y_{7t-1}$-21.6198
(4.53)* (2.53)* (2.157)*

[v] $\Delta\log y_{4t}$=-0.006305$\log x_{t-1}$+3.99$\log y_{6t-1}$+4.081$\log y_{7t-1}$-21.6198
(-0.934) (2.53)* (2.157)*

* = significant at 5% level

Two sets of five cointegrating equations were found from the VECM and the system equations where the former set of cointegrating equations were normalized from the VECM estimates and the second set of equations were found from system equations when x=India's export to African blocs which is the target variable. In EC_{1t-1} ,the coefficient of $\log(x_{t-1})$ is obtained as -0.0638l whose t value is significant at 5% level and the other t values of the coefficients are significant in the first cointegrating equation which implies that from any log run shock the system equation tends to equilibrium or in other words,6.38% error correction per year is the speed of adjustment by which $\Delta \log x_t$ tends to equilibrium that is neatly shown in Figure 3. The fitted line tends to zero.

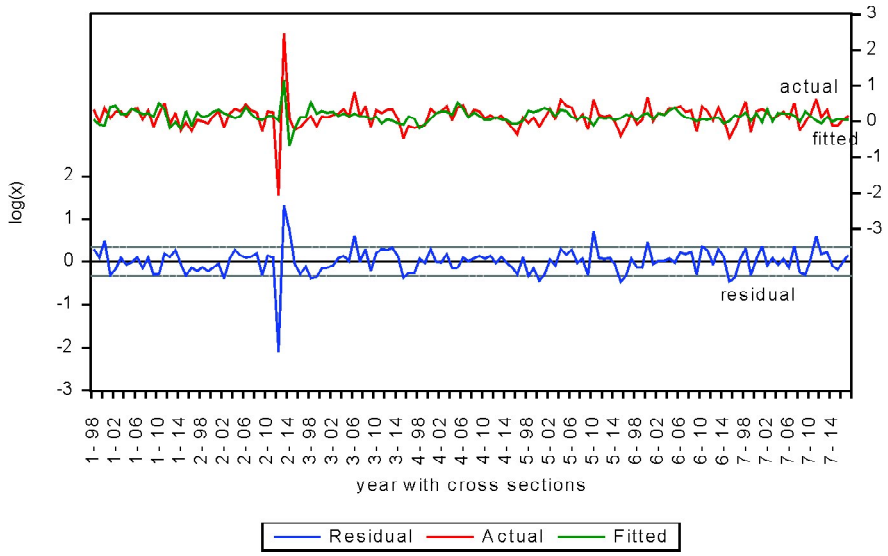

Figure 3: Equilibrium cointegrating equation 1

Source: Plotted by author.

Besides, the cointegrating equations 2 and 5 have been also moving towards equilibrium since the coefficients of $\log x_{t-1}$ are negative but they are not significant at 5% level. Even,the cointegrating equations 3 and 4 are significant at diverging level.

Thus there are long run causalities from import concentration index and openness index of 7 African blocs to India's exports to the said African blocs during 1995-2017.Their relationships are positive.The cointegrating equations 2 and 5 imply that there are long run causalities from import concentration index and openness index of 7 African blocs to GDP growth rate and REER of those African blocs during 1995-2017 but their t values of the coefficients of target variable $\log x_{t-1}$ are not significant at 5% level.

From the system equation 1, the Wald test confirmed the outcomes of short term causality where Indian export to African blocs is the target variable. It states that there are no short run causalities from GDP growth, FDI inflows, inflation rate,REER and openness of African blocs to India's export to those blocs but there is short term causality from REER of the African blocs to Indian export to their blocs.

Table 5: Short term causality

H0=No causality by Wald Test	*Value of $\chi^2(2)$*	*Probability*	*Accepted/rejected Ho*
Causality from GDP growth of African blocs to India's export to African blocs	0.703521	0.7034	accepted
Causality from FDI inflows of African blocs to India's export to African blocs	0.405107	0.8166	accepted
Causality from inflation rate of African blocs to India's export to African blocs	0.244647	0.8849	Accepted
Causality from REER of African blocs to India's export to African blocs	4.050176	0.1320	accepted
Causality from import concentration of African blocs to Indian export to African blocs	10.25469	0.0069	Rejected
Causality from openness of African blocs to India's export to African blocs	0.593186	0.7433	accepted

Source: Calculated by author

From the system equation 2 to 7,the Wald test showed that there are short term causalities [i] from import concentration of African blocs to GDP growth rate of African blocs,[ii] from openness of African blocs to inflation rate of African blocs,and [iii] from FDI inflows of African blocs to REER of African blocs respectively which are clearly shown in Table 6 below.

Table 6: Short run causality tested by the Wald test

H0=No causality by Wald Test	*Value of $\chi^2(2)$*	*Probability*	*Accepted/rejected Ho*
Causality from import concentration of African blocs to GDP growth of African blocs.	11.74973	0.0028	rejected
Causality from openness of African blocs to inflation rate of African blocs	7.256557	0.0266	rejected
Causality from FDI inflows of African blocs to REER of African blocs.	8.919452	0.0116	rejected

Source: Calculated by author

Limitations and future studies

The paper excludes other seven trading blocs of Africa which are not less important. The export and import intensities, export and import diversification indices, total foreign currency reserves, whole sale price index, rate of tariffs, export tax and import tax might affect India's export to African blocs. The paper fails to include them. India's imports to those blocs were not explained here which is left for future research. The impact of India's trade balance with Africa on macro variables is an import area which is also left for future research.

Policy recommendations

So far as the empirical results of the model are concerned, the openness index and import concentration index should be increased. Even the growth rate of GDP should be hiked with decline in the inflation rate. In general Indian export to African blocs should have positive impact on trade integration if the intra export and import shares of the blocs are increased with the enhancement of GDP growth rate. On the other hand, Indian export to African blocs should have enriched financial integration of the blocs if foreign direct investment inflows and growth rate of GDP of the African blocs have been stipulated. These are the essential policies that the blocs must be aware of. The political and economic cooperation are urgently needed to boost the process of economic integration.

Conclusion

The paper concludes that the growth rate of India's export to seven African blocs namely, CEMAC, COMESA ,EAC,ECCAS,SACU, SADC and WAEMU have been increasing at the rate of 0.13-0.19 per cent per annum during 1995-2017. These exports have significant upward structural breaks during the survey period. The fixed effect panel regression assured that if other things are unchanged,[i] one per cent increase in GDP growth rate of African blocs led to 0.101 per cent increase in export of India to African blocs,[ii] one per cent increase in FDI inflows of African blocs led to 0.1185 per cent increase in Indian export to African blocs, [iii] one per hike in inflation rate of African blocs led to 0.1839 per cent expand in Indian export to African blocs,[iv] one per cent increase in REER of African blocs led to 1.15% decrease in Indian export to African blocs, [v] one per cent increase in import concentration index of African blocs led to 1.388 per cent decrease in Indian export to African blocs, [vi] one per cent increase in openness index of African blocs led to 3.586 per cent decrease in Indian export to African blocs during 1995-2017.All are significant at 5% level. Panel cointegration tests showed that there are at least five cointegrating vectors among them. The

system equations of the vector error correction model state that there are long run causalities from import concentration index and openness index of 7 African blocs to India's exports to the said African blocs during 1995-2017. Their relationships are positive. Moreover, there are long run causalities from import concentration index and openness index of 7 African blocs to GDP growth rate and REER of those African blocs during 1995-2017 but their t values of the coefficients of target variablesare not significant at 5% level.The Wald test confirmed that there is short term causality from REER of the African blocs to Indian export to their blocs. And there are short term causalities [i] from import concentration of African blocs to GDP growth rate of African blocs,[ii] from openness of African blocs to inflation rate of African blocs, and [iii] from FDI inflows of African blocs to REER of African blocs respectively.This research may find out to formulate policies on macro variables how to accelerate trade and financial integration of African blocs with India.

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Annexure

CEMAC- The Central African Economic and Monetary Community (Gabon, Cameroon, the Central African Republic, Chad, the Republic of the Congo, Equatorial Guinea).

CEPGL-Economic Community of Great Lakes Countries (Burundi,the Democratic Republic of the Congo,Republic of Rwanda)

COMESA- Common Market for Eastern and Southern Africa (Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Sudan, Swaziland, Seychelles, Uganda, Zambia, Zimbabwe) EAC- East African Community (Burundi, Kenya, Rwanda, South Sudan, Tanzania, Uganda)

ECCAS-The Economic Community of Central African States (Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe)

ECOWAS—Economic Community of West African States (Benin, Cote dIvoire, Gambia, Ghana, Guinea Bissau,Liberia, Mali, Mauritius, Niger, Nigeria, Senegal, Sierra Leone, Togo and Burkina Faso)

SACU- Southern African Custom Union (Botswana, Lesotho, Namibia, South Africa and Eswatini)

SADC -Southern African Development Community (Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe)

UMA-Arab Maghreb Union (Algeria, Libya, Mauritius, Morocco, Tunisia)

UEMOA-Union Economique et Monetaire d I'Afrique de I'Quest (Benin, Burkina Faso, Cote dIvoire, Guinea-Bissau, Mali, Niger, Senegal, Togo)

WAEMU-West African Economic and Monetary Union (Benin, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo)

AfCFTA-African Continental Free Trade Agreement

ASSOCHAM- Associated Chambers of Commerce and Industry

AU-African Union

CII- Confederation of Indian Industries

FICCI- Federation of Indian Chambers of Commerce and Industry

FIEO -Federation of Indian Exporter's Organization (FIEO)

NEPAD- New Partnership for Africa's Development

TFTA -Tripartite Free Trade Area

The AFTZ -African Free Trade Zone

TTIP -Transatlantic Trade and Investment Partnership

UNECA-United Nations Economic Commission for Africa

Following Herfinahl-Hirschmann index, the paper included the import concentration index formula as follows.

$$\text{import concentration index} = \sqrt{\sum_{i=1}^{N}\left(Mij \big/ {}_{Mj}\right)^2 - \sqrt{\frac{1}{N}}} \Big/ 1 - \sqrt{\frac{1}{N}}$$

where Mij is the value of import of product i by country j,

xj is the total value of imports of country j and N=number of products

imported at 3 digit of the SITC revision 3