

Clusters of LDCs, their evolution between 1993 and 2013, and policies to expand their productive capacity

by
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1. Introduction and motivation of the study

This paper aims at identifying LDC clusters by regrouping them in a way that minimizes the distance between countries belonging to the same group while maximizing the distance between groups. This is especially important for the LDC that are very heterogeneous and therefore need to be supported – in addition to the existing undifferentiated measures - by cluster-specific measures aiming at expanding productive capacity, promoting GDP growth and facilitate graduation. To do so, in [section 2](#) the paper discusses the clustering variables and methodology. [Section 3](#) identifies six LDC clusters for the years 1993, 1995, 2000, 2007 and 2013, and traces their evolution over time to verify whether changes in domestic policies and global conditions influenced the ‘migration’ of countries from one cluster to another. The main point is that while during the last 20 years most LDCs experienced an acceptable or even rapid GDP growth, with a few exceptions they experienced a suboptimal structural transition characterized by re-primarization, premature tertiarization, informalization, and a limited expansion or even a decline of the value added share of manufacturing, construction and modern agriculture. In [section 4](#) we estimate panel regressions with dependent variables GDP/c and export performance including among the regressors the cluster dummies (with the pivot the group of countries that have graduated or will graduate soon) so as to test formally whether belonging to a given cluster improves/worsens GDP/c and export performance. In turn, in [section 5](#) we present a discussion of the policies that could help promoting a sustainable expansion of productive capacity in each cluster, while in [section 6](#) we outline a package of macroeconomic policies that could help achieve such objective.

2. Cluster analysis

The cluster analysis is a multivariate technique that helps regrouping countries (or other entities) in a way that minimizes the distance (of the clustering variables) between countries belonging to the same group while maximizing it between groups. In this framework, the variable(s) that identify each cluster have a higher mean and a smaller standard deviation compared to other clusters. The cluster analysis allows to reduce a large number of observations into a smaller number of manageable groups. In addition, it allows to confirm/reject *ex-ante* hypotheses about the economic behaviour of the country groups. Obviously, the choice of clustering variables influences substantially the cluster outcomes. The cluster analysis is a-theoretical (or ‘blind’). In order to obtain meaningful results it needs to be combined with prior hypotheses and theories about the groups structure and behaviour based on the experience of the researcher.

In order to overcome some of these limitations, this study adopts a two-steps methodology. To start with, we determine the first four clusters on the basis of prior information and criteria, while the two remaining clusters are determined by a standard cluster analysis. For the first four clusters we thus create four dichotomous variables based on prior information

and data. The first clustering criterion groups together countries involved in at least a conflict episode in the reference year. The second cluster is identified on the basis of the endowment of oil and mineral resources, using as threshold a share greater than that of the third quartile of the distribution of the value added share of the oil-mining countries. The third criterion (a population of less than a million) allows to regroup small (often remote) countries with a narrow land base and population base. The fourth clustering criterion identifies prevalently agricultural economies, i.e. those that belong to the upper quartile of the distribution of the value added share of this sector. Finally, the last two clusters are composed by countries that recorded a comparatively high share of manufacturing and services. This ‘mixed approach’ assigns countries to clusters in a way which is consistent with the empirical evidence and economic common sense.

The purists could accuse this approach of being somewhat arbitrary (e.g. in the choice of the clustering thresholds). To respond to this criticism, we also run a standard hierarchical clustering analysis, so as to verify the degree of overlap between the composition of clusters obtained with the two different approaches. Table 1 below reports the Cramer’s V index of association between the results of these two approaches. Such index varies between 0 (no overlap between the clusters computed with the two different methods) and 1 (complete overlap). The average index of association found for the years 1993 to 2013 is 0.62, suggesting that the two methodologies yield fairly similar results. Because of this, in what follows we discuss only the results of the ‘mixed approach’.

Table 1. Cramer’s V index of association between clusters composition obtained with the two methods mentioned above.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.67	0.6	0.64	0.56	0.58	0.58	0.58	0.51	0.74	0.67	0.67
2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	'93-'13
0.66	0.74	0.73	0.65	0.63	0.6	0.61	0.62	0.54	0.54	0.62

Source: authors’s calculations

2.1 Source of data of clustering variables

We regrouped the 50 countries that have been at some point on the LDCs list over 1993-2013, and chose *ex-ante* to limit the number of clusters to 6. Due to lack of data we exclude from the analysis Timor Leste and South Sudan, while we include in the analysis the LDC that have graduated (in square parenthesis) and that were about to join the LDC (in braces). The number of LDC in Table 2 varies between 46 and 49 depending on countries entries and exits from the LDC list. The list of LDC is from UN-DESA¹. As for the clustering variables, the war data are from the Center for Systemic Peace (CSP) Major Episodes of Political Violence, 1946-2013. We consider a country to be ‘at war’ if in the reference year it experienced a conflict (whether internal or external), excluding however episodes of political violence that are difficult to identify. Data on population and value added shares are from UNCTAD STAT. Population data are in millions while the value added shares in percentages. Though we calculated clusters for 1993, 1995, 2000, 2007 and 2013, for space reasons Table 2 presents only the data for 1993 and 2013 grouped according to the results of the 2013 clustering exercise. Cells marked in yellow identify high values for the clustering variables and countries belonging to other clusters.

Table 1. Descriptive statistics of clustering variables with reference to the year 2013

Group 2013	Country	War index		Population		Agriculture		Oil & Mining		Manufacturing		Services	
		1993	2013	1993	2013	1993	2013	1993	2013	1993	2013	1993	2013
At war	Afghanistan	7	3	14.8	30.7	63.5	25.6	0.2	0.9	10.3	11.4	22.2	53.9
	C.A.R.	0	3	3.2	4.7	34.5	41.7	8.2	2.8	18.5	18.3	37.1	34.4
	Congo Dem. Rep.	0	5	39.3	72.6	51.7	20.8	7.2	22.7	6.9	16.6	31.8	34.8
	Myanmar	4	4	43.6	53.0	63.0	33.2	0.7	5.4	6.8	19.8	28.1	36.9
	Somalia	5	5	6.3	10.3	61.7	60.2	0.6	0.7	2.1	2.5	31.3	32.5
	Yemen Rep.	0	2	14.0	25.5	18.5	15.0	5.8	23.7	10.5	8.2	62.3	49.0
Oil and Mining	Angola	6	0	12.3	23.5	11.9	9.3	42.1	50.4	5.8	5.9	35.6	27.0
	Bhutan	0	0	0.5	0.8	33.8	17.1	11.5	17.9	9.4	9.0	35.7	38.3
	Botswana	0	0	1.5	2.2	4.6	2.6	35.5	24.3	5.2	5.7	47.2	60.5
	Chad	4	0	6.6	13.2	34.0	19.8	1.0	42.4	8.5	7.0	54.5	28.9
	Equatorial Guinea	0	0	0.4	0.8	46.5	1.4	20.5	89.2	1.5	0.1	26.1	3.1
	Guinea	0	0	7.2	12.0	15.1	27.1	21.1	16.8	3.3	6.8	52.8	41.1
	Lao PDR	0	0	4.6	6.6	42.5	24.1	2.2	19.0	5.3	8.1	43.5	41.8
	Lesotho	0	0	1.7	2.1	12.7	8.1	2.3	12.4	10.2	14.2	61.1	59.6
	Mauritania	0	0	2.2	3.9	44.3	23.1	11.7	33.4	10.3	8.0	30.7	28.5
	Niger	0	0	8.7	18.4	37.4	39.6	6.1	11.6	6.4	6.5	48.5	39.8
	Sierra Leone	3	0	3.9	6.2	48.1	49.0	3.2	20.0	3.5	1.7	42.8	28.4
	Small and Remote	Cabo Verde	0	0	0.4	0.5	16.1	9.2	7.1	2.4	10.6	6.3	53.6
Comoros		0	0	0.5	0.8	38.1	42.8	1.2	1.7	4.4	6.8	50.2	46.3
Djibouti		0	0	0.6	0.9	3.5	3.7	6.9	5.2	3.3	2.5	81.3	75.7
Kiribati		0	0	0.1	0.1	27.5	25.8	2.2	1.1	6.5	5.3	62.5	64.6
Maldives		0	0	0.2	0.4	6.8	3.9	1.1	1.3	4.3	5.7	83.2	81.6
Samoa		0	0	0.2	0.2	20.6	9.3	3.2	4.9	17.8	7.7	51.5	63.0
Sao Tome & P.		0	0	0.1	0.2	28.9	20.7	2.3	3.1	8.6	7.6	51.4	61.8
Solomon Islands		0	0	0.3	0.6	45.7	28.4	1.2	4.2	5.6	8.3	45.1	56.5
Tuvalu		0	0	0.0	0.0	23.6	25.5	2.1	0.1	1.7	1.1	60.6	65.3
Vanuatu		0	0	0.2	0.3	27.2	24.3	1.8	2.1	4.9	4.5	63.6	65.2
Agricultural	Ethiopia	0	0	53.5	94.6	64.7	45.5	1.5	2.3	4.3	3.9	27.3	43.5
	Guinea-Bissau	0	0	1.1	1.8	55.2	47.2	0.9	0.6	3.5	12.0	34.7	39.0
	Liberia	4	0	2.0	4.3	49.3	70.1	2.0	3.0	8.9	5.7	35.9	18.6
	Sudan	6	0	22.8	38.5	40.7	42.7	1.2	1.6	5.7	9.8	47.9	41.8
	Togo	0	0	4.1	6.9	48.4	44.7	10.2	7.6	9.4	7.2	29.0	34.9
Mnufa	Bangladesh	0	0	113.4	157.2	25.0	16.3	3.1	3.1	14.0	17.3	53.0	56.1
	Cambodia	2	0	10.0	15.1	47.7	33.5	0.6	1.5	7.7	16.4	40.5	40.8
	Madagascar	0	0	12.6	22.9	33.5	25.7	1.3	1.5	11.3	14.2	52.9	55.2
	Senegal	0	0	8.2	14.2	18.2	16.0	3.1	5.4	17.0	14.0	58.3	60.0
Services	Benin	0	0	5.6	10.3	35.7	35.9	1.5	1.3	7.8	8.0	51.5	50.4
	Burkina Faso	0	0	9.6	17.1	31.1	34.3	1.8	9.2	13.5	7.5	48.6	43.6
	Burundi	4	0	6.0	10.5	50.6	38.1	0.8	0.9	14.1	10.5	28.3	46.7
	Eritrea	0	0	3.2	5.0	22.4	17.6	0.7	1.8	9.0	6.0	61.9	58.9
	Gambia The	0	0	1.0	1.9	15.6	23.5	0.7	4.7	7.9	5.8	70.4	60.9
	Haiti	0	0	7.5	10.4	31.5	18.6	1.3	0.7	13.5	9.6	43.9	44.7
	Malawi	0	0	9.7	16.2	50.2	32.2	3.2	2.4	17.7	11.1	24.2	51.2
	Mali	0	0	9.1	16.6	32.6	38.2	3.5	10.3	8.1	7.1	51.4	39.4
	Mozambique	0	0	14.8	26.5	37.2	29.0	0.5	6.9	12.5	10.9	47.8	50.2
	Nepal	0	0	20.3	27.8	40.4	34.7	1.4	1.8	8.9	6.2	43.1	50.3
	Rwanda	3	0	6.3	11.1	44.4	34.7	2.1	2.6	8.6	5.4	40.1	49.8
	Tanzania	0	0	28.1	50.2	31.8	33.5	3.2	5.8	9.3	7.2	50.8	43.9
	Uganda	0	0	19.2	36.6	43.3	26.8	2.3	3.7	7.0	10.1	44.0	50.9
Zambia	0	0	8.8	15.3	33.1	17.5	11.0	5.2	27.2	8.1	26.1	44.9	

Source: author's elaboration

3. Clustering results

3.1 Country clusters and their evolution over time

The results of the clustering analysis are reported in Table 2. The analysis refers to all countries that have been on the LDC list over this period. Countries indicated in braces had not joined yet the LDC group in the specific year. Those in square parenthesis had already

Table 2. Evolution of clusters of LDC over 1992- 2013

Country clusters	1993	1995	2000	2007	2013
1. Countries at war http://www.systemicpeace.org/warlist/warlist.htm	(11)Afghanistan { Angola } Burundi Cambodia Chad, Liberia Myanmar Rwanda, S. Leone Somalia, Sudan	(10)Afghanistan Angola Burundi Cambodia Liberia, yanmar Rwanda, S. Leone Somalia, Sudan	(11)Afghanistan Angola,Burundi Congo, Dem. Eritrea, Ethiopia Myanmar Nepal Sierra Leone Somalia, Sudan	(7) Afghanistan C.A.R Congo, Dem. Rep. Myanmar Somalia Yemen, Rep.	(6)Afghanistan C.A.R Congo, Dem. Myanmar Somalia Yemen, Rep.
2. Oil/mining countries Oil- mining VA share > 3 rd quartile (>7-11% of GDP depending on the year)	(9) Bhutan Botswana C.A.R. Congo, Dem. Eq. Guinea Guinea Mauritania Togo Zambia	(9) Bhutan [Botswana] Cabo Verde Congo, Dem. Eq. Guinea Guinea Mauritania Togo Yemen, Rep. Zambia	(8) Bhutan [Botswana] Cabo Verde Eq. Guinea Guinea Mali Mauritania Yemen, Rep. Zambia	(10) Angola Bhutan [Botswana] Chad Eq. Guinea Guinea Lao PDR Lesotho, Mali, Mauritania Sudan	(10) Angola Bhutan [Botswana] Chad Eq. Guinea* Guinea Lao PDR Lesotho Mauritania Niger, S. Leone
3. Small/SIDS/remote (3 rd c.c.) Population < 1 million	(10) Cabo Verde Comoros Djibouti Kiribati Maldives, Samoa Sao Tome&Prin. Solomon Islands Tuvalu, Vanuatu	(9) Comoros Djibouti Kiribati Maldives Samoa Sao Tome&Prin. Solomon Islands Tuvalu, Vanuatu	(9) Comoros Djibouti Kiribati Maldives, Samoa Sao Tome&Prin. Solomon Isl Tuvalu, Vanuatu	(8) [C.Verde] Comoros Djibouti, Kiribati Maldives, Samoa, ST&P Solomon Isl. Tuvalu, Vanuatu,	[Cabo Verde] (7) Comoros Djibouti, Kiribati [Maldives] [Samoa] ST&P, Solomon Isl. Tuvalu, Vanuatu*
4. Mostly agricultural economies, of which Agriculture VA share > 3 rd quartile (38-45% of GDP depending on the year)	(5) Ethiopia Guinea-Bissau Lao PDR Malawi Uganda	(5) Ethiopia Guinea-Bissau Lao PDR Nepal Uganda	(5) Chad Guinea-Bissau Lao PDR Liberia Malawi	(5) Ethiopia Guinea-Bissau Liberia Niger Sierra Leone	(5) Ethiopia Guinea-Bissau Liberia Sudan Togo
5. Agricultural economies that are industrializing) VA share of manufacturing+ utilities)	(10) Bangladesh Benin, B. Faso Haiti, Madagascar Mali, Mozambique Nepal, Niger { Senegal }, Tnzania	(5) Bangladesh Burkina Faso C.A.R Haiti Malawi {Senegal}	(7) Bangladesh Burkina Faso Cambodia Lesotho Madagascar Mozambique Senegal	(6) Bangladesh Cambodia Madagascar Malawi Mozambique Senegal	(4) Bangladesh Cambodia Madagascar Senegal
6. Agricultural economies strongly tertiarized (VA share of services)	(3) {Eritrea} Gambia, Lesotho Yemen, Rep.	(10) Benin, Chad Eritrea Gambia, Lesotho Madagascar Mali, Mozambique Niger, Tanzania	(9) Benin, C.A.R., Gambia, Haiti, Niger, Rwanda Tanzania Togo, Uganda	(12) Benin, B. Faso, Burundi, Eritrea, Gambia, Haiti Nepal, wanda Tanzania, Togo Uganda, Zambia	(14) Benin, B. Faso, Burundi, Eritrea, Gambia, Haiti, Malawi, Mali Mozambique Nepal, Rwanda, Tanzania, Uganda, Zambia
TOT	50	50	50	50	50
Of which on LDCs list	47	48	49	48	46

Source: authors' elaboration. Notes: 1/ Timor-Leste and South Sudan are excluded due to the lack of data 2/. Countries in red changed cluster in relation to the previous year. 3/. Countries in square brackets 'graduated in the period before the year of reference. 4/. Countries in brace had not been included yet in LDCs list in the year of reference 5/ Equatorial Guinea and Vanuatu are scheduled to graduate in 2017 and 2018 respectively.

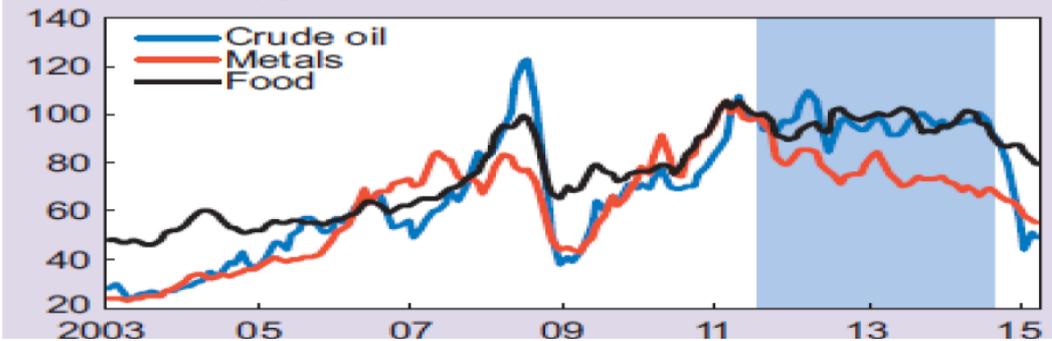
graduated in the year of reference. The results of Table 3 can be summarized as follows. First, we identified six country clusters featuring different structural characteristics, underlining once more the heterogeneity of LDC, and the need to adopt cluster-specific measures to expand productive capacity in each of them. In 2013, by considering only the countries that did not graduate, the six clusters consisted of (Table 3): a group of 6 countries at war (13% of the total of 46 LDC); 10 'oil/mining economies' (almost 22%); 7 small/SIDS/remote countries (almost 15%); 5 mostly agricultural economies (10%) (though also other economies still have a high share of agricultural value added); 4 with a still large agricultural sector but with a rising share of value added in manufacturing (10%); 14 mostly tertiarized countries (30%).

As expected, the mean of the six clustering variables varies markedly across clusters, while the coefficient of variation of each cluster is smaller than for all LDC and the other five clusters. This confirms that the countries belonging to each cluster are similar among each other but differ from those belonging to other clusters. We do have however a few borderline cases. Except for cluster 3 – which is defined on the basis of a time-invariant criterion (a population of less than one million) - the cluster composition has evolved substantially over time. Overall, 29 countries out of 50 (58%) changed cluster between 1993 and 2013. The main cluster changes are summarized below.

To start with, till 2000 the number of LDC at war ranged between 10-12. This high value is explained mainly by the conflicts in former 'client states' of the USSR and USA. With the disintegration of the former and withdrawal of military and financial support by both superpowers, the incumbents of these regimes often faced violent opposition by groups previously excluded from power. Between 2007 and 2013 the size of this cluster fell in half, as countries formerly at war reached more stable political arrangements. However new types of conflicts – e.g. inter-ethnic (CAR) and religious (Yemen) – have emerged. Preliminary notes of the CSP database suggest that in 2014-15 the countries at war include also South Sudan, Congo DRC and Mali.

Second, the countries in the 'mining economies' cluster increased from 9 in 1993 to 10 in 2013 thanks to new discoveries and the increase in the world prices of metals and energy. Meanwhile Botswana graduated and Equatorial Guinea is scheduled to graduate in 2017. The size of the mining cluster would have been greater had we adopted a less stringent clustering criterion (i.e. a share of mining value added greater than a given % threshold). In fact the share of value added in mining (that includes utilities) has also risen – if less markedly - in at least five other countries (marked in yellow, Table 2) belonging to other clusters. Changes in world commodity prices (Figure 1) have had a huge impact on the size of this cluster.

Figure 1. Commodity price index (July 2011 =100)



Source: IMF, World Economic Outlook Database

Third, cluster 3 remained fairly stable. Its size however declined from 10 in 1993 to 7 in 2013 due to the graduation of Cabo Verde, Maldives and Samoa (Tuvalu is expected to graduate in 2018). The high persistence of the cluster composition does not mean that the economic structure of these countries has not evolved (Table 2). High transport costs, and a limited resource base for agriculture and manufacturing forced these economies to further tertiarize (from already high levels), i.e. to rely on outmigration (Samoa), tourism (Maldives) and other services, while the value added share of agriculture and manufacturing generally declined.

Fourth, the number of countries with a dominant agricultural sector has not declined. Cluster 4, 5 and 6 include 18 economies (out of 47) in 1993 and 23 (out of 46) in 2013. Yet there was some differentiation within this group. Despite an acceptable GDP growth, cluster 4 (economies with a dominant agriculture) increased in number and so did their value added share. The share of agriculture rose also in other six countries belonging to other clusters.

Also cluster 5 and 6 maintained an important share of value added in agriculture but differ from the previous one. Cluster 5 witnessed a drastic decline in the number of countries that in the early years exhibited a comparatively high share of manufacturing value added. Such number fell from 10 in 1993 to 4 in 2013 pointing to the failure of manufacturing in African LDC and to a moderate rise in the Asian ones. In turn, cluster 6 recorded a rise in services (though still having a non negligible share of agriculture). While modern services such as banking, insurance, tourism and government exhibit adequate labor productivity and wages, 'informal services' consist of low value-added activities in petty trade, local transport, maintenance, and personal services. With no changes in policies, the premature development of informal services is likely to continue in the future (section 6).

3.2 Summing up: a sub-optimal structural evolution of several LDCs. The size of the LDC group has changed little over time. Between 1993 and 2013 there were only two entries (Angola and Eritrea) and four graduations (Botswana, Samoa, Maldives and Cabo Verde) with two more (Tuvalu and Equatorial Guinea) expected shortly. Of these six countries four belong to the small-SID group and two to the mining group. In the first group graduation was achieved thanks to outmigration, high-scale tourism and fishing. In the second, thanks to 'luck' (the discovery of rich mineral deposits). No LDC relying on agriculture, manufacturing and informal services graduated, and most of them remain mired in low level equilibrium poverty traps. This suggests that while the standard LDC support measures may have a positive effect on their exports (Klasen and Lehman Novak 2015), they do not trigger a broad-based development. Thus while trade-promotion policies may generate some effects in a few countries, in others (little endowed with exportables) their impact is likely to be non significant. If true, broader cluster-specific support measures will need to be introduced to achieve graduation.

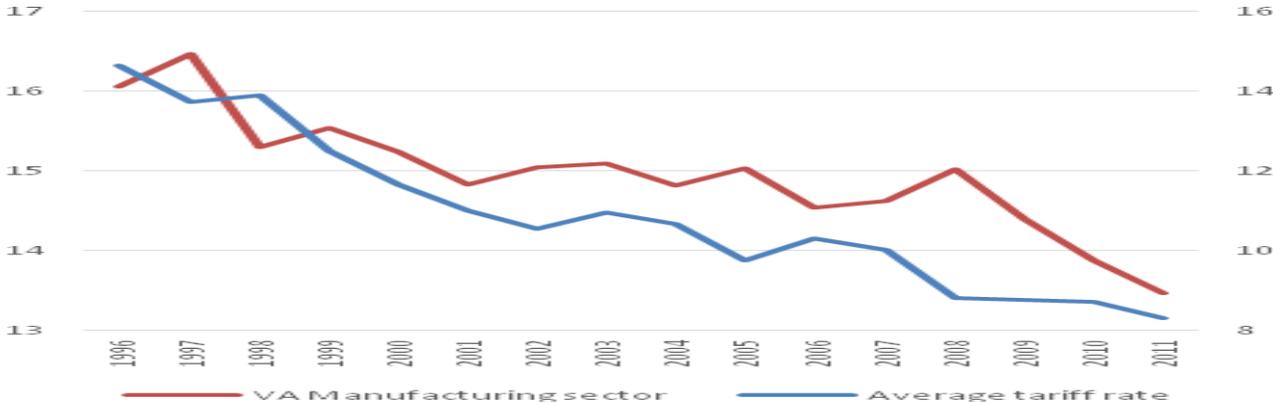
The analysis shows that LDCs structural evolution over 1993 and 2013 has in most cases deviated from Rostow's standard benchmark 'stages of economic growth'. While in small/SIDS and mining countries the search for an alternative development path has been fruitful, in others there was no structural evolution. What factors explain this fairly disappointing finding affecting many LDC? The first is the persistence of war and acute political instability that affected between 12 and 25% of all LDC over 1993-2013. In such countries, the standard CDP support measures have by necessity a limited effect, as these needed to be preceded by pacification, reconstruction, and normalization of economic and social relations.

The remote and small countries cluster recorded the highest number of ‘graduations’ thanks to tourism, emigration and fishing. Because of this, despite a medium level of GDP/c their economies are characterized by a high level of tertiarization - with services accounting for 55-75% of total value added and vulnerability to weather change.

New discoveries and rising world prices (Figure 1) have led to the graduation of Botswana and soon of Equatorial Guinea. Yet, the development of mining entailed a drop of the value added share of non-resource tradables (manufacturing and agriculture). Furthermore, graduation in these countries requires an improvement in human development and the EVI index that do not automatically occur following an increase in the share of mining. Other long term factors (discussed in section 5) need to be dealt with to make graduation permanent and achieve long term development. For instance, the high price instability of oil and metals (Figure 1) may lead to de-graduation. Also this group did not benefit much from the standard LDC support measures, as the export of minerals and oil does not depend on the MFN clause.

The decline in the number of manufacturing countries (and manufacturing exports) is a bad news for several LDC. This was due in part to premature trade liberalization (Figure 2) and REER appreciation, and in part to limited capital accumulation and FDI in a sector characterized in the past by microeconomic inefficiency and insufficient infrastructure. This was however less the case for the Asian LDC with closer links to the Chinese economy. *Ceteris paribus*, the group of manufacturing economies should have benefitted the most from the LDC support measures (MFN and other trade preferences). For instance, thanks also to these measures Bangladesh became an important exporter of garments (Rahmann 2014).

Figure 2. Average regional tariff rate (blue line, right scale) and average manufacturing value added share in the total (red line, left scale), 29 African countries



Source. Cornia (2015) Note: outliers (v.a share greater than 30 and lower than 10 percent) were dropped.

The share of agriculture remained important despite 20 years of acceptable growth. Such trend was due to various factors, i.e. to an increase in land yields and overall agricultural productivity (as in Bangladesh and Ethiopia), or to an increase in world prices of agricultural exports, or a ‘retreat into subsistence farming’ (as in a Burkina Faso and Niger). The limited modernization of agriculture remains a major problem for the LDC. Unless ‘other paths to development’ are found (as in Samoa, Cabo Verde and Botswana), the stagnation or decline of land yields will retard the development of manufacturing and modern services. Thus, cluster-specific measures are needed also for this group of countries.

Finally, tertiary LDC (with a share of 50-60% or more) rose from 3 to 14, while the service share increased also in countries belonging to other clusters. As these are low income economies, the rising consumption of services did not occur because consumer demand for food and manufactured goods got saturated but because unskilled workers find refuge in informal services. Of course, the services sector includes also modern services (finance-insurance and real estates, government services, and utilities). Yet data for 11 middle-income African countries show that their combined value accounts only for 12-31% of GDP, while that of informal sectors (commerce, restaurants, hotels, transport, and community and personal services) ranges between 12-42% (<http://www.rug.nl/research/ggdc/data/10-sector-database>). In LDC this imbalance is more pronounced.

Summing up, the persistence of conflicts, deindustrialization, re-primarization, retreat to subsistence farming, premature tertiarization and urban informalization observed during the last 20 years in many LDCs – especially in Africa – are indicative of a sub-optimal structural evolution of these countries – despite a non negligible GDP growth. There are for sure examples of LDC (as some SIDS) that successfully leapfrogged the industrial phase and followed alternative paths. Other positive examples are Bangladesh and Ethiopia. But the successes case are few. Overall, most LDCs experienced a limited increase or a decrease of the size of the tradable sector. Such sector is characterized by scale economies, positive spillovers, learning by doing, higher productivity and positive balance of payments effects. This means that in many LDC the usual package of support measures could have generated some benefits, but that their full impact was precluded by the problems illustrated at the beginning of this para.

4. Clusters and their performance in terms of GDP/c growth and exports

In this section we examine by means of a panel regression analysis whether – after taking into account several control variables - GDP/c and export performance vary significantly across clusters.

4.1 Country clusters and their impact on GDP/capita

Between 1993 and 2013 the GDP/c of LDC differed. How can this growth-*cum*-diversification be explained? Did belonging to a cluster rather than another affect economic performance? To answer this question, we estimate a panel regression for the years 1993-2013 including six cluster dummies for the six groups identified in Table 3 (using as a pivot the group of six countries that graduated or are about to do so). We also used in regression the following control variables: fixed capital formation or alternatively the capital stock; FDI, arable land per capita; the labor participation rate; the real effective exchange rate (REER); the rate of inflation (CPI), the terms of trade and the percentage of urban population. As the purpose of this paper is to identify the performance of clusters, the above variables are just used as ‘plausible controls’, and not to estimate detailed growth regressions *per se*.

The coefficients of the six dummies indicate whether – after taking into account the control variables - belonging to a given cluster improves or worsens the growth performance in relation to the pivot. The regression was carried out on a panel of 46 countries and 21 years, for a total theoretical number of 830 observations, which declined to 670 in the case of specification (2) due to missing values. We run the regressions using both fixed effects (FE) and random effects (RE) The results are presented in Table 4.

Table 4 . Panel regression with cluster dummies (dependent variable: log GDP/c), 1993-2013

	(1) FE	(2) FE	(1) RE	(2) RE
Log Gross capital formation	0.379***	-	0.311***	-
Log Capital stock per capita	-	4.083***	-	3.871***
Log FDI stock per capita	0.049***	0.059***	0.073***	0.083***
Active population (%)	0.011**	0.014**	0.004	0.015***
Log Arable land per capita	-0.065	-0.368***	-0.208***	-0.052
CPI Index (2005 =100)	0.001***	0.002***	0.001***	0.002***
REER	0.005***	0.007***	0.005***	0.006***
Net barter terms of trade index	0.003***	0.004***	0.003***	0.004***
Urban population (% of total)	-0.002	0.015***	0.005*	0.010***
Dummy countries at war	-0.454***	-0.343**	-0.780***	-0.468***
Dummy oil/mining countries	-0.320***	-0.306**	-0.559***	-0.415***
Dummy small countries	-0.211***	-0.072	-0.150**	-0.205
Dummy agricultural countries	-0.355***	-0.240*	-0.642***	-0.401***
Dummy manufacturing countries	-0.468***	-0.369***	-0.761***	-0.483***
Dummy service economies	-0.428***	-0.321**	-0.718***	-0.433***
Observations	830	670	830	670
R2 within	0.829	0.808	0.821	0.800
R2 between	0.034	0.398	0.394	0.565
R2 overall	0.188	0.493	0.511	0.644

Note: * ** and *** denote significance at the 10% 5% and 1% levels respectively.

The results show that almost all control variables are statistically significant and with the expected sign, regardless the specification chosen, except for arable land per capita. In specifications (1), we use the gross fixed capital formation as a proxy of the capital stock. The results of different specifications suggests that the parameters' estimates are fairly robust.

More important, it appears that the cluster dummies affect differentially and significantly the log of GDP/c. In particular – in relation to the pivot - the small/remote and mining clusters fare better than agriculture, though in specification (2) the coefficient of the small countries cluster is not significant. At the same time the countries at war and those with large manufacturing and services sector fare, on average, worst than all others in a statistically significant way. Overall, specifications (1) for both the FE and RE estimators provide more plausible results.

4.2 Country clusters and export performance

Also export performance over 1993 and 2013 (proxied by the log of export value) differed markedly across LDCs. How can this divergence be explained? Did belonging to either of the clusters identified above affect it ? To answer this question, also in this case we estimate a panel regression for the years 1993-2013 for all 46 countries including cluster dummies for the six groups identified in Table 2. We also include the following ‘control variables’ : log of world GDP, the real effective exchange rate (REER); the index of export prices of each country; the average tariff rate applied by the USA, Europe and China on the exports of LDCs taken as a group. In a second specification, we introduce also a variable proxing trade infrastructure, i.e. road density per square kilometer. As before, the regression tests whether belonging to a given cluster affects export performance in relation to the pivot (see Table 4).

We tested two specifications for the export performance. In the first, exports are measured by the export/GDP ratio, while in the second (presented below) we use the log of the value of exports. For some reasons (that will require further enquiry) the first specification provides little satisfactory results. The second is reported in Table 5 below. The results of the latter test show that all control variables are statistically significant in all specifications. In turn, the road intensity index is weakly or not significant. However, the results remain quite stable and show that they are robust to different specifications.

As expected, in both the FE and RE specifications, all cluster dummies have a negative sign in relation to the pivot, though their distance from it varies. In particular, the worst relative performance varies a bit depending on the specification chosen. The small countries dummy is not significantly different from the pivot in three out of four specifications (likely they are very similar to those in the pivot group). The export performance of the other country clusters can be broadly and plausibly ranked (from the better to the worst cluster) as follows: mining, manufacturing, agriculture, services and countries at war. It must be noted, however, that such regression has an extremely low R2, suggesting that many other factors not included in this analysis explain export performance.

Table 5. Panel regression of export performance (dependent variable: logarithm of export value), 1993-2013

	(1) FE	(2) FE	(1) RE	(2) RE
Log of world GDP per capita	1.625***	1.563***	1.632***	1.589***
REER	0.003***	0.005***	0.003***	0.004***
LDC Export prices (2000 = 100)	0.000***	0.000***	0.000***	0.000***
Tariff rate applied on LDC exports	-0.039***	-0.059***	-0.038***	-0.057***
Road density per sq km	-	0.010*	-	0.007
Dummy countries at war	-0.892***	-1.625***	-0.668***	-1.298***
Dummy oil/mining countries	-0.402**	-0.902***	-0.203	-0.608***
Dummy small countries	-0.066	-0.377	-0.158	-0.785***
Dummy agricultural countries	-0.592***	-1.222***	-0.385**	-0.912***
Dummy manufacturing countries	-0.520***	-1.038***	-0.283	-0.702***
Dummy service economies	-0.649***	-1.179***	-0.429**	-0.862***
Observations	934	669	934	669
R2 within	0.657	0.738	0.656	0.735
R2 between	0.092	0.056	0.021	0.005
R2 overall	0.067	0.059	0.114	0.170

Note: * ** and *** denote significance at the 10% 5% and 1% levels respectively.

All in all, the countries at war are – as expected - the worst performers (or among the worst ones) both in terms of GDP/c and exports. On the other hand, countries in the mining/oil and small countries clusters perform better than the others in terms of growth, while the mining/oil cluster is also the best export performer. These results also suggest that – despite the obstacles to industrialization mentioned above - the manufacturing cluster ranks well in terms of trade performance but not in terms of growth. Finally, the agricultural and services-oriented clusters do not differ substantially among each other though they perform better than the manufacturing cluster in terms of GDP per capita. In what follows we discuss the policy implication of these results, proposing a specific set of interventions for each group of countries.

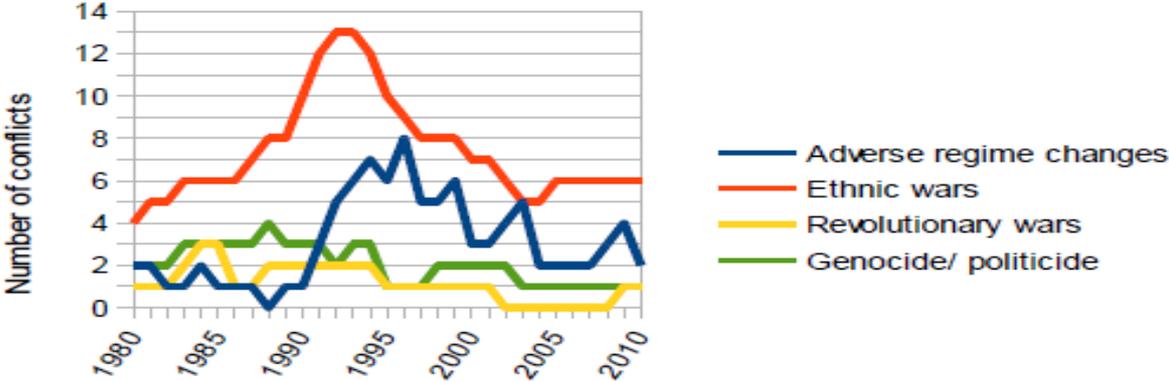
6. Cluster- specific policies to expand productive capacity in LDC

In growth models, ‘expanding productive capacity’ generally means extending the land frontier, opening up new mines and oilfields, and accumulating physical, infrastructural and human capital, as well as technological capabilities. A socially acceptable income distribution (to avoid labor shirking and social conflicts) and ‘efficient public institutions’ are also important for growth. The ability to expand production depends also on macro signals (the exchange, wage, and interest rate), the extent of trade and financial liberalization, and the usual macro balances (budget and balance of payments deficits, inflation and public/private debt). Finally, international economic conditions affect the degree to which productive capacity can be efficiently increased, as LDCs are highly dependent on the international business cycle. These conditions vary substantially among very heterogeneous LDC. This means that the standard LDC support package needs to be complemented by cluster-specific measures that are briefly discussed below

6.1 Policies for LDCs at war

As noted in section 5, the LDC at war recorded the worse growth and export performance. As shown in Figure 3 the origins of internal conflicts are quite different, and include factors such as ethnicity, the collapse of the Soviet Union (and the related vanishing of aid), failed development and horizontal inequality (Stewart 2001). Reducing the number of LDC at war requires introducing *ex-ante* measures to prevent the outbreak of conflicts, and *ex-post* measures to promote the country’s pacification and reconstruction.

Figure 3. Trends in the number of violent conflicts, 1980-2010



Source: Menchi-Rogai (2012)

Ex-ante measures for conflict prevention include removing acute ‘horizontal inequality’ between social groups in the distribution of assets, state jobs, higher education, top military positions, social services and so on. They should also aim also at avoiding the failure of the state and political institutions that mediate the competing interests of different groups and social classes. It is important in particular to avoid the collapse of the ‘minimum state’ (often caused by revenue crises) by ensuring that a sufficient amount of fiscal resources are available for the functioning of essential services. Finally, conflicts are at times triggered by a protracted growth collapse (at times triggered by external shocks) that eventually transforms a country’s ‘exchange economy’ into an ‘economy of scarcity’ and then into an ‘economy of expropriation’ and conflict. Under these circumstances, it is the interest of the international community to intervene early on with funds and technical and legal assistance, to prevent the much larger human and economic costs of conflicts and ensuing reconstruction. The literature on aid to states at risk of conflict finds that in highly fragile states growth would be 1.4

percentage points lower in the absence of aid, and that most fragile states are under-aided in respect to other developing countries (McGillavray and Feeny 2008).

Ex-post reconstruction measures focus on guaranteeing the security of LDC previously at war. A peace agreement is a necessary but not sufficient conditions to return to normalcy. There is in fact an immediate need to demobilize, disarm and re-integrate former combatants (possibly with the help of peace-keeping forces); to organize the return and reintegration of displaced populations; grassroots level reconciliation; meeting the humanitarian needs of affected populations by improving food security, eliminating black market profiteering and rehabilitating essential social infrastructure. Next, reconstruction efforts should focus on rebuilding credible and well regulated state institutions (central bank, treasury, revenue collection authority, police and judiciary), and lay the foundations for a democratic transition (African Union, 2006). Once these key pillars have been rebuilt, economic policy should focus on the promotion of a broad-based recovery driven by the private sector and FDI. In this regard, public expenditure reforms to promote growth and poverty alleviation must avoid recreating conditions of ‘horizontal inequality’ (Addison 2003). In this regard, relation with donors are essential, especially in the initial phase. As an example, in the early years of post-war reconstruction in Mozambique, 87 % of the monetary GDP was constituted by foreign aid. Only after most of these measures have been implemented, LDC formerly at war may be benefitting from the LDC standard support measures.

6.2 Policies for mining-oil LDC

While experiencing over 1993-2013 a faster growth of GDP/c and exports than other clusters (Tables 4 and 5), the mining-oil LDC faces specific challenges in the field of macroeconomic management, inequality, political stability and long term growth. Also in this case, it is unlikely that the standard LDC support measures had an impact on the graduation of Botswana and Equatorial Guinea.

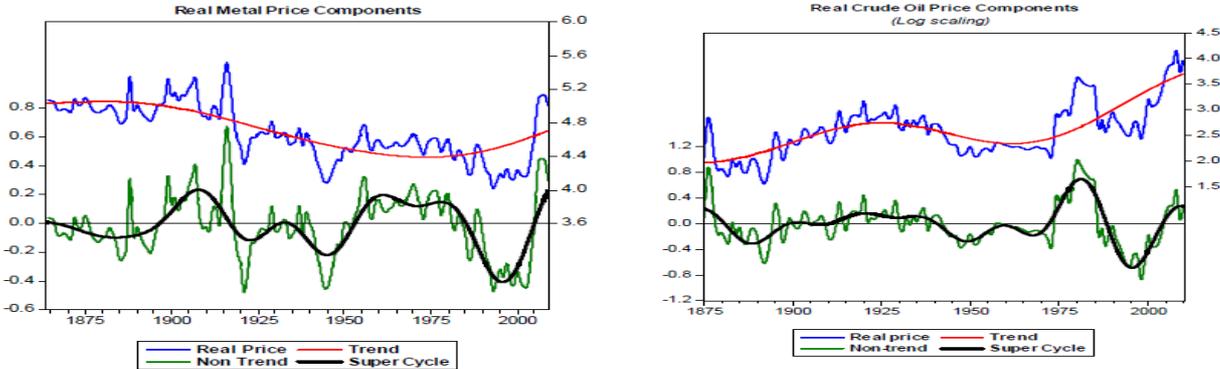
While new discoveries and gains in terms of trade of oil/metals LDC producers for sure accelerate short term growth, history and macroeconomics show that they face several short and long term problems. In a classical article, Sachs and Warner (1995) show that over the long term countries endowed with abundant natural resources tend to grow more slowly and have higher income and asset concentration than other economies. One explanation of the slow growth is that *manna from heaven* leads to laziness and sloth. Another emphasizes that growth in the resource sector does not lead to broad-based development as mines/oil fields have small forward and backward linkages with rest of economy. Also, *ex-ante* uncertainty about future commodity prices reduces capital accumulation and investments in education.

Inequality and political stability are also affected. In this sector, production requires a lot of capital but little unskilled labor, while ownership of mines and mining rents are highly concentrated in the hands of multinationals and local elites. Yet, in countries with high income and wealth inequality long term growth has been shown to be depressed by negative incentives, political instability and social conflicts (Cornia 2004). In extreme cases (Angola was a good example in the 1990s), resource rents (particularly from oil fields and diamond mines may cause ‘greed wars’ between national factions that aim at capturing such wealth.

Another problem are the long term fluctuation in the prices of metals, oil and cash crops as shown in Figure 4 below. Such fluctuations, especially due to the super-cycles documented by

Erten and Ocampo (2012), threaten long term growth stability, fiscal revenue and public expenditures. As noted by Ocampo (2013), the commodity price booms that lasted till 2013 (Figure 1) is likely to continue only if China, India and other large developing countries are able to de-link from the slow-growing OECD countries. Other problem concern the inability to diversify over the long term.

Figure 4. Long term ‘super-cycles’ in the real prices of metals and oil



Source: Ocampo (2013)

These LDC face also more immediate problems: the first is the Dutch Disease. As shown by the Swan-Salter model, large inflows of export proceeds generate an increase in absorption that drives upward the price of non-tradables, typically via housing bubbles. This causes a REER appreciation, the fall of manufacturing exports, de-industrialization and – once the mineral deposits are exhausted - slow long term growth.

There are, of course, virtuous examples of how resource-rich countries managed such problems through policy action, as in the case of well-managed Botswana (that avoided the political problems of rent economies) and other countries. These examples and policies are reviewed briefly hereafter.

The first policy objective is to promote economic diversification and avoid re-primarization. A few mid-high income countries such as the Chile, the Netherlands and Abu Dhabi managed to diversify their economy and increase the export of non-resource tradables characterized by positive learning-by-doing externalities. The policy adopted in this regard included a stabilization of the exchange rate to avoid Dutch Disease effects. The same objective can also be achieved by ‘sterilizing’ the increase in money supply due to a commodity *bonanza* by issuing state bonds that reduce the money in circulation. Another approach relies on administrative measures that reduce the amount of money in circulation, for instance by encouraging domestic entities to invest abroad or asking banks to shift their deposits at the Central Banks. Reaching the objective of diversifying the economy will also be facilitated by the adoption of an overall industrial policy (see later).

Policy measures can also moderate the impact of specialization in mining/oil on public finance and intra- and inter-generational inequality. Chile introduced a Copper Stabilization Fund to reduce the impact of price volatility on government revenue and the exchange rate. In years of high prices (relative to a long term benchmark set by law) the excess dollar receipts were placed in an offshore copper stabilization fund without affecting the macroeconomy. These monies were re-injected into the national budget in years of low copper prices. As for the impact on inequality, in the 2000s Bolivia and other Latin American countries

redistributed part of their resource rents to low-income people by means of non-contributory pensions and well targeted subsidies. Such approach reduced intra-generational inequality (Cornia 2014). In turn, inter-generational inequality improved in oil/gas producing Norway where the government set up an inter-generational Government Pension Fund that absorbs every year around 10 percent of GDP (depending on oil/gas prices). In the future, the returns on this growing fund will be spent by the government to the benefit of future generations.

Additional policies are need in LDC part of this cluster as such nations are almost unavoidably affected by a ‘fiscal laziness’. This makes that much needed reforms to broaden the tax base are postponed *sine die*. This however entails that in years of low commodity prices the budget deficit increases sharply or that pro-growth public expenditures are cut. A broadening of direct and value added taxes and the removal of tax allowances and elusion are particularly necessary, during periods of *bonanza*. Last, institutional reforms are needed to ensure transparency in the management of resource rents. The literature surveyed in Ndikumana (2014) indicates that at least 8 percent of petroleum rents earned by oil rich African countries with weak institutions ends up in tax heavens located mainly in advanced countries.

6.3 Policies for small and remote LDCs

As noted, countries in cluster 3 have a small land base and lack mineral deposits. Despite a population of less than one million, the pressure on land, fresh water and other resources is high. All this precludes sizeable agricultural and industrial projects and leads to overspecialization on few items that exposes these countries to adverse terms of trade changes. In addition, distance from export markets entails high transport costs so that few manufacturing activity undertaken must focus on high valued-added and low-weight items, the production of which requires a limited land area. Finally most LDC in this cluster are located in the South Pacific and are therefore exposed to natural disasters which are increasing in frequency, intensity and duration. They are also threatened by a long term rise in sea level due to global warming. These countries have limited capacity to respond to these threats, as it is not possible to move to high ground. For instance, Tuvalu is less than three meters above sea level and the tallest building on the island is three stories high.

As noted earlier, given all this the past development strategies of these countries mainly concentrated on migration, fishing, and tourism. Given their high population density and limited work opportunities, the Southern Pacific Islands and Cabo Verde recorded a high rate of outmigration that generated remittances ranging between 10 and 20 percent of GDP (<http://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS>). As for the future, the countries of immigration could consider reducing the barriers to the entry of migrants coming from countries affected by natural disasters and establish ‘ecological migrant quotas, not least for the ‘temporary move of LDC service providers’ within the context of Mode 4 negotiations in GATS. Such a decision – and a reduction in the cost of remittances and improvement in working conditions - would feed a steady flow of income to cluster 3 countries.

Practically all countries in this cluster are surrounded by waters rich in fish, but exploitation of this resource requires that their fishing rights are protected and possibly extended. Finally 60-70% of their value added is generated by the services sector (Table 1). In the LDC belonging to such clusters and graduated tourism generated an important share of GDP. Where tourism is a practicable option, one could consider adopting norms to attract FDI in this sector that – as discussed just below – plaid a key role in Mauritius’s development .

Intensifying efforts in these three areas is a first way for expanding productive capacity in this cluster. Yet, one could also explore the possibility of implementing multi-steps strategies like those followed with success in Mauritius. In 1961, the Nobel Laureate James Meade declared the country ‘un-developable’ due to its isolation, lack of natural resources, small population (0.6 million), high inequality and ethnic tensions. The island survived for years as a sugar mono-culture that was its sole source of exports. But it then introduced a few export processing zones (EPZ) for the high-scale garment sector that raised substantially exports. When textile wages started rising, Mauritius diversified into tourism and – more recently – into offshore banking. This process was driven by domestic investments as well as by FDI in these three sectors (while FDI were forbidden in agriculture and commerce) – where they played a key role in transferring know-how, increasing capital accumulation and raising output (Blin and Ouattara, n.d.).

These LDC also need special assistance to strengthen disaster resilience, and mitigation of climate changes. Without external support, it will take a long time to build locally these capacities. The following international support measures could therefore be considered: first broaden the coverage of formal insurance mechanisms against co-variant shocks. As noted in Linnerooth-Bayer and Mechler (2008) in rich countries about 30% of losses due to natural disaster (totaling about 3.7% of GNP) were insured in the 2000s. In contrast, in low-income countries only about 1% of losses (amounting to 12.9% of GNP) were insured. Due to lack of insurance, a limited tax bases and modest donor assistance, many vulnerable developing countries are unable to raise sufficient resources to replace or repair damaged assets and restore livelihoods in the aftermath of natural disasters. Additional insurance measures could be introduced to improve such situation including catastrophe bonds, weather derivatives, and commodity indexed bonds. Such contracts may be costly, but this problem could be solved if an international public intermediary financed the cost of insuring against the above risks, or if non-covariant risks are pooled among countries. The latter approach has been adopted by CARICOM which set up with the help of donors a Caribbean Catastrophe Risk Insurance Facility that pools the risks of several Caribbean countries and provides immediate liquidity in case of shocks for a much lower insurance premium than private insurers.

Finally, it should be possible to strengthen aid-based measures, including a global contingency fund, financed in advance by donors, providing resources to countries affected by severe shocks, or by earmarked international taxes on carbon emissions and other activities that cause climate change. An initial fund to strengthen disaster resilience already exists (the UN Green Climate Fund) though cluster 3 countries argue that its access is cumbersome.

6.4 Policies for agricultural LDC

Table 3 has shown that the number of agricultural economies has risen, together with the share of agricultural value added of countries belonging to other clusters. Such phenomenon highlights a major problems faced by most LDC, i.e. the limited diffusion of the “Green Revolution”, especially in Africa. A measure of this imbalance is that in cluster 4 low land-productivity entail that 50-70% of labor is employed in agriculture that accounts for only 25-35% of GDP.

Due to low yields and rising population growth such countries produce today 30% less food per person than in 1960s (though this trend improved somewhat in the 2000s). By 2006, 35 LDC were net food importers as well as recipients of food aid. Long term prospects are even

more worrying, as by 2050 Africa (to which most LDC of this cluster belong) will have to produce 300% more food to feed its fast growing population of 2 billion. Under current policies, it is unlikely that agricultural LDC will ‘graduate’. The achievement of such target requires a major change in agricultural policies and greater efforts at reducing population growth (now running at around 2.8 % a year in African LDC and at close to 4% in Niger).

What factors explain the persistence of low land and labor productivity in agriculture? The main problem is the absence of modernisation of agriculture. This is turn due to the ‘policy neglect’ of this sector that for long has been considered not as a growth driver but as a reserve of labour, food, raw material and savings to be transferred to the urban modern sector, as posited in the Lewis model. There are however examples of LDC that have overcome this problems, including Bangladesh and Ethiopia. In this regard, Table 6 shows that the Bangladesh’s growth acceleration during the first 15 years after Independence was driven not so much by the export of garments but by a rapid increase in land yields and food output made possible by a Green Revolution pivoting around improved rice seeds, the spread of irrigation and fertilizers and the shift from one to three crops a year. Indeed, over 1974-80 and 1981-90 the Green Revolution and reduced female fertility explained between 45 and 75 % of rising GDP/c growth. The contribution of remittances and exports of garment started to be felt only in the 1990s. An equally encouraging example of agricultural modernization is provided by Ethiopia that between 2001 and 2012 increased its food production per capita by 70 % .

Table 6. Bangladesh: Average GDP/c growth by policy driver over 1974- 2011.

	1974-80	1981-90	1991-04	2005-11
Fertility reduction	0.04% 2.64%	0.37% 35.89%	0.65% 22.49%	0.42% 8.24%
RMG Industry	0.00% 0.00%	0.07% 6.56%	0.63% 21.77%	0.79% 15.39%
ODA	0.34% 25.34%	0.05% 4.92%	-0.23% -7.83%	-0.05% -0.96%
Remittances	0.24% 18.15%	0.12% 11.68%	0.39% 13.38%	1.18% 22.96%
Green Revolution	0.57% 42.42%	0.46% 44.75%	0.63% 21.76%	0.73% 14.22%
Other factors	0.15% 11.46%	-0.04% -3.80%	0.83% 28.44%	2.06% 40.14%
Average GDP/c growth	1.33%	1.03%	2.91%	5.14%
Standard deviation of GDP/c growth	4.13%	1.15%	0.89%	0.33%
Average under-5 mortality rate	210‰	170‰	102‰	56‰

Source: Traverso (2015)

An expansion of productive capacity in this cluster entail overturning the past neglect and the prioritisation of investments in agriculture, as suggested by the Ranis-Fei model, and as shown by Ethiopia’s Agriculture Development Lead Industrialization (ADLI). Given missing or incomplete markets and poor infrastructure, this objective cannot be reached only through a free-market approach, and requires also an active state intervention.

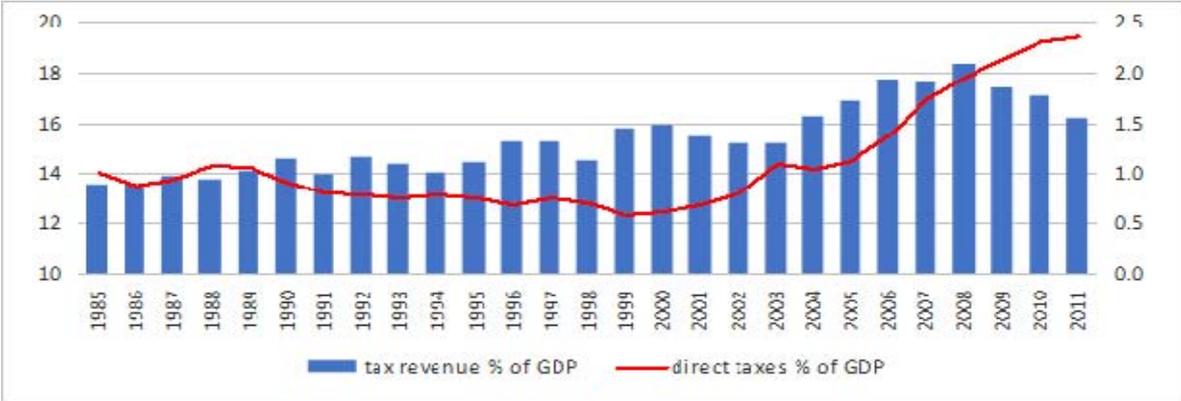
The measures needed to modernize agriculture broadly include: first, an acceptably egalitarian access to land, to be achieved via land reform or informal land titling by local authorities. Second, the use of improved seeds and modern inputs must increase. Where credit markets are absent, access to seeds and inputs may need to be subsidized. The wisdom of such policy

has been frequently contested. But such programs are needed in countries - like Malawi - characterized by high population density, falling farm size, rising cost of imported fertilizers, skewed access to credit, and weak extension services. For instance, the 1998 government-subsidized Malawian Starter Pack Program (providing a free small packs of high yielding maize and lugumes seeds and fertilizers enough for 0.1 ha) reversed the prior decline in maize production per capita, and over 1998-2005 raised maize production by 125-150 kg per household (World Bank, n.d.).

Fourth, indigenous capacities to develop and adapt new farming technologies ought to be strengthened. R&D on food crops has lagged behind – with the exception of the maize revolution of East Africa that raised food production per capita therein between 2005 and 2011. Such policy requires increasing public expenditure to promote the diffusion of new technologies, strengthen indigenous farming capacities, and develop road infrastructure and electricity for storage and output commercialization. This means restoring the budgetary support to LDC agriculture that was eliminated during the era of ‘get prices right’. The successor organizations to CGIAR should play a greater role in carrying out research on African crops, supporting R&D in national research institutions, and ensure that improved seeds remain (as they were in the past) ‘international public goods’.

Fifth, growing public expenditure on agriculture needs to be accompanied by additional revenue generation. In this regard, Figure 5 suggests that several African LDC have already intensified their tax efforts (Figure 5), as shown by a gradual increase in tax/GDP ratio while in several countries direct taxation has risen relative to the total during the last 10-15 years. Last, LDC may consider imposing countervailing duties on subsidized food imports from developed countries (a cause of declining food production in LDC), while at the same time lowering tariffs on seeds, fertilizers and transport equipment.

Figure 5. Average regional tax/GDP ratio in Sub-Saharan Africa (vertical bars, left scale) and direct taxes/GDP ratio (right scale)



Source: Cornia (2015)

6.5 Policies for manufacturing LDC

The industrial take-off of China, India and Vietnam was preceded by a rise in land yields and agricultural output driven by changes in institutions (e.g. an equitable land reform) and domestic terms of trade, as well as subsidies on modern inputs. The impact of an improved agriculture on industrialization is well known. Rising yields reduce the prices of ‘wage goods’

(food) and so lower real wages in manufacturing and services, are a source of raw material, create a market for manufacturing goods and improve the balance of payments.

After this objective is achieved, there is need to diversify the economic structure by expanding manufacturing and modern services. In doing so, countries may choose to focus on an export-oriented strategy or rely on both the domestic and the export markets. However, the latter choice is available only to countries with a large-enough domestic market (i.e. with a population of over 20-30 millions). This option is instead scarcely available to LDC with a small domestic market. For them, specialization in a few manufacturing products or components is preferable. In both cases, manufacturing provides an opportunity to modernize, and benefit from scale economies, technological spillovers and learning-by-doings.

What are the obstacles to industrial development in many LDC? The main ones are a lack of domestic and foreign investments, public infrastructure, skills, credit and financial services. As argued in section 3.2 and Figure 2, premature trade liberalization and appreciated real exchange rates are also responsible for the decline of manufacturing in LDC.

How can capacity be expanded in this sector? To start with, it is necessary to increase the supply of public goods, in particular human capital and infrastructure (roads, markets, electrification, water, and harbors/airports). The literature on the ‘crowding in’ of private investments due to rising investments in public infrastructure supports this recommendation. Without such measures, the standard LDC-MFN and ‘aid for trade’ measures (potentially more effective than in other clusters) have a limited effect. An improvement in business climate and a reduction of administrative barriers to export, access to credit, and technology are also needed.

Increasing private investments is of course a central issue, especially for large firms. In LDC private firms can scarcely self-finance their investments due to their limited cash-flow. They thus depend on expensive bank financing due to the under-banking of LDC. FDI offers an opportunity to fill this gap, and foster structural change, skills and technological transfer, and overall spillovers. In a way the insufficient industrialization of many LDC is related to their inability to attract manufacturing FDI. The situation is however more favourable in the Asian LDC. Yet, since 2000 FDI into African and other LDC and originating from China, India, Brazil and South Africa have increased, if from a low base (Chen et al, 2015). Such FDI are primarily driven by market-seeking and so depend on the size of the LDC’s domestic market, while efficiency-seeking FDI are still limited despite the low production cost of LDC. Most of these FDI focus on low value-added sectors such as textile, clothing, leather and footwear, food processing, beverages, product assembling, metal products and printing. The LDC receiving most FDI include Ethiopia, Uganda, Tanzania, Rwanda (*ibid.*) as well as Laos, Cambodia and Bangladesh. The concentration in labor-intensive but low value added activities is acceptable in the short run, but should be seen as a first step to integrate into Global Value Chains. The introduction of tax-free EPZ may also help.

An additional option is to promote Small and Medium Enterprises (SMEs), Chinese-type Town and Village Enterprises and rural non-farm (RNF) activities. These comparatively smaller units specialize in the production of a broad range of goods in sectors that: are characterized by limited economies of scale, are vertically integrated with the primary sector, produce goods that are consumed locally, or are heavy and therefore protected by high transport costs. Such strategy entails facilitating the creation and financing of SMEs. These have lower investment per capita, greater flexibility than firms, soak up surplus labour,

modernise rural areas, and develop in regions with low savings. SMEs can also congregate in networks that attract international aid and FDIs to build ‘hub-and-spoke’ firms in which SMEs work as subcontractors, benefiting from the technical knowledge and spin-offs of skilled personnel of the ‘hub’ (the foreign firms). A variant of this approach is to promote RNF activities producing locally traded goods – deriving from livestock, fisheries, cottage industries, and services that satisfy the preferences of local consumers. In China and Bangladesh 40-50 per cent of rural employment is in RNF activities.

A strategy that promotes manufacturing needs to be supported by an overall ‘open-economy industrial policy’. Such policy needs first of all to adopt a macro-policy that – in addition to creating export infrastructure – offers some protection from competing imports. Such protection can be provided by WTO-compatible trade protection (in case of threats to the balance of payments), a devalued and stable exchange rate, and non-tariff barriers (like rules of origin and fito-sanitary norms, that are widely used in the industrialized countries), an attraction of FDI, and private-public partnerships for the production of new goods (as done in Chile in the case of salmon exports).

6.6 Service oriented LDC

The service sector is heterogeneous. It includes modern tradable and non tradable services as well as an important informal non tradable sector mainly located in urban areas. On the one side, overall development depends crucially on services in the field of banking, insurance, utilities, transport, tourism, and public services. These are complementary to the growth of manufacturing, construction, RNA activities, and modern agriculture. In addition some services (e.g. in tourism as in cluster 3) have grown in importance due to impossibility of developing agriculture and manufacturing. On the other side, the low-productivity (mostly urban) informal sector behaves like a ‘sponge’ that absorbs surplus labor unable to find employment in the formal sector. A faster development of manufacturing, utilities, construction and modern agriculture would by itself reduce its size, but often these sectors grow more slowly than it is desirable. In this case, the size of the informal sector rises. In addition, rural-urban migration is likely to increase, as rural population growth is not slowing, at least in SSA’s LDC, and will shift the urban informal sector workers unemployable in an agriculture that has reached its land frontier.

Policy measures for this cluster should thus follow a two-pronged approach: first, help develop formal services and, second, upgrade the productivity of informal activities. Due to the complexity of this sector, the measures to promote formal services cannot be fully reviewed here. Suffice it to mention that the development of government services, infrastructure and utilities often entails an increase in public spending and so require an increase in tax revenue. Perhaps the most important related policy should focus on the creation of a de-repressed, accessible and - at the same time - strictly regulated financial sector. In this regard, the experience of Japan in the 1960s and Latin America in the 2000s may be a blueprint for action for many LDC. Stiglitz argued that during the early phases of its development, Japan reached a high coverage of banking services thanks to its reliance on a widespread network of post offices. This reform helped raising savings deposit and providing credit to the productive sectors all over the country. In turn, Latin America – that had in the past had over-liberalized the financial sector without increasing credit supply to the economy while experiencing financial instability– introduced in the 2000s reforms that enhanced the capitalization, funding, and supervision of banks, imposed a stricter prudential regulation on

the financial systems, enhanced risk-assessment mechanisms in large banks, developed appropriate legal and accounting frameworks, and reduced currency mismatches (Rojas-Suarez. 2007).

As noted above, people enter the informal sector by default, i.e. due to lack of formal sector jobs and steady migration from rural areas. The informal sector comprises micro-firms of 1-5 people, is characterized by low levels of technology, employs unskilled labor (but now also graduates), mostly women. Its entry (motivated mostly by economic survival) and exit are easy. The sector makes extensive use of local raw materials and produces for local urban markets. The main activities include food processing, making clothes, cooking utensils, small furniture and handicrafts, as well as building small houses and kiosks, or working as hairdressers, car washers, drivers of informal taxis and traders. The main obstacles to their development are lack of credit, skills, technology, space, access to water and electricity – and being subject to complicated administrative norms. Policy responses (ILO 2007) generally focus on breaking up informality while preserving its job-creation and income generating potential, by investing in the ‘integrated urban local development’. This entails investing in human capital formation (e.g. via apprenticeship course), facilitate access to improved technology and credit via bank-assisted credit unions and micro-credit institutions (as done in Bangladesh by the BRAC Bank), titling of public land used for production, improved supply of water and power, and affirmative policies that enhance social protection also for informal sector workers. To see these measures implemented, the informal sector needs to organized itself and consult with government to frame policies in its favor.

7. Suggestions for macroeconomic policies to expand capacity in LDC

It is difficult to define a universal package of macroeconomic policies for expanding production capacity in different clusters of LDC. Yet, some broad principles may apply fairly generally (Rodrik 2003). These should focus on maintaining acceptable macro balances, while orienting the key policy tools (interest rate, exchange rate and financial regulation) to capacity expansion and the prevention of external and internal crises. The key elements of such approach can be very briefly summarized as follows:

To start with, LDC should aim – whenever possible – at reducing dependence on foreign savings, lowering foreign indebtedness and mobilizing to the maximum domestic savings. As shown above, FDI can help expanding capacity and skills. Instead, portfolio flows cause instability and must be controlled, as countries relying on this kind of finance often end up in financial traps and suffer from REER instability. A key issue concerns the timing, duration and scope of capital controls. While the IMF now supports temporary controls on inflows during crises, the approach suggested here entails that they can be used as long as needed and be extended also to outflows. Capital accumulation thus needs to be funded mainly through the strengthening of indigenous saving and banking institutions, increased credibility and firms’ incentives to invest. In countries with low tax/GDP ratios, raising taxes and public savings is also an option to increase capital accumulation.

The choice of the exchange rate regime is crucial. Where possible (i.e. except LDC part of monetary unions as in West Africa) the exchange rate should aim at promoting exports while reducing currency crises. Fixed-peg regimes have often lead to crises and may be useful only in very small countries. In most LDC, countries may opt for a stable and competitive real effective exchange rate (REER) that has been shown to be a key factor for kick-starting

growth and improving long-term performance (Rodrik 2003). In addition, LDC should aim at achieving a broadly defined long term equilibrium of the current account balance. As argued above, the ‘growth financed by foreign savings’ paradigm should be reconsidered so as to avoid problems of foreign indebtedness and inability to control the exchange rate. During the 2000s most developing regions improved their current account position thanks *inter alia* to changes in their exchange rate regime.

The free trade policies adopted in the 1990s have not been overturned during the 2000s. In many LDC they have led to ‘re-primarization’, deindustrialization, premature tertiarization and informalization, as well as to a rise in income inequality. As shown in Figure 2, a fall in tariffs has gone hand in hand with a shrinkage of manufacturing. As argued in section 6.5 the trade (and exchange rate) policy must thus be reconsidered so as to avoid the collapse of the import-competing sector, while actively seeking to diversify exports, and rebalancing trade asymmetries with China and other emerging economies (Ocampo 2012).

Unlike in the past, fiscal policy should adopt a clear countercyclical stance, during both crises and booms. The copper stabilization fund of Chile mentioned in section 6.3 is a good example of this policy, that can be pursued also through ‘fiscal rules’ and fiscal responsibility laws. There must therefore a shift away from Washington Consensus policies demanding quick budget cuts during crisis years, as such cuts reduce growth, investments and tax revenue over the short term, thus leading to an ‘illusory fiscal adjustment’. In very poor LDC, donor assistance needs to be raised on occasion of extremes external shocks. While deficits certainly need to be reduced, this should be done gradually, e.g. by 1-1.5 per cent of GDP a year.

Tax policy needs to be strengthened and – in the many LDC with very low tax/GDP ratios - tax revenue must be increased, while dependence on resource rents needs to be reduced, as mentioned in section 6.3. Also in several LDC, the last decade witnessed a fairly general rise in tax/GDP ratio (Figure 5). Increases in commodity prices contribute to rises in resource taxes, but what is needed is a broader and equitable tax reform, which helps raising badly needed public investments in infrastructure and human capital, that are essential for expanding productive capacity and the private sector.

As for monetary policy. According to the orthodox stance, inflation is costly and affects the poor the most. However, in LDC affected by structural rigidities - driving inflation below 10 per cent is difficult and does not produce perceptible growth benefits while rapid disinflation generally causes a contraction of GDP and—because of the endogeneity of tax revenue to GDP—a widening of the fiscal deficit. As a result, a policy of high real interest rates should be avoided as it increases production costs and prices. Thus, while the control of inflation is sacrosanct, its target value and the speed of its reduction must take into account the above considerations, and be broadly driven by flexible inflation targeting. This policy should help contain cost-push inflation and, at the same time, avoid a contraction in investment that depresses capacity expansion and long term growth. Last, monetary policy should aim at providing liquidity more broadly and focus on countercyclical regulation to prevent asset price bubbles leading to systemic crises.

Finally, as already discussed in section 6.6 while in LDC there is an urgent need to increase credit provision, this must be done while avoiding the creation of shadow financial institutions not subjected to Central Bank. LDC thus require banking reforms and financial regulation like those mentioned in section 6.6.

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