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TRADE REGIONALISATION AND OPENNESS IN AFRICA

Lelio Iapadre and Francesca Luchetti

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE
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Abstract

The intensity of trade among countries belonging to the same region depends not only on the existence and effectiveness of a regional integration agreement, but also on other factors, which include the overall trade policy orientation and the relative level of geo-graphic and economic barriers affecting intra- and extra-regional trade.

After presenting a set of indicators aimed at measuring correctly the intensity of bi-lateral trade preferences, this paper shows that most African countries tend to trade more intensely with partners belonging to the same region than with the rest of the world.

However, this is not so much the result of the weak regional integration agreements that are in force in Africa, as a consequence of the manifold barriers limiting the degree of international openness of African countries. Under this perspective, a relatively high level of intra-regional trade, far from revealing the success of preferential integration policies, confirms that Africa's participation in the process of globalisation is still very limited.

Keywords

Regional integration. Trade. Africa. Statistical indicators. Network analysis.

1. Introduction^{*1}

The process of trade regionalisation can be defined as the tendency of trade flows to grow more intensely among neighbouring countries belonging to the same region (intra-regional trade) than among countries belonging to different regions (extra-regional trade). This results from the setting up of an increasing number of regional integration agreements on a preferential basis (regionalism), as well as from the tendency of firms to develop their activities more intensely within the borders of regions, than on a global scale (market-driven regionalisation).

More generally, it must be acknowledged that the network of international trade relations does not develop at the same rate across different partner countries. On the contrary, as predicted by gravity models, the intensity of bilateral trade flows exhibits a high degree of variability, depending on the relative size of the partner countries and on their distance, as well as on a set of additional factors segmenting national markets (tariffs, quantitative restrictions, different currencies, regulations, and so on) or creating preferential linkages, such as the use of a common language, migration flows, and free-trade agreements.

Regionalism is at the core of an intense debate in academic and policy circles. On the one hand, regional integration, particularly if it goes beyond the simple removal of trade barriers, has the potential to augment the production of transnational public goods and solve many difficult problems in the governance of cross-border relations. More specifically, the integration level that can be achieved on a regional scale is believed to be deeper than what could be feasible at the multilateral level. On the other hand, the development of often overlapping preferential integration schemes can have detrimental effects, by fragmenting the set of market regulations, diverting trade flows, and making the progress of multilateral negotiations more difficult.

It is, therefore, of paramount importance to measure correctly the intensity of trade regionalisation, in order to improve the understanding of economic globalisation, feed the public debate on its effects on the progress of societies, and support decision-making at all levels.

It is commonly believed that trade among African countries is relatively low, even in comparison with other developing areas.² For example, the last UNCTAD report on economic development in Africa compares the intra-regional trade share of African countries (9 per cent on average between exports and imports in 2004-06) to that of developing America (20 per cent) and Asia (47 per cent), and presents data going back to 1960, concluding that “that Africa has consistently had a considerably lower proportion of intra-regional trade than other regions” (UNCTAD, 2009, p. 21).

This is considered to be the long-lasting result of trade patterns established in the colonial age, when African countries were led to export their natural resources to Europe, without building economic linkages with neighbouring countries. Moreover, this is often presented as evidence of the failure of regional integration agreements (RIAs) among African countries to achieve their trade goals, due to the lack of fundamental conditions for their success, such as good infrastructure and the complementarities of specialisation patterns.

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¹ The author wants to thank Dr. Yves-Alexandre Chouala and Prof. Michael Barnett for their invaluable comments.

² It is often argued that official data underestimate the actual importance of intra-regional trade in Africa, due to the large size of illegal and informal cross-border transactions. Although this problem can be particularly relevant for some countries, such as in North-Eastern Africa, the overall picture should not be affected significantly (UNCTAD, 2009, note 9, p. 107).

Empirical evidence about trade regionalisation is often based upon simple statistical indicators that do not take adequately into account cross-country differences in the value of total trade, leading to unreliable rankings across regions.

After recalling the limitations of these traditional measures, this paper applies a set of relatively new statistical indicators to trade among African countries, with the aim of assessing its actual degree of regionalisation correctly.

The approach of the analysis is only descriptive. There is no ambition to establish causal relationships between the intensity of trade flows and regional integration agreements or other possible factors, a task which would require an econometric exercise going beyond the limits of this paper.

Africa has been divided into six non-overlapping regions, which correspond, as far as possible, to the main regional integration areas. Countries belonging to more than one RIA have been assigned to the region towards which they show the maximum level of revealed trade preferences, as defined below. A list of regions with their member countries is provided in the Annex. The country composition of each region has been kept constant over time, regardless of the accession dates of the member countries to the RIAs.

2. Intra-regional trade intensity in Africa: a quantitative assessment

The simplest statistical indicator used to assess the relative importance of intra-regional trade is its share of the region's total trade (*intra-regional trade share, S_i*):

$$S_i = t_{ii}/t_i \quad [1]$$

$$0 \leq S_i \leq 1$$

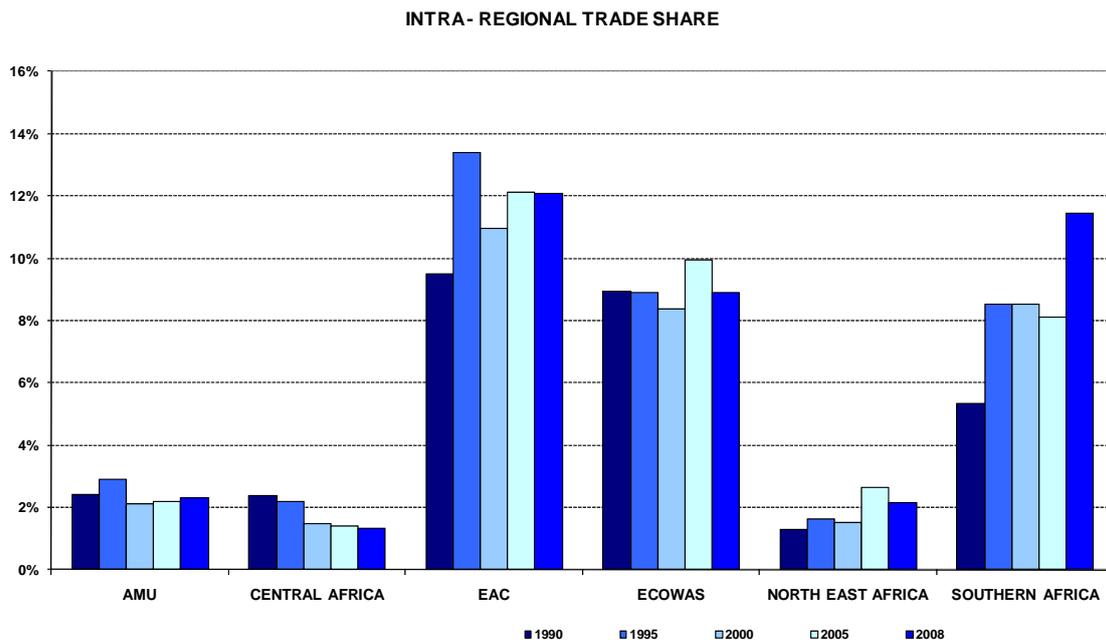
in which: t_{ii} = region i 's intra-regional trade (exports plus imports);

t_i = region i 's total trade.

Given its intuitive appeal, this indicator is often used in the empirical analysis of RIAs (see, for example, WTO, 2007, Tables I.10 and III.3).

Intra-regional trade shares for the six African regions identified in this paper are shown in Figure 1.

Figure 1: Intra-Regional Trade Share



EAC, ECOWAS and Southern Africa show relatively larger intra-regional trade shares, at levels slightly lower than in some American regions, such as the Andean Community and Mercosur. This indicator is only about 2 per cent in AMU, Central Africa and North East Africa, even below the well-known case of the South Asia Free Trade Area (SAFTA), where it was around 5 per cent in 2005.

An upward trend of the intra-regional trade share in the last two decades is visible only for EAC, North East Africa, and Southern Africa.

Unfortunately, as shown by Anderson and Norheim (1993), among others, the intra-regional trade share incurs at least two problems, impairing its use for cross-region and time-series analyses. Regardless of the level of trade integration, a region's intra-regional trade share is positively affected by:

- 1) the number of its member countries, for any given value of its total trade;
- 2) its size in terms of total trade, for any given number of member countries.

The latter problem is particularly insidious, because it gives the intra-regional trade share a pro-cyclical bias, so that dynamic regions, whose trade grows more rapidly than the world average, tend to show rising intra-regional trade shares independently of their degree of trade integration, that is, even assuming that the weight of every partner in the region's trade is equal to its weight in world trade ('geographic neutrality').

One possible alternative is offered by the *intra-regional trade intensity index* (I_i), which, in its simplest specification, is equal to the ratio between region i 's intra-regional trade share (S_i) and its share of world trade (W_i):³

$$I_i = S_i/W_i = (t_{ii}/t_i)/(t_i/T) \quad [2]$$

$$0 \leq I_i \leq (T / t_i)$$

in which: t_{ii} = region i 's intra-regional trade;
 t_i = region i 's total trade;
 T = world trade.

This index is equal to one if the region's weight in its own trade is equal to its weight in world trade (geographic neutrality). In contrast, if intra-regional trade is relatively more important than trade flows with the rest of the world, as is usually the case, the index is higher than one.

Correspondingly, an *extra-regional trade intensity index* (E_i) can be defined as:

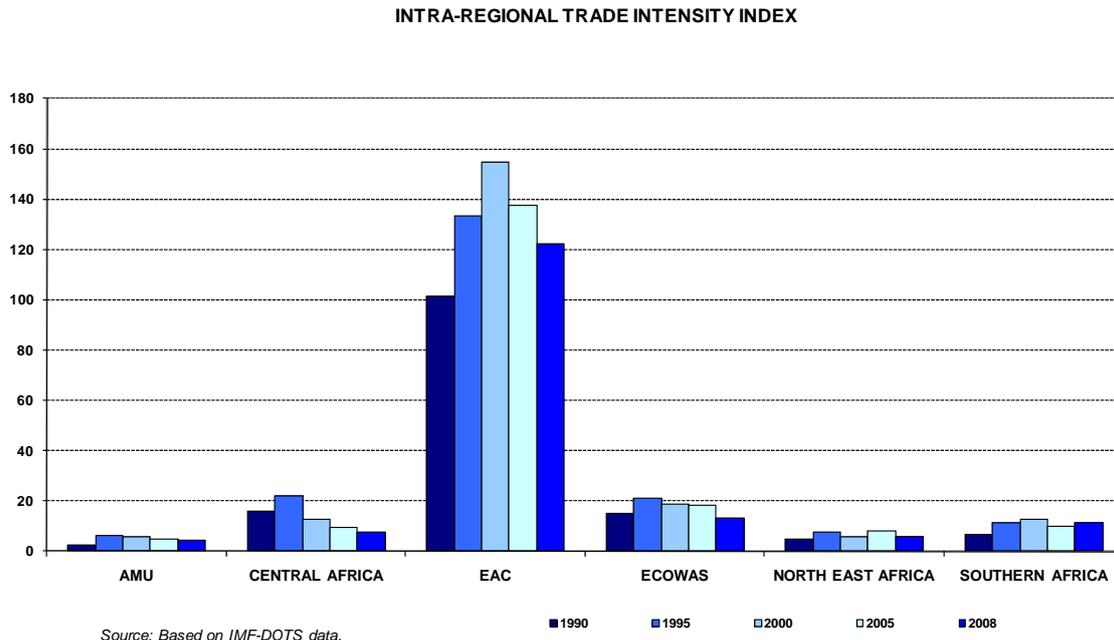
$$E_i = (1 - S_i) / (1 - W_i) \quad [3]$$

$$0 \leq E_i \leq [T / (T - t_i)]$$

Intra-regional trade intensity indices have sometimes also been used in the study of African trade (see, for example, Yang and Gupta, 2007), in which they reach very high levels, leading to the conclusion that intra-regional trade is much more important for African countries than could be expected upon the basis of their weight in world trade. Figure 2 shows these indicators for the six African regions of this paper.

³ It should be reminded that, since no country can trade with itself, the denominator of the indices should be corrected by subtracting from the region's total trade, as well as from world trade, one n -th of the region's total trade (where n is the number of countries in the region), as shown by Anderson and Norheim (1993: 82, footnote 6). This correction ensures that the index is approximately equal to unity, if the geographic orientation of the region's trade is not inward biased. The more similar are the trade values of member countries, the lower is the approximation error. See also Frankel (1997: 25-29). The Anderson and Norheim correction is important for comparing trade intensity levels of different regions, but may be neglected if the interest is focused on the time path of intra-regional trade intensity in a single region. On the other hand, this correction does not solve other problems raised by the fact that no country can trade with itself, which were highlighted by Savage and Deutsch (1960). A more rigorous correction procedure has been proposed by Freudenberg, Gaulier and Ünal-Kesenci (1998).

Figure 2: Intra-Regional Trade Intensity Index



The figure is made difficult to read by the extremely high levels reached by this indicator in EAC, in which the intra-regional trade share happens to be more than 100 times larger than the region’s weight in world trade. Intra-regional trade-intensity indices are always much higher than the value of 1 also in the other five regions, but show a clear upward trend only in Southern Africa.

The intra-regional trade intensity index, despite overcoming the limitations faced by the unadjusted trade share, is, in turn, affected by a number of statistical problems, which limit its interpretability and usefulness:

1. *range variability*: the maximum value of the index is a decreasing function of the region’s total trade, so that indices computed for different regions and/or periods are not perfectly comparable with each other;
2. *range asymmetry*: its range below the threshold value of 1 is much smaller than above, which may give rise to biased assessments of the index changes, and create problems in econometric estimates involving the index;
3. *dynamic ambiguity*: intra- and extra-regional trade-intensity indices can move in the same direction, if certain conditions hold, creating problems in their interpretation.

A possible solution has been proposed by Iapadre (2006) with a *regional trade introversion index*, which measures the intensity of “revealed trade preferences” (RTP) among countries belonging to the same region.

The *regional trade introversion index* (J_i) is based upon a modified version of intra- and extra-regional intensity indices (HI_i , HE_i), in which the intra-regional trade share is compared to the region’s share of the trade of other regions (and not of world trade), so that their range is independent of the size of the region. J_i rises (or falls) only if the intensity of intra-regional trade grows more (or less) rapidly than that of extra-regional trade. The index is made symmetric through a bilinear transformation of the ratio between HI_i and HE_i , so that the threshold value of geographic neutrality ($J_i = 0$) divides its range into two equal parts. Moreover, an increase in J_i shows that the intensity of intra-regional trade flows has grown more than that of extra-regional trade, solving the dynamic ambiguity problem of traditional trade intensity indices.

Its formula is the following:

$$J_i = (HI_i - HE_i)/(HI_i + HE_i) \quad [4]$$

$$-1 \leq J_i \leq 1$$

in which:

$$HI_i = S_i/V_i \Xi (t_{ii}/t_i)/(t_{ri}/t_r)$$

$$HE_i = (1 - S_i)/(1 - V_i)$$

t_{ii} = region i's intra-regional trade;

t_i = region i's total trade;

t_{ri} = region's i extra-regional trade;

t_r = total trade of the rest of the world.

The corresponding regional trade extroversions index (F_i) can be defined as:

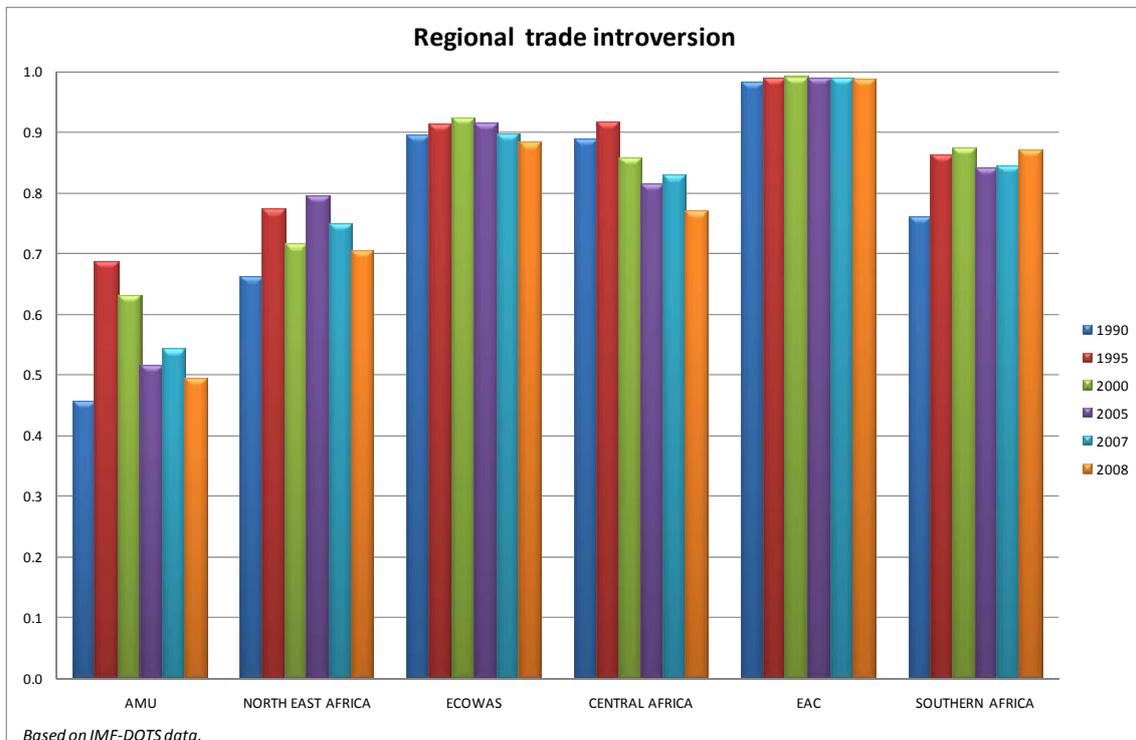
$$F_i = (HE_i - HI_i)/(HE_i + HI_i) = -SJ_i \quad [5]$$

$$-1 \leq F_i \leq 1$$

A further interesting property of the regional trade introversion index is that it simultaneously measures the relative intensity of intra-regional trade in the target region i and in the rest of the world, taken as a single “complementary region”. Stated differently, if the world is divided into two regions, since, by definition, $S_2 = (1 - V_1)$; $V_2 = (1 - S_1)$, and *vice versa*, it is easy to show that $J_2 = J_1$, independently of the size of the regions. Intuitively, it is reasonable that, if the world is divided into only two regions, any level of trade introversion in one of them implies the same result in the other, with the limiting case in which both regions are completely isolated from each other.

The trade introversion indices for our six African regions are shown in Figure 3. The main facts already visible in the previous figures are not altered, but this indicator is better suited to allow reliable comparisons across different regions.

Figure 3: Regional Trade Introversion



The regional trade introversion index can be seen as a particular case of the bilateral RTP index, showing the relative intensity of trade flows between a pair of countries or regions (Iapadre and Tironi, 2009).

A more comprehensive picture of regional trade in Africa is offered by Table 1, which shows RTP indices not only for intra-regional trade (introversion indices), but also for trade between each pair of African regions, as well as for their trade with the European Union (27), which is by far the most important extra-regional partner of African countries.

Table 1: Revealed Trade Preference Index

Table 1 - REVEALED TRADE PREFERENCE INDEX								
1990	AMU	NORTH EAST AFRICA	ECOWAS	CENTRAL AFRICA	EAC	SOUTHERN AFRICA	EUROPEAN UNION	REST OF THE WORLD
AMU	0.46							
NORTH EAST AFRICA	0.29	0.66						
ECOWAS	-0.33	-0.92	0.89					
CENTRAL AFRICA	0.56	-0.84	0.65	0.89				
EAC	-0.62	0.70	-0.83	-1.00	0.98			
SOUTHERN AFRICA	-0.75	-0.63	-0.27	-0.53	0.50	0.76		
EUROPEAN UNION	0.49	0.09	0.09	0.35	0.11	0.10	0.67	
REST OF THE WORLD	-0.54	-0.13	-0.27	-0.49	-0.35	-0.20	-0.68	0.70
2000	AMU	NORTH EAST AFRICA	ECOWAS	CENTRAL AFRICA	EAC	SOUTHERN AFRICA	EUROPEAN UNION	REST OF THE WORLD
AMU	0.63							
NORTH EAST AFRICA	0.18	0.71						
ECOWAS	0.17	-0.62	0.92					
CENTRAL AFRICA	-0.04	-0.77	0.78	0.86				
EAC	-0.86	0.83	-0.18	-0.72	0.99			
SOUTHERN AFRICA	-0.61	-0.48	0.29	0.21	0.84	0.87		
EUROPEAN UNION	0.60	0.04	0.02	0.09	-0.09	0.04	0.75	
REST OF THE WORLD	-0.65	-0.09	-0.24	-0.19	-0.32	-0.22	-0.75	0.76
2008	AMU	NORTH EAST AFRICA	ECOWAS	CENTRAL AFRICA	EAC	SOUTHERN AFRICA	EUROPEAN UNION	REST OF THE WORLD
AMU	0.49							
NORTH EAST AFRICA	0.25	0.71						
ECOWAS	-0.27	-0.73	0.88					
CENTRAL AFRICA	-0.25	-0.71	0.60	0.77				
EAC	-0.68	0.69	-0.31	-0.73	0.99			
SOUTHERN AFRICA	-0.64	-0.30	0.32	-0.18	0.80	0.87		
EUROPEAN UNION	0.48	-0.17	-0.13	-0.07	-0.31	-0.14	0.74	
REST OF THE WORLD	-0.52	0.09	-0.10	-0.01	-0.17	-0.13	-0.74	0.75

Source: based on IMF DOTS data.

Taking the RTP index of the “rest of the world” as a benchmark of international trade integration, the table shows that regional trade introversion is particularly high in Sub-Saharan Africa (SSA). In other words, the inability of SSA countries to participate successfully in extra-regional trade translates into a relatively high intensity of trade with regional partners, which illustrates the concept of “trade introversion” used to name the RTP index for intra-regional trade. On the other hand, regional trade introversion is relatively low in the AMU region, due mainly to its more intense linkages with the European Union.

While, in the 1990s, trade introversion was on the rise everywhere (except in Central Africa), no African region shows a further increase in the index in the current decade, and some of them (AMU, ECOWAS and Central Africa) have experienced a marked decline.

Trade flows among different African regions are relatively less intense than intra-regional flows and strongly affected by geographical distance. In fact, positive RTP indices for inter-regional flows were recorded almost exclusively between neighbouring regions in 2008. However, RTP indices for inter-regional flows among African areas have been generally increasing in the last two decades,

particularly those involving ECOWAS and Southern Africa, whose bilateral index has become positive.

What is possibly more striking in Table 1 is that, leaving aside AMU, RTP indices between African regions and the European Union show a downward trend in the last two decades and all became negative in 2008. Far from stimulating more intense trade with African countries, EU preferential integration policies have failed to prevent a weakening of bilateral trade linkages.

On the other hand, RTP indices for African regions with the rest of the world (excluding Africa and the EU), despite remaining mainly negative, have consistently risen in the last two decades, possibly reflecting the growing role of African countries as the suppliers of raw materials to China and other emerging countries.

The fact that, overall, trade among African regions has been growing more rapidly than intra-regional trade is confirmed by the dynamics of the assortativity coefficient, an indicator proposed by Newman (2003) in the context of “binary network analysis” in order to measure to what extent interactions among a network’s nodes tend to follow a “homophilic” pattern. When applied to a multi-region matrix of trade values (Iapadre and Tironi, 2009), this index measures globally the tendency of countries to trade more intensely with intra-regional partners than with partners in other regions.

The resulting intra-regional assortativity coefficient (IAC) can be defined as:

$$IAC = (Tr(\mathbf{R}) - \|\mathbf{R}^2\|) / (1 - \|\mathbf{R}^2\|) \quad [6]$$

in which \mathbf{R} is the matrix of intra- and inter-regional trade flows, divided by their total, Tr is the trace operator, and $\|\mathbf{R}^2\|$ is the sum of all the elements of matrix \mathbf{R}^2 .

IAC is equal to zero in the case of geographic neutrality, that is, when regions trade with each other in proportion to their total trade values, and reaches a maximum value of one in the limiting case of no inter-regional trade. On the other hand, in the limiting case of no intra-regional trade, the minimum (negative) value of IAC is equal to:

$$- \|\mathbf{R}^2\| / (1 - \|\mathbf{R}^2\|).^4$$

In the case of Africa, the IAC index is relatively high, confirming the presence of regional trade introversion, but tends to fall over time (from 0.65 in 1990 to 0.56 in 2007), reflecting the relative intensification of inter-regional flows.

Another important aspect of trade regionalisation is the geographic diversification of trade flows. If the distribution of intra-regional exports and imports were proportional to the trade size of regional partners (geographic neutrality), this could reveal that distance-related intra-regional barriers do not affect the direction of bilateral trade flows, showing the progress of regional integration.

An *intra-regional geographic neutrality index* ($IRGNI_i$) can be defined as the Finger-Kreinin similarity measure between the country distribution of each region’s intra-regional trade and its neutrality benchmark, based upon the value of each partner’s extra-regional trade. Its formula is as follows (Iapadre and Tironi, 2009, p. 12):

$$IRGNI_i = 1 - \sum_{j \neq i} |IS_{ij} - IV_{ij}| / 2 \quad [7]$$

in which:

IS_{ij} = partner j ’s share of region i ’s intra-regional trade;

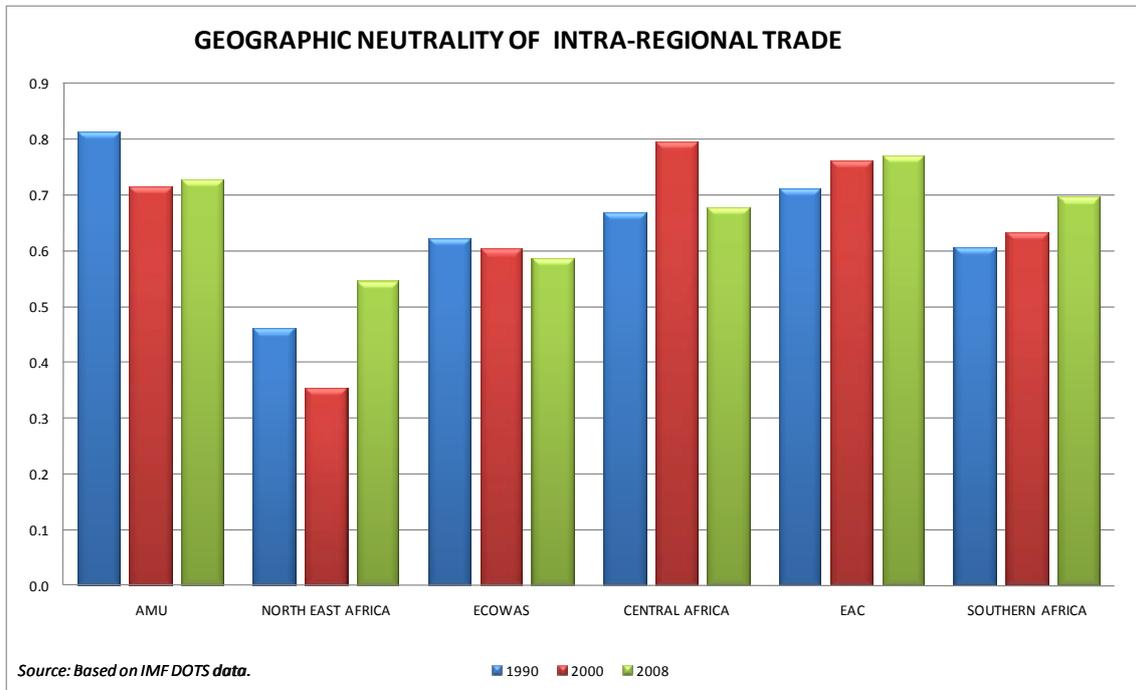
IV_{ij} = partner j ’s share of region i ’s total extra-regional trade.

⁴ The minimum IAC of -1 (perfect disassortativity) is reached when $Tr(\mathbf{R}) = 0$ (no intra-regional trade) and $\|\mathbf{R}^2\| = 0.5$. The latter parameter depends on the distribution of extra-regional flows and on the number of regions. It can be shown that $\|\mathbf{R}^2\|$ is equal to 0.5 only for a two-region world with no intra-regional trade. For a symmetric matrix with a number of regions larger than 2, the minimum IAC is higher than -1 and grows with the number of regions.

This index ranges from 0, when region i 's intra-regional trade is concentrated with partners which have no extra-regional trade, to 1, when it is neutrally-distributed across all its possible regional partners.

Figure 4 shows $IRGNI_i$ for the six African regions of this paper.

Figure 4: Geographic Neutrality of Intra-Regional Trade



There is no clear trend in the data, with some regions (EAC and Southern Africa) evolving towards a higher degree of intra-regional neutrality, and others moving more erratically or in the opposite direction (AMU and ECOWAS). Overall, the process of regional integration does not appear to have significantly reduced the importance of distance-related barriers to bilateral trade within African regions.

A more precise assessment of trade regionalisation can be given by considering also the overall (intra- and extra-regional) trade openness level of each region. High levels of regional introversion are more worrying when they come together with low levels of trade openness, underlying the fact that intra-regional trade preferences are not so much the result of successful integration policies as the unavoidable outcome of problems in extra-regional trade.

A region's relative degree of openness (O_i) can be measured by its trade-to-GDP ratio relative to the world average trade-to-GDP ratio:

$$O_i = (t_i/y_i)/(T/Y) \quad [8]$$

in which:

- t_i = region i 's total trade.
- T = world trade.
- y_i = region i 's gross domestic product (GDP).
- Y = world GDP.

However, this indicator is affected by several problems, similar to those already discussed for trade-intensity indices. A possible solution is a symmetric indicator of relative trade openness (SO_i), which is equal to zero if the region's degree of openness is equal to the world average:

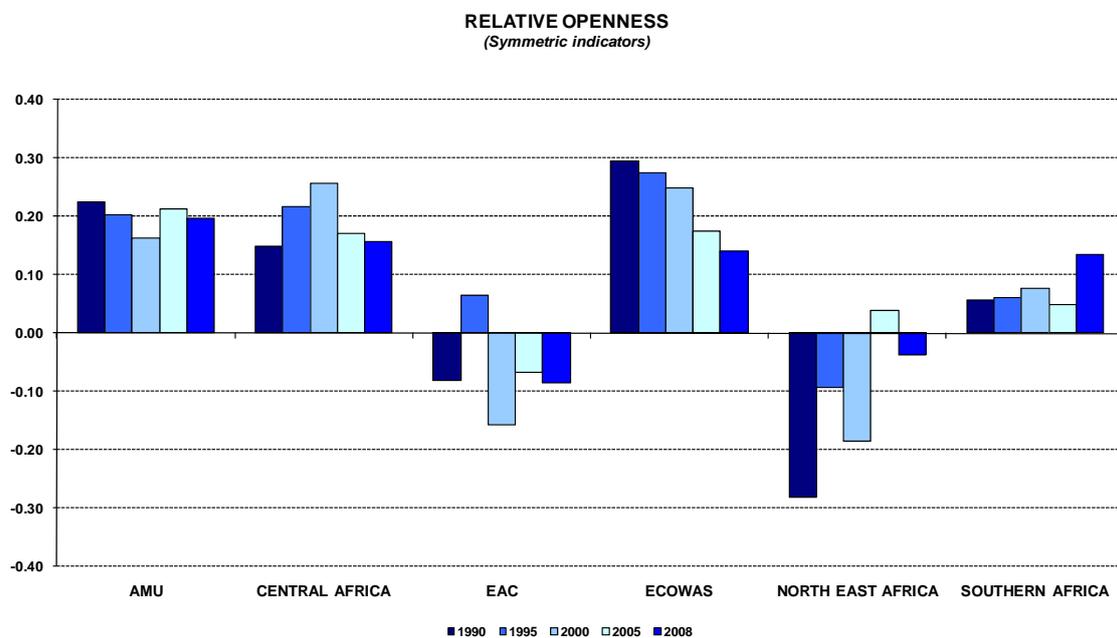
$$SO_i = \frac{\{(t_i/y_i) - [(T - t_i)/(Y - y_i)]\}}{\{(t_i/y_i) + [(T - t_i)/(Y - y_i)]\}} \quad [9]$$

$$-1 \leq SO_i \leq 1$$

The trade-to-GDP ratio is an imperfect measure of trade openness for a variety of reasons. First of all, it should be recalled that trade flows are measured in terms of gross output (including the value of intermediate goods), whilst GDP is expressed in terms of value-added. This problem cannot be easily solved because data on the value of gross domestic production are not readily available. Secondly, since GDP includes the services sector, trade in goods and services should be used in the numerator. Thirdly, independently of these statistical problems, the trade-to-GDP ratio should be used very cautiously in cross-country comparisons, because it is inversely related to country size (see Anderson and Norheim, 1993: 80, footnote 1). All other things being equal, larger countries tend to show lower trade-to-GDP ratios, only because they face a smaller ratio between foreign and domestic markets.

Keeping these reservations in mind, we can assess the relative trade-openness levels of our six African regions in Figure 5.

Figure 5: Relative Openness



Source: Based on IMF-DOTS data

Notwithstanding their very small size, which should translate into high openness indicators, all African regions tend to show relatively low and often decreasing SO_i indices. In two of them, the trade-to-GDP ratio is even lower than the world average, as shown by the negative sign of the SO_i index.

It can be argued that high levels of regional introversion tend to be accompanied by a low degree of overall trade openness, and this is particularly evident in the case of EAC.

3. Conclusions: regional trade integration and the role of Africa in world markets

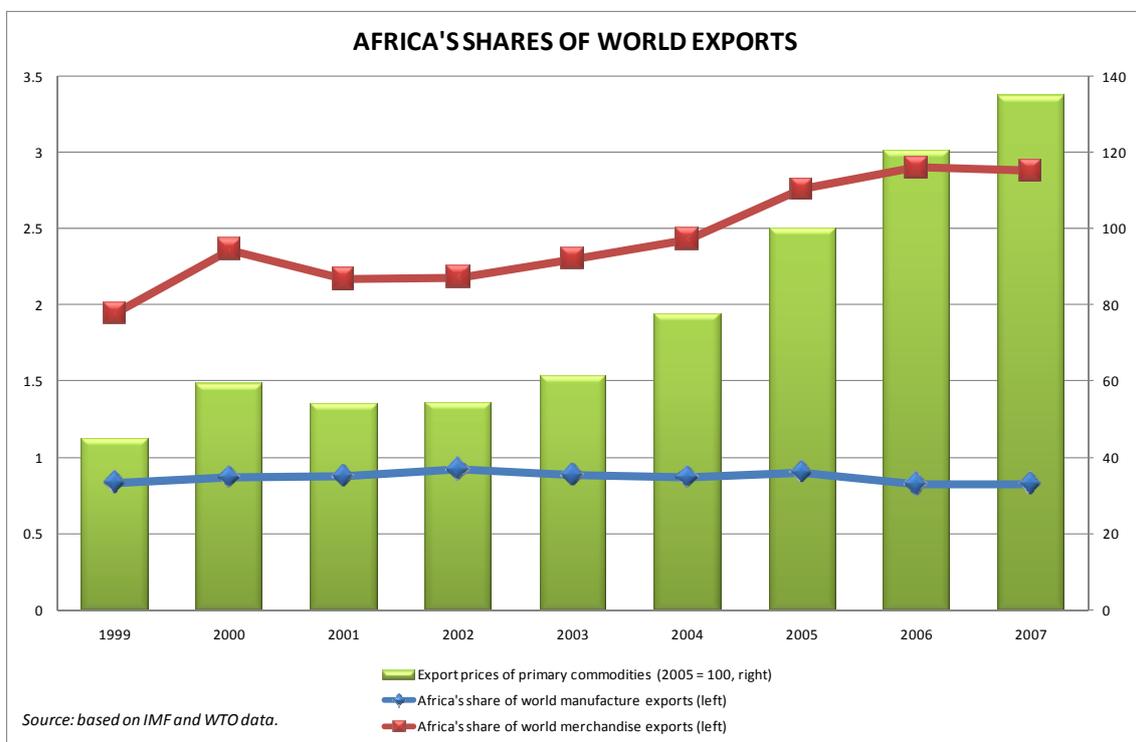
All the indicators presented so far tend to convey the idea that trade regionalisation in Africa is not low. Although intra-regional trade shares are much smaller than in other developing regions, they are much larger than would be expected, given the size of African regions in world trade. In other words, Africa shows a high degree of regional trade introversion, which seems to be mainly due to its very

limited capabilities in extra-regional trade (constrained by several domestic and external barriers), rather than to the process of regional integration.

Some small signs of change are, however, visible in the data, notably the downward trend of trade introversion in some regions, which is matched by slightly more intense flows among African regions and with the rest of the world, with the striking exception of the EU.

To a certain extent, these changes can be traced back to the recent upsurge of several African economies, led mainly by the booming demand for raw materials from China and other emerging countries. Africa's share of world exports, which had gradually declined until the late 1990s, has been rising in the current decade (Figure 6). However, this recovery is exclusively due to the large increase in the prices of primary commodities, as is shown by the fact that Africa's share of world manufactured exports remained stable in this period, or rather, has fallen slightly in the last two years.

Figure 6: Africa's Shares of World Exports



The inability of African countries to develop a competitive manufacturing industry appears to be the main reason of their persistent marginality in world trade, which also explains their high regional trade introversion. In the last few months, the rising trend of raw material prices has resumed, signalling that the global economic crisis could be near its end. This could create new opportunities to adopt the structural reforms needed to engender a sustainable development process in African countries. Regional integration policies could give an important contribution to overcoming this challenge. Their success will, however, be measured more by their ability to create the necessary infrastructure for a more effective integration of African countries into world markets, than on their effect on intra-regional trade.

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Annex – Composition of African Regions

AMU (Arab Maghreb Union)	Central Africa
Algeria	Cameroon
Libya	Gabon
Mauritania	Equatorial Guinea
Morocco	Congo, Republic of
Tunisia	Central African Republic
	Chad
North East Africa	São Tomé and Príncipe
Djibouti	
Egypt	EAC (East African Community)
Ethiopia	Burundi
Somalia	Kenya
Sudan, the	Rwanda
	Tanzania
ECOWAS (Economic Community of West African States)	
Benin	Southern Africa
Burkina Faso	Angola
Cape Verde	Comoros
Côte d'Ivoire/Ivory Coast, the	Congo, Democratic Republic of
Gambia, The	Madagascar
Ghana	Malawi
Guinea	Mauritius
Guinea-Bissau	Mozambique
Liberia	SACU ⁵
Mali	Seychelles, the
Niger	Zambia
Nigeria	Zimbabwe
Senegal	
Sierra Leone	
Togo	

⁵ SACU includes Botswana, Lesotho, Namibia, South Africa, and Swaziland.

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