Analysis on Ethiopia's Revealed Comparative Advantage and Its Structural Transformation

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Research

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Abstract

This study examines Ethiopia's structural transformation by using the revealed comparative advantage approach using export data for years 1996–2018. Primary and low technology manufactured products have comparative advantage over other product groups for the periods 1996 to 2018. However, there is an improvement in all manufactured product categories except low technology manufactured products (textile, garment and footwear) and resource-based manufactured goods. Thus, based on revealed comparative, structural transformation has occurred in the Ethiopian economy over the last decades but it is very insignificant. Hence, Ethiopia reveals strong comparative advantage in export of primary products, it is important to add value to these products for higher export earnings.

1. Introduction

Ethiopia has emerged as one of the fastest-growing economies in Africa in the twenty-first century. Despite this rapid growth, however, structural transformation of the economy remains the country's central challenge (evidence manufacturing sector contribution to GDP is 6.4% in 2017; manufacturing sector contribution to export 3 % in 2017, African economic outlook country note, 2018). The Government of Ethiopia is striving in taking different actions that are thought to facilitate and enhance the transformation.

Structural transformation refers to “the reallocation of economic activity across three broad sectors (agriculture, manufacturing, and services) that accompanies the process of modern economic growth” (Herrendorf et al., 2013, McMillan, 2014). An economy's structural transformation is important because it reveals the extent of its economic development, and the degree to which policies put in place to steer the economy are effective. Structural change is also a key driver of economic development (McMillan, 2014). Timmer et al. (2012) give a list of four processes that define structural transformation, which are; a decline in the share of agriculture in gross domestic product (GDP) and employment, a rapid urbanization process, a rise in a modern industrial and service sector, and a demographic transition from high births and deaths to low ones. A country's export content can also reflect its structural transformation (Das, 1998). For example, on average for the newly industrializing economies of Hong Kong, Korea, Singapore and Taiwan, from 1975 to 1996, exports of manufactured products as a percentage of total exports increased from approximately 70–90%. Given this connection between the structure of the economy and export content, what can Ethiopia's comparative advantage tell us about the extent to which the structure of the economy has changed and transformed over the years?

Structural transformation of an economy can result from among others, a change in factor endowments and deliberate policies to drive the economy toward a desired path. As an economy grows, its factor endowments will also change, including the skill levels of its people. An improvement in the skill levels of labor can contribute to improving the goods produced in an economy, as the more skilled manpower are applied in productive activities and hence enabling the economy to move from low skilled products to high skilled products. This in turn allows the economy to move from exporting raw materials when the skill levels of its labor were lower, to exporting processed products as the skill levels become higher.

The comparative advantage of a nation can change if a change in government policies invites investment or favors some sectors that were neglected before. Thus, from a policy standpoint, the comparative advantage of a nation can be steered in a direction that policy makers see as encouraging and beneficial to the nation. For example, the governments of the East Asian Tigers put specific policies to steer their economies in a certain way, which accelerated their growth through becoming more export-oriented, resulting in structural changes (Das, 1998). Forbes and Wield (2002) also note that in Korea, subsidies and import protection were combined with export incentives for the local industry, which accelerated the building of an industry that beats world standards. In Singapore, the government combined strong investment in education with pushing industry up the value chain to create a strong industrial sector.

Given that the comparative advantage of a nation can change depending on how an economy's structure evolves over time, the extent and nature of that structural transformation can be deduced from trade data, or specifically, its export content or basket. Indeed, numerous studies have been done which have employed the revealed comparative approach to assess the extent and nature of transformation of various economies. Revealed Comparative Advantage (RCA), developed by Bela Balassa (1977, 1965), builds on the concept of comparative advantage, which reflects a country's specialization, given differences in opportunity costs in producing the goods that it exports. The RCA index has been used in empirical studies on structural transformation, competitiveness and changing specialization. For example, Batra and Khan (2005) undertake a comparative study of China and India's structural transformation using the RCA approach. In terms of sectoral transformation, Saboniene (2011) analyses how Lithuania's manufacturing sector had transformed and how it could be assisted in becoming more competitive in Europe and Beatrice Kalinda Mkend (2012) worked for Tanzania.

This study employs the RCA approach to examine the extent to which the Ethiopia's economy has structurally changed. The results are given and discussed in Sect. 4. The calculated indices are based on the SITC rev.3 products, by technological categories. This paper examines

whether there has been any shift in Ethiopia's comparative advantage. This assessment is done based on Ethiopia's revealed comparative advantage between 1996–2018.

2. Data And Methodology

2.1. Data

The data for the calculations were provided by the United Nations Conference on Trade and Development (UNCTAD) Statistical Division. The data are recorded using SITC (rev. 3) industry classification. They are available for the time period 1995–2013. The three digit level of classification provides more detailed information about the commodity structure of exports (255 classes clustered into 10 major groups – see Appendix A) and offers an opportunity for more accurate conclusions biased to a lesser extent by excessive aggregation. This paper deals solely with the issue of international trade in goods.

2.2. Method of Data Analysis

This Empirical examination of the products in which countries have a comparative advantage in employs the concept of revealed comparative advantage (RCA). It refers to how nations perform relative to each other in terms of trade in specific commodities. Assuming that different nations' trade composition in terms of commodities reflect differences in the relative costs they face in producing them, once calculated, the RCA index "reveals" the comparative advantage of nations. As an economy's structure changes, the RCA can change, as well as if there is an improvement in world demand for the products, and when trade specialization changes (Batra and Khan, 2005).

Balassa's RCA index is calculated as follow

$$RCA = \frac{X_{ij}/X_i}{X_{wj}/X_w}$$

In Eq. 1, X_{ij} is a country i 's exports of commodity j , X_i is country i 's total exports, X_{wj} are world exports of commodity j , and X_w are world total exports. The index thus divides the share of a country's exports of a particular good in its total exports by the world's share of exports of that good in total world exports. The index is used for identifying the commodities in which a particular country's comparative advantage lies or does not lie. The interpretation of the index is straightforward; if the calculated value is greater than 1 in any product category, then it implies that the share of that good in a country's exports is more than the world share, and hence it has a comparative advantage in that particular good. The index is used in identifying the comparative advantage of countries or regions, and it can be calculated for particular markets (for instance the market for minerals or vegetables), regions (for example for the East African Community or the Southern African Development Community) or for the global market. This paper calculates the RCA index for the global market.

3. Data Analysis And Discussion

3.1. Sectorial composition of exports

Figure 1 in Appendix 1 gives the average percentage export shares of Ethiopia's products by technological categories exports. Primary products export has highest share in total export (17%). The second highest among technological categories exports is medium technology manufactures: automotive and medium technology manufactures: engineering (15%). If exports are based on resource endowment, Ethiopia should have highest export of resource based -agro base manufacturing products and low technology manufactures. However, Ethiopia's resource -agro manufacturing export is one of the lowest shares which are only 6%.

3.2. Inter-temporal variation in Ethiopia's 's RCA and Structural Transformation

Table 1 results show that Ethiopia had comparative advantage in two product groups in 1996, which is stagnant only in two product groups in 2018. However, there is an improvement in all manufactured product categories except low tech. manufactured products (textile, garment and footwear) and resource-based manufactured goods (in other classifications). Table 2 shows that the number of product groups in which Ethiopia has a comparative advantage does not change from 1996 to 2018. It shows that Ethiopia has comparative advantage only in two product groups. These are primary products group and low tech. manufacturing products such as textile, garment and footwear products among nine listed Rev. 3 SITC classification products. However, RCA for primary products decline from 5.769 in 1996 to 3.22 in 2018. Its RCA has been declined by 2% on average from 1996 to 2018. While low tech. manufactured products(textile, garment and footwear) and resource-based manufactured goods (agro-based), resource-based manufacturing goods (other classifications), medium technology (manufactured products(engineering), high technology manufacturing goods (other classifications), medium technology manufacturing products (automotive), low technology manufacturing products (other classification), high technology manufacturing products (electronic) and

medium technology manufacturing products (process) has been grown by -2%, 6%, 25%, 28%, 51%, 116%, 68%, 72%, 62% and 56% from 1996 to 2018. Among all groups of products medium technology manufactured products (engineering) has shown the highest growth rate which is about 116% on average from 1996 to 2018. It is evident that the product groups are predominantly primary products. One would have expected that these products groups in which Ethiopia has overall advantage, has losing its advantage over time. It is interesting to note that the numbers of product groups that have shown progress in RCA gained are more than the product groups that their RCA have been declined.

3.3. Specialization of exports

Specialization index can indicate a country's position of comparative advantage. Specialization index shows whether a country is net exporter or net importer of particular product. In this regard, specialization index is considered an indicator of comparative advantage. The index ranges between -1 to 1. Higher value indicates that a country is specialized as exporter, and lower value means that she is specialized as importer. The specialization index shows that Ethiopia is specialized as importer in all technological based manufacturing exports except primary products.

4. Conclusion

Ethiopia has emerged as one of the fastest-growing economies in Africa in the twenty-first century. Despite this rapid growth, however, structural transformation of the economy remains the country's central challenge (evidence manufacturing sector contribution to GDP is 6.4% in 2017; manufacturing sector contribution to export 3 % in 2017. The Government of Ethiopia is striving in taking different actions that are thought to facilitate and enhance the transformation.

This study employs the RCA approach to examine the extent to which the Ethiopia's economy has structurally changed. The calculated indices are based on the SITC rev.3 products, by technological categories. This paper examines whether there has been any shift in Ethiopia's comparative advantage using export data for years 1996–2018.

The RCA approach results show that primary and low technology manufactured products have comparative advantage over other product groups for the periods 1996 to 2018. However, there is an improvement in all manufactured product categories except low technology manufactured products (textile, garment and footwear) and resource-based manufactured goods. Thus, based on revealed comparative advantage, structural transformation has occurred in the Ethiopian economy over the last decades but it is very insignificant. Hence, Ethiopia reveals strong comparative advantage in export of primary products, it is important to add value to these products for higher export earnings.

Declarations

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

Competing interests

The author declares that there is no any competing interests.

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Authors' contributions

The corresponding author is a sole author and have worked the whole manuscript

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Tables

Table 1
RCA index of exports (SITC rev.3 products, by technological categories)

Year	Primary products	Low tech. man.: textile, garment and footwear	Resource-based man.: agro-based	Resource-based man.: other class	Medium tech. man: engineering	High tech man: other	Medium tech. man: automotive	Low tech. man: other class	High tech man: electronic	Medium tech man.: process c
1996	5.769	1.120	0.039	0.236	0.000	0.007	.	0.000	.	0.000
1997	5.748	0.881	0.069	0.318	0.129	0.150	0.002	0.009	0.014	0.002
1998	6.762	0.546	0.062	0.249	0.075	0.115	0.013	0.036	0.018	0.012
1999	6.647	0.615	0.112	0.207	0.165	0.161	0.016	0.027	0.020	0.010
2000	5.113	0.801	0.323	0.161	0.155	0.247	0.021	0.027	0.018	0.020
2001	6.659	1.734	0.195	0.444	0.115	0.089	0.015	0.051	0.142	0.030
2002	5.267	1.323	0.714	0.123	0.013	0.044	0.009	0.013	0.012	0.010
2003	5.262	1.036	0.436	0.068	0.113	0.049	0.008	0.079	0.011	0.043
2004	4.694	0.649	0.358	0.145	0.048	0.087	0.004	0.012	0.013	0.009
2005	4.945	0.892	0.569	0.179	0.070	0.034	0.004	0.019	0.008	0.015
2006	4.327	0.991	0.316	0.098	0.184	0.024	0.022	0.009	0.013	0.037
2007	4.638	1.270	0.491	0.087	0.053	0.044	0.071	0.027	0.016	0.033
2008	4.186	1.177	0.384	0.041	0.057	0.241	0.107	0.125	0.026	0.058
2009	4.689	0.868	0.342	0.068	0.107	0.082	0.064	0.038	0.161	0.034
2010	4.940	1.029	0.156	0.080	0.119	0.051	0.071	0.027	0.049	0.049
2011	4.464	1.702	0.196	0.124	0.059	0.052	0.063	0.027	0.017	0.036
2012	4.078	1.260	0.167	0.072	0.095	0.090	0.078	0.030	0.030	0.035
2013	3.450	1.114	0.255	0.293	0.088	0.095	0.043	0.048	0.015	0.036
2014	3.273	0.888	0.184	0.658	0.049	0.071	0.045	0.029	0.034	0.028
2015	3.251	0.710	0.159	0.395	0.080	0.052	0.024	0.016	0.022	0.047
2016	3.690	1.224	0.228	0.149	0.210	0.096	0.108	0.075	0.035	0.059
2017	3.617	1.019	0.209	0.373	0.133	0.104	0.084	0.045	0.032	0.067
2018	3.222	1.092	0.232	0.333	0.144	0.105	0.092	0.056	0.032	0.075
Aver	4.726	1.041	0.269	0.213	0.098	0.091	0.044	0.036	0.034	0.032

Table 2
Growth of RCA index of exports (SITC rev.3 products, by technological categories)

Year	Primary products	Low tech. man.: textile, garment and footwear	Resource-based man.: agro-based	Resource-based man.: other class	Medium tech. man: engineering	High tech man: other	Medium tech. man: automotive	Low tech. man: other class	High tech man: electronic	Medium tech man.: process c
1996										
1997	0.00	-0.21	0.77	0.35	.	20.43	.	.	.	.
1998	0.18	-0.38	-0.10	-0.22	-0.42	-0.23	5.50	3.00	0.29	5.00
1999	-0.02	0.13	0.81	-0.17	1.20	0.40	0.23	-0.25	0.11	-0.17
2000	-0.23	0.30	1.88	-0.22	-0.06	0.53	0.31	0.00	-0.10	1.00
2001	0.30	1.16	-0.40	1.76	-0.26	-0.64	-0.29	0.89	6.89	0.50
2002	-0.21	-0.24	2.66	-0.72	-0.89	-0.51	-0.40	-0.75	-0.92	-0.67
2003	0.00	-0.22	-0.39	-0.45	7.69	0.11	-0.11	5.08	-0.08	3.30
2004	-0.11	-0.37	-0.18	1.13	-0.58	0.78	-0.50	-0.85	0.18	-0.79
2005	0.05	0.37	0.59	0.23	0.46	-0.61	0.00	0.58	-0.38	0.67
2006	-0.12	0.11	-0.44	-0.45	1.63	-0.29	4.50	-0.53	0.63	1.47
2007	0.07	0.28	0.55	-0.11	-0.71	0.83	2.23	2.00	0.23	-0.11
2008	-0.10	-0.07	-0.22	-0.53	0.08	4.48	0.51	3.63	0.63	0.76
2009	0.12	-0.26	-0.11	0.66	0.88	-0.66	-0.40	-0.70	5.19	-0.41
2010	0.05	0.19	-0.54	0.18	0.11	-0.38	0.11	-0.29	-0.70	0.44
2011	-0.10	0.65	0.26	0.55	-0.50	0.02	-0.11	0.00	-0.65	-0.27
2012	-0.09	-0.26	-0.15	-0.42	0.61	0.73	0.24	0.11	0.76	-0.03
2013	-0.15	-0.12	0.53	3.07	-0.07	0.06	-0.45	0.60	-0.50	0.03
2014	-0.05	-0.20	-0.28	1.25	-0.44	-0.25	0.05	-0.40	1.27	-0.22
2015	-0.01	-0.20	-0.14	-0.40	0.63	-0.27	-0.47	-0.45	-0.35	0.68
2016	0.14	0.72	0.43	-0.62	1.63	0.85	3.50	3.69	0.59	0.26
2017	-0.02	-0.17	-0.08	1.50	-0.37	0.08	-0.22	-0.40	-0.09	0.14
2018	-0.11	0.07	0.11	-0.11	0.08	0.01	0.10	0.24	0.00	0.12
Aver	-0.02	0.06	0.25	0.28	0.51	1.16	0.68	0.72	0.62	0.56

Table 3
Specialization index of exports based on SITC rev.3 products, by technological categories

YEAR	Primary products	Resource-based manu: agro-based	Resourced man: other	Low techn.manuf: textile, garment and footwear	Low tech. manu: other produ	Medium tech manu: automotive	Medium tech manu: process	Medium tech man: engineering	High tech mau: electronic and electrical	High tech manu: other
1995	0.352	-0.936	-0.731	-0.088	-0.988	-0.997	-0.988	-0.842	-0.984	-0.869
1996	0.805	-0.976	-0.914	-0.285	-1.000	.	-1.000	-1.000	.	-0.997
1997	0.815	-0.932	-0.802	-0.129	-0.993	-0.998	-0.999	-0.903	-0.973	-0.898
1998	0.607	-0.946	-0.904	-0.443	-0.976	-0.987	-0.993	-0.944	-0.974	-0.905
1999	0.575	-0.923	-0.911	-0.438	-0.984	-0.992	-0.996	-0.907	-0.972	-0.912
2000	0.573	-0.833	-0.936	-0.305	-0.981	-0.984	-0.989	-0.874	-0.959	-0.801
2001	0.357	-0.955	-0.909	-0.289	-0.985	-0.994	-0.993	-0.951	-0.866	-0.957
2002	0.563	-0.670	-0.949	-0.315	-0.993	-0.995	-0.996	-0.992	-0.984	-0.982
2003	0.032	-0.881	-0.979	-0.500	-0.971	-0.996	-0.985	-0.948	-0.992	-0.986
2004	0.297	-0.874	-0.947	-0.649	-0.994	-0.998	-0.998	-0.977	-0.991	-0.956
2005	0.443	-0.786	-0.936	-0.567	-0.993	-0.998	-0.995	-0.975	-0.993	-0.985
2006	0.406	-0.898	-0.974	-0.618	-0.996	-0.995	-0.989	-0.940	-0.987	-0.988
2007	0.537	-0.835	-0.973	-0.492	-0.992	-0.976	-0.989	-0.984	-0.990	-0.983
2008	0.117	-0.903	-0.991	-0.421	-0.963	-0.953	-0.986	-0.981	-0.991	-0.894
2009	0.416	-0.900	-0.983	-0.471	-0.990	-0.974	-0.992	-0.967	-0.936	-0.966
2010	0.495	-0.938	-0.970	-0.440	-0.988	-0.971	-0.981	-0.947	-0.972	-0.974
2011	0.454	-0.935	-0.950	-0.159	-0.988	-0.972	-0.986	-0.973	-0.983	-0.972
2012	0.607	-0.939	-0.978	-0.326	-0.990	-0.969	-0.988	-0.964	-0.976	-0.951
2013	0.514	-0.902	-0.871	-0.342	-0.980	-0.980	-0.985	-0.963	-0.984	-0.955
2014	0.535	-0.919	-0.786	-0.527	-0.990	-0.977	-0.989	-0.977	-0.976	-0.954
2015	0.397	-0.930	-0.851	-0.649	-0.994	-0.988	-0.984	-0.961	-0.985	-0.965
2016	0.446	-0.923	-0.951	-0.536	-0.978	-0.943	-0.982	-0.923	-0.971	-0.965
2017	0.401	-0.915	-0.864	-0.547	-0.985	-0.956	-0.978	-0.945	-0.976	-0.952
2018	0.344	-0.909	-0.877	-0.532	-0.982	-0.953	-0.976	-0.943	-0.975	-0.954
Aver	0.462	-0.898	-0.914	-0.420	-0.986	-0.980	-0.989	-0.949	-0.974	-0.947

Figures

Figure 1

SITC rev. products by technological categories

Figure 2

SITC rev.3 products, by technological categories