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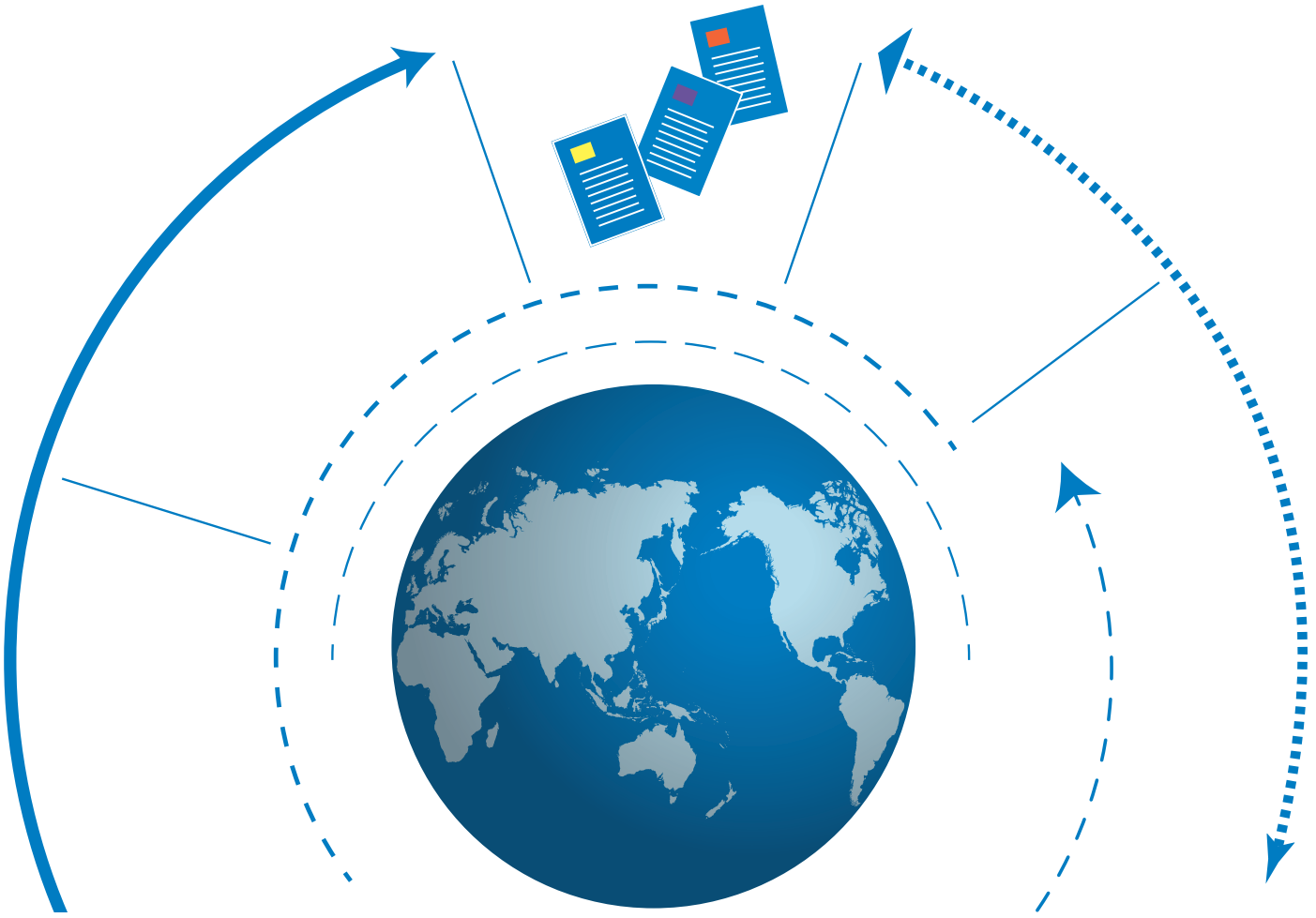
Working Paper No. 327

Research area: **African Economic Outlook**

Explaining diversification in exports across higher manufacturing content - what is the role of commodities?

Jan Rieländer and Bakary Traoré



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September 2015

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ACKNOWLEDGEMENTS

This Working Paper is a follow-up of the work started in the framework of the *African Economic Outlook 2013* report. The authors wish to express their sincere gratitude to Carlos Alvarez, former Vice Minister of Economy (2004-06) of Chile and Deputy-Director at the OECD Development Centre from 2010-13, who provided precious guidance, and also to Jean-Philippe Stijns. The OECD BTDIxE 2012 classification provided by Colin Webb and Norihiko Yamano (OECD STI directorate) has been very instrumental to check the consistency of the new methodology we devised to classify all the international trade products into three manufacturing categories (unprocessed or raw, semi-processed, and fully-processed products).

Many thanks also to Carl Dahlman, Helmut Reisen, Henri-Bernard Solignac-Lecomte, Jose Ramon Perea, Christian Daude and Alexa Tiemann for their comments on the draft. The authors would like to thank Thang Nguyen, Melanie Favrot and Estelle Plat for their research assistance. All remaining errors are the authors' responsibility.

PREFACE

Most low-income countries export mainly unprocessed commodities. Yet, in their pursuit of structural transformation, they also seek a more diversified economic structure, including developing a strong manufacturing sector to create jobs and spur innovation as in more advanced economies. What is the best way for them to promote economic diversification? Should countries aim straight for manufacturing? Should they focus on the products most in line with their already-known and used endowments? Should they follow some sort of ladder of activities towards a well-diversified economy? Or should they simply lean back and let the markets sort it out? Finally, do the answers vary depending on the country?

A body of recent research suggests that a country's diversification process would tend to move along pathways of "nearby" products: the "new" products it specialises in would build on the existing productive capabilities and knowledge used to produce the "old" ones. It would follow then that low-income, raw commodity exporting countries should build on their natural-resource endowments. This would not always imply moving downstream and transforming those resources locally. Depending on learning processes, capabilities and the types of endowments, value addition at the local level may or may not make economic sense.

In order to diversify the national economy, boost productive capacities and create jobs, industrialisation can also be facilitated by further mobilising different types of natural resources. I invite you to read this paper and discover how building a strong and diversified primary sector across a range of different commodities could actually contribute to boosting productive capacity, including in manufacturing exports. This research was inspired by a major conclusion of the 2013 *African Economic Outlook* on natural resources and structural transformation. The Outlook's cross-country analysis stated that, while dependence on natural resources poses serious challenges, natural resource abundance is associated with positive outcomes such as long-term growth. By analysing the correlations among export diversification patterns of unprocessed, semi-processed and finished goods, this paper indicates that broadening the array of exported unprocessed commodities is a good predictor of higher manufacturing diversification. And, it is sometimes a first step towards industrialisation for many poor countries.

This important conclusion makes a compelling case for inviting more low-income countries to join the OECD Development Centre's ongoing Policy Dialogue on Natural Resources.

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September 2015

RÉSUMÉ

Ce document apporte de nouvelles preuves empiriques à la littérature récente sur les façons dont les pays développent de fortes capacités productives, en analysant plus finement les trajectoires de diversification des exportations entre différents types de produits. Les données COMTRADE à 4-chiffres pour 176 pays sur la période 1992-2011 sont utilisées pour classer les produits selon trois catégories dans le processus de fabrication : produits non-transformés, semi-transformés et produits finis. Il ressort que les performances de diversification dans les produits non-transformés et la diversification dans les produits plus élaborés sont étroitement corrélées entre elles. En particulier, la diversification des exportations de produits de base au cours des trois dernières années, un objectif relativement facile à atteindre pour de nombreux pays pauvres, est un fort indicateur d'expansion de "l'avantage comparatif révélé (ACR)" dans les produits intermédiaires et finis. Ce lien est robuste à différents modèles économétriques et différents groupes de pays, et s'avère plus fort lorsqu'on considère uniquement la liste des produits exportés avec avantage comparatifs (méthodes ACR) que quand on utilise tous les produits d'exportation. Ainsi, au lieu de ralentir la trajectoire de transformation structurelle, un secteur primaire diversifié est une étape cruciale vers un accroissement des capacités de production et l'accélération de la création d'emploi.

Classification JEL :

- C23 Les modèles des données de panel - Modèles spatio-temporels
- F14 études empiriques du commerce
- F43 Croissance économique des économies ouvertes
- O11 Analyses macroéconomiques du développement
- O5 Études économiques par pays

Mots-clés : diversification des exportations, haute intensité manufacturière, le rôle des produits de base.

ABSTRACT

This paper adds new empirical evidence to the recent literature about the ways countries develop strong productive capacities, by analysing the patterns of export diversification across different levels of manufacturing content. We use trade data at the 4-digit level for 176 countries from 1992 until 2011, and we classify all the products into three manufacturing categories (unprocessed, semi processed and finished goods). We found that countries' diversification performances among unprocessed commodities and the diversification across higher manufacturing content are closely correlated with each other. In particular, diversification performance in a large range of raw commodities over the three previous years, which might be easier to attain for many poor countries, is a strong predictor of an expansion of current revealed comparative advantage (RCA) among intermediate and final goods. The relationship is robust to different econometric models and different country groups, and stronger when using the RCA filters than using all export lines. Thus, instead of holding a country back, a diversified primary sector is an important stepping stone towards a strong productive capacity and jobs.

JEL Classification:

- C23 Panel Data Models - Spatio-temporal Models
- F14 Empirical Studies of Trade
- F43 Economic Growth of Open Economies
- O11 Macroeconomic Analyses of Economic Development
- O5 Economywide Country Studies

Keywords: export diversification, higher manufacturing content, role of commodities.

I. INTRODUCTION

How economies develop strong productive capacity is a core question of development economics. Every economy was at some point based on just a few basic products more or less directly derived from the resources nature has to offer. Over time human ingenuity combined with trade has led to countries producing a much wider ranges of products. Each new product that an economy produces represents a set of capabilities (Hausman and Hidalgo, 2011), e.g. production factors (land, labour, capital) and inputs (intermediate products, services) combined in a new way. If the new product is successful in the markets, and demanded by consumers, its production will expand, typically leading to the creation of industry clusters and additional varieties of the product. Throughout this process, new opportunities of employment and income generation are being created that offer higher incomes. Prosperity is spread across society as these new opportunities expand and allow people to move up from lower-income activities (Lewis, 1954; McMillan and Rodrik, 2011). In short, the broadening of a country's product basket, also referred to as extensive diversification,[1] is at the heart of the process we call development.[2]

A great deal of empirical work has been done over the last ten years to link this story line to actual observations. Using both domestic production (Imbs and Wacziarg, 2003) and trade data (Klinger and Lederman 2004 and 2006; Cadot, Carrère and Strauss-Kahn, 2011) this literature finds a strong pattern linking diversification and development. Various data sources and measures deliver similar results. Diversification of export products, as well as exports shares of GDP show a positive correlation with average per capita income until average per capita income reaches around USD 25 000 in constant 2005 prices. At higher levels of income specialisation becomes the dominant process.

On the flipside, countries that remain dependent on few products and fail to diversify have dim prospects of future long-term growth. Low-income countries in particular run the risk of becoming trapped in dependence, usually on a single or a few commodities. A wide range of research has documented the negative correlation between natural resource dependence and negative economic outcomes (Neary & van Wijnbergen, 1986; Gelb, 1988; Auty, 1990; Sachs & Warner, 1999; van der Ploeg, 2010). Contrary to the "resource curse" concept however, natural

[1] The term "extensive diversification" describes diversification resulting from the emergence of new products. Equalisation of product shares would also result in diversification and is referred to as "intensive diversification".

[2] The product-variety branch of endogenous growth theory following Romer (1990) has modelled this story of growth.

resource abundance *per se* is not correlated with negative outcomes, only export dependence on natural resources[3] (Stijns, 2005; Gylfason, 2007; Brunnschweiler and Bulte, 2008; van der Ploeg and Poelhoekke, 2010). Many natural resource abundant countries have been able to use this endowment to diversify and grow their economy. Natural resource dependence is thus a case of failure to diversify, rather than a curse.

So if diversification is paramount for development, how can a country promote diversification? Should countries: *i)* categorically aim for manufacturing as the "elevator" sector (Rodrik, 2011) that can propel productivity; *ii)* focus on the products most in tune with their factor endowments; *iii)* follow some sort of a ladder of activities towards a well-diversified economy (see for example Lin, 2012); or *iv)* simply lean back and let the markets sort it all out? Finally, do the answers to these questions vary from country to country?

This paper analyses how export diversification patterns of unprocessed, semi processed and finished goods correlate with each other in order to answer some of these questions. In addition to the measures commonly used to study diversification, such as the number of active export lines (for example Cadot et al., 2011) and measures of "discoveries" (for example Klinger and Lederman, 2004 and 2006), we propose two new filters based on the concept of revealed comparative advantage following Balassa (1965). The concept of revealed comparative advantage (RCA) is a stronger filter for the competitiveness of exports than the pure number of export lines.

We find that diversification among commodities and diversification among higher order of manufacturing follow the same trend. In particular, diversification in a large range of raw commodities, here defined as unprocessed goods, is a strong predictor of an expansion in the number of RCA among intermediate goods and final goods (Figure 1). The relationship is stronger when using the RCA filters than using all export lines. This finding is robust to the inclusion of a range of controls accounting for size, geography and the business environment such as finance and infrastructure.

Our results also suggest that *discoveries in exports* – i.e. number of new and significant products a country adds to its export basket – play an important role for long term growth and this holds for each level of manufacturing content. Export diversification is driven by discoveries, i.e. bringing new products to export markets. Using measures of export product discovery and splitting them by manufacturing intensity as done by Klinger and Lederman's (2006), we also confirm the strong correlation between discoveries and cumulative growth of GDP per capita at all three product levels during the 2000s. Interestingly, discoveries in raw products have a significantly larger coefficient than discoveries in semi-finished or finished goods.

[3] Dependence is usually measured as the share of natural resource exports in total exports or the share of natural resource rents in GDP. Abundance is measured as natural resource reserves or production per capita.

Figure 1. **Diversification among commodities "previews years" seems to be a good predictor of the current RCA among higher levels of processing – Illustration for 2007-10.**

Figure 1.a Correlation using the number of **active export lines** (*Nline* raw)

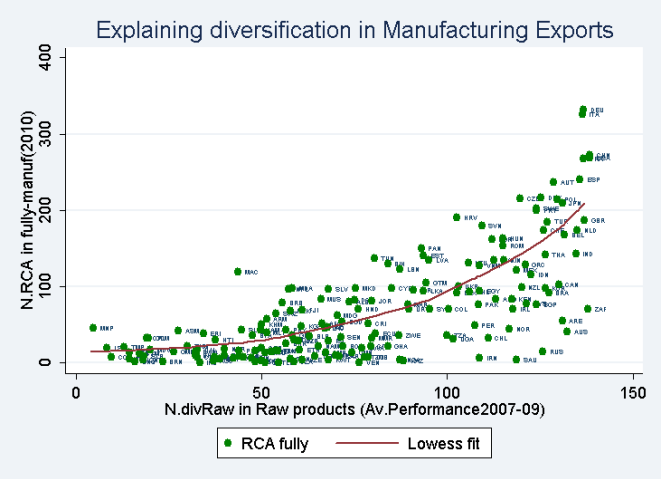
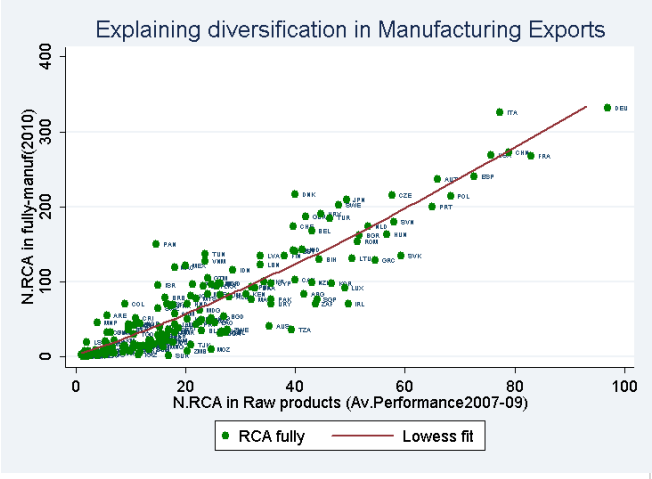


Figure 2.b. Correlation Using the concept of C*lusterRCA*



These results indicate that:

- There seems to be no trade-off between commodity diversification and diversification among goods with higher manufacturing intensity. The two processes seem to be covariant and mutually reinforcing trends in many growing countries. In particular, there is no evidence for a pattern of leaving behind commodity exports as a country moves into products with higher manufacturing content. To the contrary, growing countries continue to add new commodities to their exports basket until they reach high levels of GDP per capita.

- Diversification based on the basic tenets of comparative advantage is a stronger predictor of development than pure diversification. For countries where commodities are reflective of comparative advantage, expanding the spectrum of commodities that are exported is likely to bring about an expansion of non-commodity exports, and boost their structural transformation.

The rest of the paper is organised as follows. The next section presents the data and methodology to classify diversification by different processing categories, and provides some stylised facts about this classification. Section III describes the econometric models we applied to disentangle the determinants of diversification process in higher order of manufacturing, and then presents the main results and their robustness. Section IV tests the robustness of the results, and Section V concludes.

II. MEASURING EXPORT DIVERSIFICATION BY MANUFACTURING LEVELS: THE METHODOLOGY

This section first presents our methodology to balance data quality, and then describes the way we classified trade products into three manufacturing categories of. Finally, it presents the four different measures of export diversification by manufacturing levels.

Balancing data quality with comprehensiveness

We use COMTRADE data via WITS as the standard source of trade data from 1992 until 2011. Due to this extended time window and the large number of developing countries available in the dataset, we rely on both HS88/92 and SITC-rev3 classifications[4] to balance data quality with comprehensiveness. Different from Klinger and Lederman, 2004 and Cadot et al. (2011), we use exports at the 4-digit level. For many developing countries the use of more detailed 6-digit data seems not to add any additional information in terms of percentage distribution of trade between raw commodities, semi-processed and fully-processed goods. Analysing African export data, Easterly and Reshef (2010) conclude that the 4-digit level is even preferable, given the amount of measurement errors at the 6-digit level. Furthermore, we use reports by importing countries, rather than the direct declaration by exporting countries because generally more care is given to recording imports than exports for purposes of tariff collection.

Then finally, to double-check if data on developing countries are not systematically worse in quality at the 4-digits level, we set-up the following methodology: for each country we sum up the values for the specified products at the 4-digits level by year, and then we compare it to total trade flows reported. The gap represents the "unspecified trade flows" at the 4-digits level. Regarding this criteria, we do not find any difference of quality between the low income countries and the others. Only few data series are of insufficient quality. They are mainly very small islands like Aruba, Guam, The Bahamas, or "Unspecified" origins. Moreover, we excluded also Monaco, Montserrat (MSR), and the entity called "Special Categories (SPE)" because the sum of products specified at the 4-digits data exceed far the total trade reported. See in annex (Table A.2) the statistics indicating the SITC 4-digits data quality for each country between 1992 and 2011.

[4] HS was introduced in 1992. As trade reporting until then relied on the SITC system, HS data can be patchy during the first years of implementation, especially for developing countries.

Classifying the products into three manufacturing categories

To identify the manufacturing intensity of each product category available in the international trade nomenclatures, such as the Harmonized System (HS) and the Standard Industrial Trade Classification (SITC), we use a two step-approach. First, we use the WTO Multi-Lateral Trade Negotiations (MTN) nomenclature's measure of manufacturing intensity, which distinguishes between three categories: unprocessed or raw, semi-processed, and fully-processed products. In the second step, we use the concordances available via the World Integrated Trade Solution[5] platform to map this MTN nomenclature onto the HS nomenclature and from there onto SITC. More than 90% of the SITC 4-digits products codes have direct correspondence in both nomenclatures. Remaining product lines without clear correspondences were classified "by hand".[6] Finally, the End-Use classification[7] of the products recently developed by OECD (see Zhu and al., 2011) has been very instrumental to check the consistency of our methods.

Table 1 summarises the number of products in each category when using the SITC nomenclature, and provides some empirical statistics between 2000 and 2011. Note that during this period, 5.9% to 9.5% of products are reported has "confidential" in the SITC (see the last row of Table 1).

[5] The World Integrated Trade Solution (WITS) is software developed by the World Bank, in close collaboration and consultation with various International Organizations including United Nations Conference on Trade and Development (UNCTAD), International Trade Center (ITC), United Nations Statistical Division (UNSD) and World Trade Organization (WTO).

[6] For instance, the manufacturing intensity has been allocated by hand for 40 SITC products codes, which have no correspondence with MTN; of which 34 belong to section 89 of the SITC nomenclature and includes products like "original sculpture", accessories of musical instruments. In addition, we also made a trade-off for 24 products which have an overlap between two MTN manufacturing categories.

[7] The End-Use classification of the products is a new tool developed by OECD for analysing global production networks. International trade Products are broken down both by industrial sectors and by end-use categories allowing, for example, insights into the patterns of trade in intermediate goods between countries to track global production networks and supply chains, and helping to address policy issues such as trade in value added and trade in tasks. See STAN Bilateral Trade Database by Industry and End-Use.

Table 1: **The world trade by manufacturing category: Total number of product lines in each processing category, and empirical statistics between 2000 and 2011**

	Number of products	Percentage shares of world total exports (period 2001-11)										
	SITC rev.3	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Unprocessed or raw products	143	12.6	12.4	12.8	13.4	15.1	15.6	15.3	18.1	15.9	17.1	19.0
Semi-processed products	296	16.6	16.3	16.4	17.0	16.9	17.2	18.3	18.0	16.8	17.8	18.3
Fully-processed products	592	64.9	65.1	64.2	62.7	61.2	59.3	58.0	54.5	57.8	56.2	53.9
Unspecified trade flows	-	5.9	6.2	6.6	6.8	6.8	8.0	8.4	9.5	9.4	8.8	8.8
Total	**1031**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: The results are based on the SITC-rev3 classification (4-digits)

Source: Authors' calculations based on UN COMTRADE (2013), via http://wits.worldbank.org/wits/.

Measuring export diversification by manufacturing levels

For each of the three manufacturing categories described above we apply four different measures of diversification. First, we follow CADOT et al. (2011) in using the number of a country's active export lines in a given year as a basic measure of diversification, denoted $Nline_{t,c}$ as the number of active export lines of country c in period t. Separating product categories, we have $Nline\_raw_{t,c}$ for raw materials, $Nline\_semi_{t,c}$ for intermediate goods and $Nline\_finished_{t,c}$ for finished goods, exported by country c in period t. Second, we use a filter rule which takes into account the number of active lines with exports higher than USD 10 000, both in the current year and in the year before. These cut-off values are arbitrary, but our objective is to remain consistent with the approach used by Klinger and Lederman (2004 and 2006). In the document, we will call this measure "significant active lines" (respectively denoted $Sign\_raw_{t,c}$ for commodities, $Sign\_semi_{t,c}$ for intermediate goods, and $Sign\_finished_{t,c}$ for final products).

The third and fourth measures are based on Balassa's measure of revealed comparative advantage (RCA), which is a higher filter for exports competitiveness than the pure number of export lines. The concept of revealed comparative advantage (RCA) reflects the ratio of product i's share in country c's export to its share in world trade, formally

$$\boldsymbol{RCA_{i,c}} = \frac{\mathbf{X_{i,c}/X_c}}{\mathbf{X_{i,w}/X_w}}$$

where $X_{i,c}$ is the sum of the exports of product i by country c, X_c the sum of total exports by country c, $X_{i,w}$ the sum of world exports of product i and X_w the sum of total world exports. A value of $RCA_{i,c}$ greater than one means that country c exports relatively more of good i than the average country and therefore has a revealed comparative advantage in this good. Then the

number of a country's export product lines with RCA greater than 1 constitutes a measure of diversification. We call this measure NRCA.

Our third measure computes NRCA_$raw_{i,c}$, NRCA_$semi_{i,c}$ and NRCA_$finished_{i,c}$ as the NCRA for each respective product processing level.

For our fourth measure, we first split world trade data into processing categories and then construct NRCA separately for each group, calling it ClusterRCA. In other words, $ClusterNRCA_{i,c}$ – which is the number of a country's export product lines with RCA greater than 1 – compares country c's exports of product i to world exports in the same processing category only:

$$\boldsymbol{cluster\ RCA_{i,c}} = \frac{\mathbf{X}_{i,c}/\boldsymbol{clusterX_c}}{\mathbf{X}_{i,w}/\boldsymbol{clusterX_w}}$$

where $clusterX_c$ refers to the combined exports of each manufacturing cluster (unprocessed, semi-processed, and final goods) by country c.

This measure differs from NRCA in two ways. First, it gives a more detailed picture of a country's export position and relative diversification within a given processing category because exports in other processing categories are excluded from the calculation. For example, Kenya's raw material exports are compared with France's raw material exports only, not taking into account the very different patterns of exports in manufactured goods these two countries exhibit, but which would have been included in calculating $NRCA_{raw}$ for the two countries. Second, ClusterRCA is based on two smaller denominators (clusterXc and clusterXw) than NRCA, thus allowing for more products in each processing category to exhibit comparative advantage. This second feature is particularly relevant for countries with very dominant export products such as oil or gas, where few other export products are counted as exhibiting comparative advantage, even where such exports might be of significant size. For example, Nigeria[8] shows much more diversified non-oil exports in the clustered measure (see Annex, Figure A.1). The number of products exported with relative comparative advantage is much more important when we apply the new methodology ClusterRCA, especially for the manufacturing sectors.

[8] The rebasing exercise of the GDP in 2014 by the Nigerian authorities reveals a more diversified economy than previously thought.

III. RESULTS: DIVERSIFYING ACROSS HIGHER MANUFACTURING CONTENT – WHAT IS THE ROLE OF COMMODITIES?

How do countries diversify / specialise across higher manufacturing content? What is the role of commodities? This section will present the empirical results for these two questions.

GDP per capita and the process of diversification/ specialisation across the manufacturing categories

Applying the four different filters of export diversification (as described above) to the data, and breaking them down by manufacturing category, we largely confirm the "U-shaped relationship" between GDP per capita and the process of diversification/specialisation found by Imbs and Wacziarg (2003), and Cadot et al. (2011). For instance, using diversification measured by active export lines without any filters or clusters, we find the turning point from diversification to specialisation to be around USD 25 000 (see Table 2, column 1). Separating the products into manufacturing intensity groups, the turning point remains in this neighbourhood for active export lines. However, when using NRCA and ClusterRCA, the transition point appears at a higher income level for finished products (around USD 30,000 constant GDP per capita) and a lower level for unprocessed commodities. The estimation model is the following:

$$\boldsymbol{Div\_level_{c,t}} = \mathbf{a_0} + \boldsymbol{\beta_1 GDP\_percap_{c,t}} + \boldsymbol{\beta_2 GDP\_percap^2_{c,t}} + \boldsymbol{\alpha_{geo}}\mathbf{Geo'_c} + \boldsymbol{\varepsilon_{c,t}} \quad \textbf{(Eq.1)}$$

Table 2 suggests that the diversification-specialisation patterns of the three categories of manufacturing intensity have similar trajectories vis-à-vis per capita income. Moreover there is no pattern of leaving behind commodity exports as a country moves into products with higher manufacturing content.

Export diversification is driven by discoveries, i.e. bringing new products to export markets. Using measures of export product discovery and splitting them by manufacturing intensity as done by Klinger and Lederman's (2006), we also confirm the strong correlation between discoveries and cumulative growth of GDP per capita at all three product levels during the 2000s. Interestingly, discoveries in raw products have a significantly larger coefficient than discoveries in semi-finished or finished goods (Table 3).

Table 2. **Diversification/ Specialisation transition process by manufacturing categories: Any turning points across income levels?**

	Using "Active lines" as measure of diversification				Using "NRCA" (Balassa, 1965) as measure of diversification			Using ClusterRCA as measure of diversification		
	All products categories	Filter= raw-products only	Filter= semi-processed products only	Filter= fully-processed products only	Filter= raw products only	Filter= semi-processed products only	Filter= fully-processed products only	Filter= raw products only	Filter= semi-processed products only	Filter= fully-processed products only
GDPpcap (cst)	5.45E-2	3.35E-3	9.63E-3	1.43E-2	3.12E-4	3.78E-3	6.48E-3	1.88E-3	3.15E-3	4.32E-3
	[0.3E-2]***	[0.3E-2]***	[0.6E-2]***	[0.1E-2]***	[1.3E-2]**	[0.3E-2]***	[0.7E-2]***	[0.2E-2]***	[0.3E-2]***	[0.5E-2]***
GDPpcap^2	-1.11E-6	-5.65E-8	-1.955E-7	-3.007E-7	-1E-8	-7.73E-8	-1.074E-7	-3.78E-8	-6.58E-8	-6.33E-8
	[0.1E-6]***	[0.8E-6]***	[0.2E-7]***	[0.2E-7]***	[0.42E-9]**	[1E-8]***	[0.2E-7]***	[0.6E-7]***	[1E-7]***	[1.5E-78]***
Landlocked==1	-345.13	-19.35	-61.28	-91.94	-2.95	-8.66	-22.74	-4.3	-13.31	-16.8
	[24.28]***	[1.51]***	[3.87]***	[7.09]***	[0.64]***	[1.08]***	[2.23]***	[0.65]***	[1.00]***	[2.25]***
Constant	1 282.25	68.15	160.19	412.79	20.96	26.54	49.49	17.17	30.89	83.73
	[18.11]***	[1.18]***	[3.14]***	[4.89]***	[0.47]***	[0.99]***	[2.03]***	[0.55]***	[0.96]***	[1.83]***
N	1 936	1 936	1 936	1 936	1 936	1 936	1 936	1 936	1 936	1 936
R2_A	0.34	0.31	0.35	0.33	0.02	0.27	0.27	0.21	0.26	0.24
Turning points between Diversification/ Specialisation	**USD 24 556**	**USD 29 662**	**USD 24 626**	**USD 23 739**	**USD 15 618**	**USD 24 442**	**USD 30 173**	**USD 24 827**	**USD 23 959**	**USD 34 106**

Note: The dependent variables are the measures of diversification in the header row. Independent variables include GDP, GDP squared, and being landlocked. Standard errors of the coefficients are indicated in square brackets. * p<0.1; ** p<0.05; *** p<0.01. Note that the results are similar using other alternative country-specific effects models (like the areg or xtreg commands).

Table 3. **Discoveries play an important role for the long-term growth: OLS regression results (robust standard errors for heterogeneity)**

	Type of discovery (period 2001-2010)			
	All type of products	Filter= Discovery in **raw products only**	Filter= Discovery in **semi-processed products only**	Filter= Discovery in **fully-processed products only**
Effect of Discoveries on the GDP growth	**0.002**	**0.016**	**0.004**	**0.005**
	[0.001]***	[0.005]***	[0.002]**	[0.002]***
Initial GDP per cap (Av 1998-2000)	-0.000006	-0.000006	-0.000008	-0.000006
	[0.000002]***	[0.000002]***	[0.000002]***	[0.000002]***
Population size	0.001	0.001	0.001	0.001
	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Constant	1.229	1.221	1.290	1.235
	[0.045]***	[0.048]***	[0.038]***	[0.042]***
R2	0.23	0.23	0.18	0.24
N	170	170	170	170

Note: The dependent variable is the long-term GDP growth ratio (Av.GDPpercap [2008-2010] / Av.GDPpercap [1998-2000]). The first row reports the effect of discovery by type of products. Controls include initial level of GDP per capita, and the population size. Standard errors of the coefficients are indicated in square brackets.* p<0.1; ** p<0.05; *** p<0.01

Finally, taking a closer look at individual countries indicates that diversification within the three groups of goods indeed follow similar trends (increasing, or decreasing, as GDP per cap grows). Figure 1 shows country-specific patterns for some countries that have shown strong growth between 2000 and 2011. Countries with lower levels of GDP per capita like India,

Indonesia, Ghana and Kenya continued to diversify their exports of unprocessed commodities while diversifying exports with higher manufacturing content. The specialisation process for high income countries like Norway and Ireland has taken place in both types of exports as well. For Australia, we observed increasing diversification until USD 22000 GDP per capita, then the specialisation become dominant at the higher income levels.

Figure 2. **Filtered pathways of selected countries: Stages of GDP per capita and diversification by manufacturing intensity**

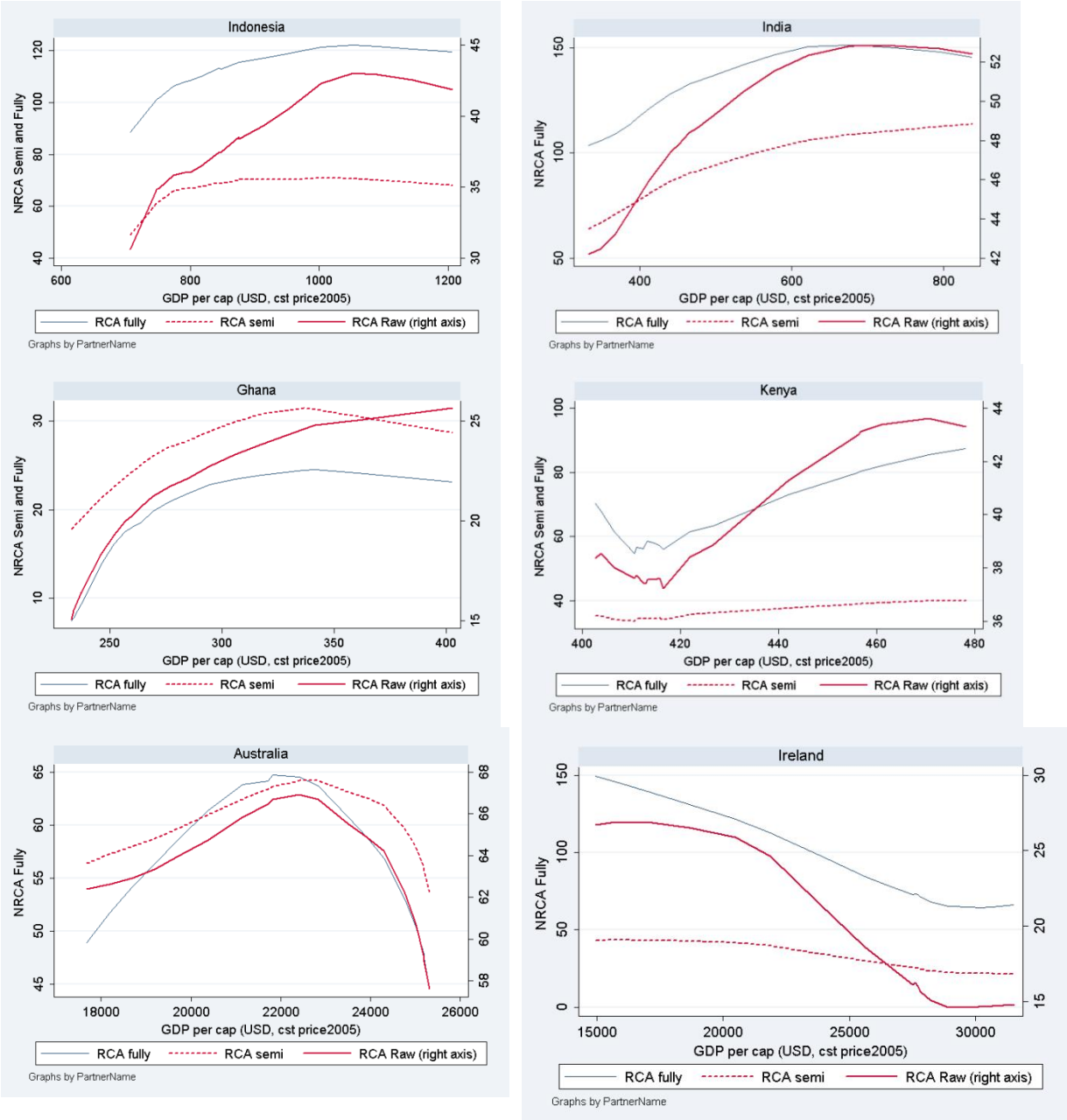
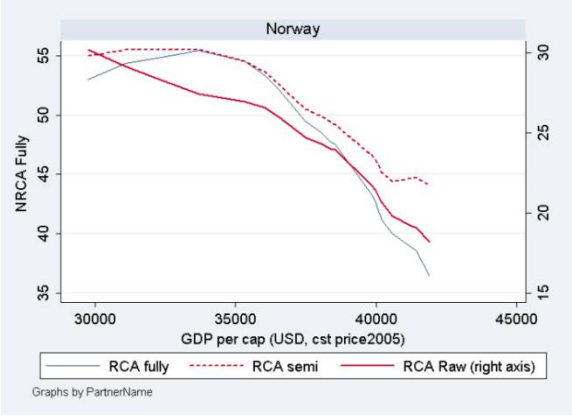


Figure 2. **Filtered pathways of selected countries: Stages of GDP per capita and diversification by manufacturing intensity *(cont.)***



Note: Graphs obtained using the "Lowess smoothing". This method is a nonparametric analysis which carries out a locally weighted regression of Yvar (the diversification within the three manufacturing levels) on Xvar (the GDP per capita, constant values), and displays the graph. Because of its locality, the Lowess smoother tends to follow the data. This method is more desirable than the "polynomial smoothing" method, where the fitted values are sensitive to all the data points.

Explaining the role of commodities in diversifying across higher manufacturing levels

Coming back to the questions about the role of commodities in diversifying across higher manufacturing levels, a more precise understanding of the determinants is required. For instance, many low income countries export mainly unprocessed commodities and aspire to a more diversified economic structure that includes a strong manufacturing sector which has been an important pillar of employment and innovation for many advanced economies. The question is thus whether diversification among unprocessed commodities, i.e. expanding the number of exported commodities, which might be easier to attain for many poor countries, is a predictor of manufacturing diversification.

Using data on 176 countries in the world, we find a close link between the diversification performances in resource diversification over the three previous years, and a strong manufacturing sector. And this strong correlation holds when we consider only African countries. Figures 1 and 3 illustrate the examples for 2010.

To check the consistency of this relationship, we employ a fixed-effect panel regression model, using data from 1992 to 2011. Four different measures of diversification in unprocessed commodities are used as explanatory variables for current diversification in finished goods. We then apply two specifications to the model: First, we consider the average levels of commodity diversification Div_raw over the three previous years (i.e. years t-3, t-2 and t-1) and the one-year lag level of commodity dependence Dep_raw, to avoid potential problems of endogeneity when using the current values. Second, we control for country-specific effects (α_c) to account for unobserved factors such as levels of skill availability, capacity and experience of the national firms. We include multiple dimensions for fixed effect such as geography, and income groups. For example being landlocked can affect the shipping costs.

$$\mathbf{NRCA\_finished_{c,t} = a_0 + \beta_1 Av3.Div\_raw_{c,t-1} + \beta_2 Dep\_raw_{c,t-1} + \delta X'_{c,t} + \theta_{size} Size'_{c,t} + \alpha_c FE'_c + \varepsilon_{c,t}} \quad \textbf{(Eq.2)}$$

where

- $Av3.Div\_raw_{c,t-1}$ represents the average level of diversification in raw materials over the 3-previous years, as described above,
- $Dep\_raw_{c,t-1}$ is a variable measuring the one-year lag values of dependence on raw materials, such as the share of raw material exports in GDP;
- $Size'_{c,t}$ is a set of variables that control for the size of an economy, here GDP and population size.
- FE'_c is a set of variables controlling for "country specific effects" such as landlockedness, and the world income groups or World regions, and
- $X_{c,t}$ is a vector of contextual variables that have been identified as important for growth and diversification in the literature, such as infrastructure quality, terms of trade shocks, private credit as % of GDP, and a measure of property rights. NRCA_$finished_{c,t}$ serves as dependent variable.

We tested first the "full country-fixed model" with a dummy for each country, but achieved stronger result when we specify the multiple FE'_c like the geographic characteristics and the country's income group.

Table 4 shows the results of our basic model.[9] It confirms some well-known facts in the literature about the effects of GDP, population, geography and income groups. For instance, the relationship between GDP and diversification among processed goods follows the inverted U found in the literature. Openness to trade, terms of trade shocks, population and landlocked status all have the expected signs and are significant.

Furthermore, the results confirm that the average performance of raw material diversification over the previous periods is a significant predictor of diversification among processed goods. $Cluster\text{RCA}_{raw}$ is the raw material diversification measure with the strongest correlation with diversification among finished products. Nline_{raw} has the weakest correlation and NRCA_{raw} is in between. It is worth reminding that the concept of revealed comparative advantage (RCA) is a stronger filter for the competitiveness of exports, than the pure number of export lines. Figure 2 shows the correlations between commodity and manufacturing diversification using Nline and ClusterNRCA.

Raw material dependence, on the other hand, has a significantly negative relationship with diversification among finished products. This negative relationship confirms the emerging consensus of the resource curse literature that dependence and not abundance of natural resources is the culprit.

[9] Similar results are found when using RCA in semi-processed products (NRCA_semi) as dependent variable (see Annex, Table A.2), or combining semi-processed and fully-processed groups ($\text{NRCA}_{manufactured}$).

Table 4. **Explaining exports diversification in manufactured products: Regression results using four different measures of diversification in commodities**

		Applying different concept of diversification in commodity exports			
	FE model (using **NRCA_*Raw***)	Filter= (***Nline_raw***)	Filter= (sign_raw)	Filter= (**NRCA_*Raw***)	Filter=(Cluster RCA_raw)
Diversif. in Raw(Av. performance over the 3-previous years)	**0.75**	**0.73**	**0.85**	**1.12**	**2.74**
	[0.25]***	[0.03]***	[0.04]***	[0.11]***	[0.07]***
Dependence (Raw exports / GDP)t-1	**-0.06**	**-0.71**	**-0.72**	**-0.82**	**-0.23**
	[0.04]	[0.14]***	[0.14]***	[0.15]***	[0.05]***
Control variables					
GDP per capita (constant PPP)	0	0.0015	0.0007	0.0024	0.0018
	[0]	[0.0004]***	[0.0004]*	[0.0004]***	[0.0003]***
GDPpercap^2	0	0	0	0	0
	[0]	[0.0000]***	[0.0000]***	[0.0000]***	[0.0000]***
Openness (Trade / GDP) t-1	0	0.06	0.07	0.12	-0.05
	[0]	[0.02]***	[0.02]***	[0.02]***	[0.02]**
ToT (D1) t-1	-0.03	-0.21	-0.21	-0.18	-0.1
	[0.01]***	[0.07]***	[0.07]***	[0.07]***	[0.03]***
Population size	0.16	0.07	0.06	0.11	0.04
	[0.09]*	[0.01]***	[0.01]***	[0.01]***	[0.00]***
Landlocked (versus Costal)		-8.65	-7.03	-13.86	-9.03
		[1.61]***	[1.63]***	[1.55]***	[1.36]***
Income groups (compared to the "High income OECD")					
Group = High income: non-OECD countries	..	-59.01	-47.25	-76.4	-14.72
		[5.50]***	[5.44]***	[5.62]***	[4.33]***
Group = Upper middle income countries	..	-62.23	-58.65	-78.67	-12.15
		[5.83]***	[5.70]***	[6.09]***	[4.47]***
Group = Lower middle income countries	..	-57.25	-55.49	-76.57	-4.34
		[7.17]***	[7.00]***	[7.40]***	[5.59]
Group = Low income countries	..	-65.45	-64.17	-90.14	-18.31
		[7.98]***	[7.79]***	[8.13]***	[6.24]***
Constant	42.14	61.98	80.62	97.37	17.71
	[6.50]***	[8.78]***	[8.39]***	[8.61]***	[6.80]***
Number of observations	2295	2295	2295	2295	2295
R2 Adjusted	0.08	0.68	0.69	0.63	0.8
Econometric methods	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*
Number of countries	176	176	176	176	176
Country specific effects	*Yes (FE)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*
Time effects	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*
Period	*1992-2011*	*1992-2011*	*1992-2011*	*1992-2011*	*1992-2011*

Note: The dependent variables are the measures of diversification in the header row. Controls include GDP per cap, GDP per cap squared, being landlocked, and countries' income groups. Standard errors of the coefficients are indicated in square brackets. * p<0.1; ** p<0.05; *** p<0.01. Note that the results are similar using other alternative country-specific effects models (like the areg or xtreg commands).

Figure 3. **Diversification among commodities "previews years" seems to be a good predictor of the current RCA among higher levels of processing – Illustration for 2007-10**

Figure 3a. Correlation using the number of significant export lines (Sign_raw)

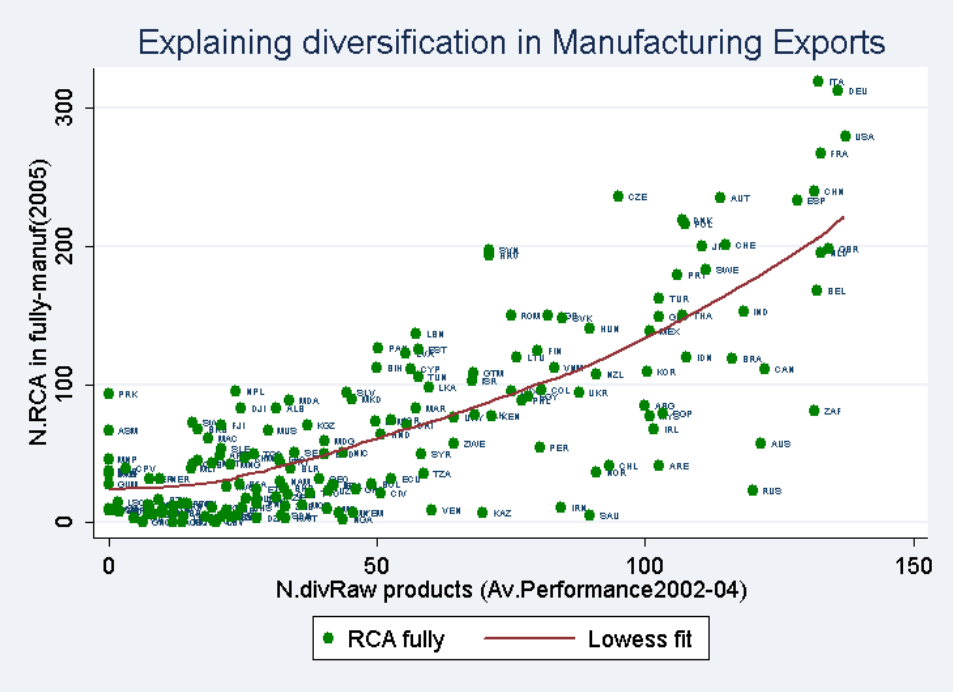
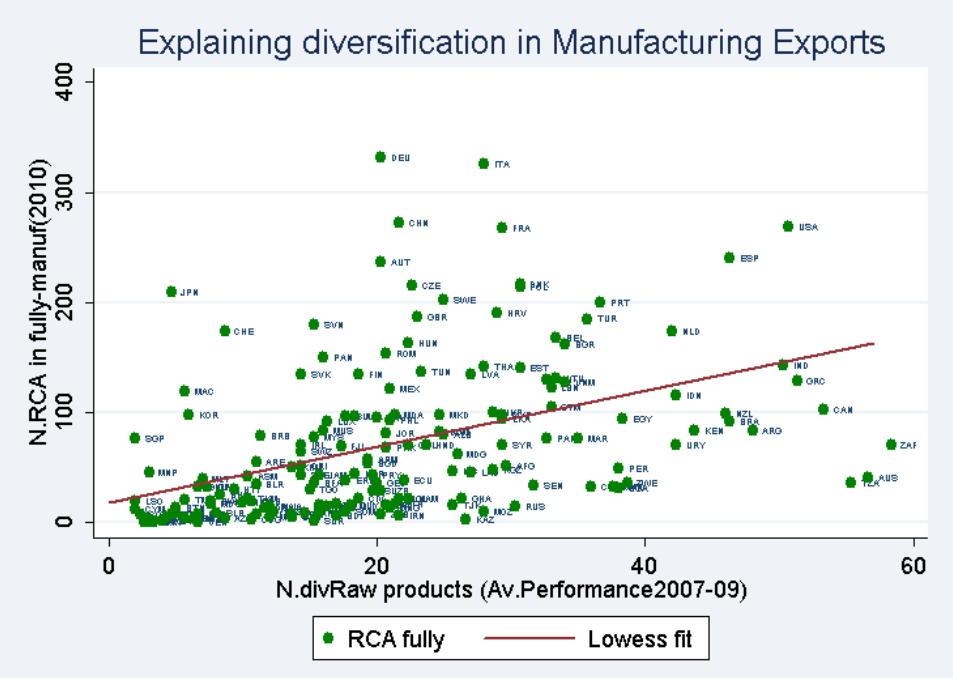


Figure 3b. Correlation using the concept of RCA (Balassa, 1965)



IV. ROBUSTNESS

This section checks the robustness of the findings through three methods. First, one might argue that the role of diversification among commodities in facilitating comparative advantage in higher manufacturing exports may work only for some specific country groups. We restrict the sample, for example dropping islands and small countries, or oil-exporters (Table 5) to confirm that our findings do not depend on sample selection.

Second, we test for three additional hypotheses on the standard errors to show that the findings are also robust to the specification of the regression model. Indeed, trade data may exhibit the same problems that can lead to some bias in standard errors estimated by pooled OLS/WLS or fixed-effects (within) regressions.

Heteroskedasticity: We may observe an unequal distribution of disturbances in the country-specific trade patterns over time (idiosyncratic heteroskedasticity).

Serial autocorrelation: The disturbances can also have a serial correlation over time if the current realisations of the dependent variable (RCA performance) are influenced by the past ones. Then this autocorrelation process (either autoregressive or moving average residuals) can produce cumulative bias when the time dimension expands.

Cross-panel correlation: The disturbances of a panel model are not necessarily independent across-cluster of countries (see Cameron and Trivedi [2005], p.702). In practice trade data are likely to exhibit complex patterns of mutual dependence between the cross-sectional units. For example countries in the same economic zone are interdependent, and a shock in China or in the Euro-zone boom may affect African countries. Moreover, the growing upstream and downstream interconnections in global value chains increase the interdependence of countries' competitiveness policies (OECD, 2013). Therefore country or state level data are likely to be spatially correlated. The fixed effect regression, per se, does not eliminate this bias on the standard errors.

For presentation purpose, we show results for these robustness checks only for one of the four diversification measures shown above. We can provide the other results upon request.

Table 5. **The link between commodities exports and the capacity to diversify across higher manufacturing levels: results by country groups**

	Results by country groups								
	(1) Excluding small islands	(2) Africa only	(3) High income: OECD	(4) High income: non-OECD	(5) Low income only	(6) Lower middle income	(7) Upper middle income	(8) Non-oil only	(9) Oil producing countries only (a)
Diversif. in Raw(Av. performance over the 3-previous years)	**0.91**	**1.31**	**0.15**	**3.71**	**0.67**	**1.76**	**1.21**	**1.74**	**0.95**
	[0.12]***	[0.09]***	[0.25]	[0.41]***	[0.08]***	[0.16]***	[0.13]***	[0.10]***	[0.24]***
Dependence (Raw exports / GDP)t-1	**-0.88**	**-0.37**	**-10.91**	**-0.82**	**-0.7**	**-0.46**	**-1.73**	**-0.97**	**-0.98**
	[0.17]***	[0.10]***	[0.99]***	[0.12]***	[0.06]***	[0.13]***	[0.14]***	[0.08]***	[0.34]***
GDP per capita (constant PPP)	0.003	0.008	0.007	-0.001	0.007	0.022	0.01	0.005	0.006
	[0.000]***	[0.001]***	[0.002]***	[0.001]*	[0.008]	[0.003]***	[0.002]***	[0.000]***	[0.001]***
GDPpercap^2	0	0	0	0	0	0	0	0	0
	[0]***	[0]***	[0]***	[0]	[0]	[0]***	[0]***	[0]***	[0]***
Openness(Trade / GDP) t-1	0.12	0.09	0.07	0.17	0.17	0.26	0.27	0.04	0.22
	[0.02]***	[0.03]***	[0.12]	[0.02]***	[0.04]***	[0.04]***	[0.04]***	[0.03]	[0.08]***
ToT (D1) t-1	-0.2	-0.09	0.87	0.04	-0.14	-0.21	-0.14	-0.14	-0.29
	[0.07]***	[0.04]**	[0.74]	[0.07]	[0.04]***	[0.09]**	[0.14]	[0.07]**	[0.14]**
Population size	0.11	-0.11	0.41	-0.02	0.21	0.1	0.19	0.25	0.13
	[0.01]***	[0.02]***	[0.05]***	[0.26]	[0.03]***	[0.01]***	[0.05]***	[0.03]***	[0.01]***
Constant	86.21	-9.95	40.36	10.36	-1.45	-43.05	-31.12	0.46	-3.4
	[8.97]***	[2.40]***	[33.32]	[15.12]	[5.29]	[6.04]***	[11.43]***	[3.42]	[9.64]
N	2,152	834	286	210	597	669	533	1,646	649
R2_A	0.64	0.61	0.51	0.58	0.42	0.74	0.46	0.59	0.55
Country specific effects	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography)*	*Yes (geography)*	*Yes (geography)*	*Yes (geography)*	*Yes (geography)*	*Yes (geography)*	*Yes (geography)*
Number of countries	162	52	27	20	39	49	41	128	48
Time effects	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*
Period	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011

(a) Countries with oil production equal or greater than 100 thousand barrels per day (Av. 2005-11).

Note: The dependent variable is the RCA in manufacturing exports (NRCA_finished). Each column filters for country groups (the header row). Standard errors of the coefficients are indicated in square brackets. Controls include GDP per cap, GDP per cap squared, the population size, time period (1992-96, 1997-01, 2002-06, 2007-11)... Country fixed effects (FE') are being landlocked, and countries' income groups. * p<0.1; ** p<0.05; *** p<0.01

Table 6. **The link between commodities exports and the capacity to diversify across higher manufacturing levels: robustness to the specification errors**

	Model (SE type =White)	Model (SE type = Newey-West)	Model (SE type = Driscoll/Kraay)	Model = GMM (1)
Diversif. in Raw(Av. performance over the 3-previous years)	**1.12**	**1.12**	**1.12**	**0.77**
	[0.11]***	[0.19]***	[0.07]***	[0.20]***
Dependence (Raw exports / GDP)t-1	**-0.82**	**-0.82**	**-0.77**	**-0.31**
	[0.15]***	[0.21]***	[0.16]***	[0.08]***
GDP per capita (constant PPP)	0	0	0	0
	[0]***	[0]***	[0]***	[0]***
GDPpercap^2	0	0	0	0
	[0]***	[0]***	[0]***	[0]***
Openness (Trade / GDP) t-1	0.12	0.12	0.09	-0.01
	[0.02]***	[0.03]***	[0.01]***	[0.18]
ToT (D1) t-1	-0.18	-0.18	-0.25	-0.24
	[0.07]***	[0.06]***	[0.06]***	[0.09]***
Population size	0.11	0.11	0.11	0.04
	[0.01]***	[0.01]***	[0.00]***	[0.13]
Constant	97.37	97.37	119.35	701.65
	[8.61]***	[15.48]***	[10.53]***	[132.74]***
N	2295	2295	2468	2305
R2_A or [R2]	0.63	-	[0.64]	-
SE specification type	*Heteros*	*Heteros + MA(3)*	*Heteros + MA(q) + Xpanel-dependence*	-
Country specific effects	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*
Period dummies	*Yes*	*Yes*	*Yes*	*Yes*
Number of countries	176	176	176	176
F_P	-	0.000	-	0.000
Ar1P	-	-	-	0.01
Ar2P	-	-	-	0.17
Period	1992-2011	1992-2011	1992-2011	1992-2011

Note: The dependent variable is the RCA in manufacturing exports (NRCA_finished). Each column filters for country groups (the header row). Standard errors of the coefficients are indicated in square brackets. Controls include GDP per cap, GDP per cap squared, the population size, time period (1992-96, 1997-01, 2002-06, 2007-11)... Country fixed effects (FE') are being landlocked, and countries' income groups. * p<0.1; ** p<0.05; *** p<0.01.

In STATA linear regression models the option vce(robust) produces consistent standard errors for panel data in the presence of heteroskedasticity (following White [1980]). The Newey–West (1987) model is an extension of White's estimator that fits the data when there is autocorrelation in addition to possible heteroskedasticity on the standard errors. The panel-corrected standard error model adjusts the standard errors appropriately when cross-sectional dependence is present (see Hoechle [2012]). The error structure is assumed to be heteroskedastic, autocorrelated up to some lag, and possibly correlated across panels (as described by Driscoll and Kraay [1998]). (xtscc).

(1) The GMM instruments = lag (1 to 3).Diversif. in Raw(Av.Performance over the 3-previous years), lag (1to3). Dependence (Raw exports / GDP).

The third robustness test controls for common determinants of export success in raw and manufactured products. The strong correlation between diversification in raw materials and in manufactured goods points to a set of common drivers that are behind both types of diversification. Indeed many of the factors that are required for successful exports, such as logistical capacity, a good business environment, networks in foreign markets and many others are necessary for exports of processed goods, as well as for the export of unprocessed commodities.

Table 7. **The link between commodities exports and the capacity to diversify across higher manufacturing levels: Controlling for common determinants of export success in raw and manufactured products**

	Property Rights (Eq.1)	Credit Size (Eq.2)	Business environment (Eq.3)	Electricity production (Eq.4)	Road density (Eq.5)	Quality of Infrastructure (Eq.6)
Diversif. in Raw(Av.Performance over the 3-previous years)	**1.35**	**0.76**	**0.94**	**1.27**	**1**	**0.76**
	[0.14]***	[0.09]***	[0.33]***	[0.09]***	[0.21]***	[0.17]***
Dependence (Raw exports / GDP)t-1	**-0.35**	**-0.77**	**-1.05**	**0**	**-2**	**-2**
	[0.05]***	[0.10]***	[0.23]***	[0]***	[0]***	[0]***
CPIA property rights(1=low to 6=high)	3.39					
	[1.52]**					
Domestic credit to private sector (% of GDP)		0.22				
		[0.04]***				
% of firms with major constraints in finance access			-0.53			
			[0.20]***			
% of firms using the TIC or telephone			0.413			
			[0.16]***			
Electricity production per capita				0.0009		
				[0.00]		
Road density (km per 100 sq. km of land area)					0.04	
					[0.02]**	
Quality of overall infrastructure, 1-7 (best)						19.5
						[1.88]***
Population size	0	0	0.02	0	0	0
	[0]***	[0]***	[0.10]	[0]**	[0]***	[0]***
Landlocked	-10.08	-20.97	-30.6	-8.8	-55.44	-29.52
	[2.05]***	[1.94]***	[5.64]***	[1.95]***	[3.86]***	[4.18]***
Constant	7.76	55.51	49.75	5.59	66.9	12.17
	[6.00]	[3.49]***	[16.83]***	[2.83]**	[7.46]***	[9.91]
R2	0.60	0.66	0.45	0.50	0.40	0.50
N	523	2036	136	441	741	741
Dummies	*Yes (World regions)*	*Yes (World regions)*	*No*	*No*	*No*	*No*
Dummy for each year	Yes	Yes	Yes	Yes	Yes	Yes
Period	2000-11	2000-11	2000-11	2000-11	2000-11	2000-11

Note: The dependent variable is the RCA in manufacturing exports (NRCA_finished). Each column reports the results of different basic determinants (the header row). Standard errors of the coefficients are indicated in square brackets. Controls include dummies for the world regions, the population size, and the time period. World region dummies are not reported in order to save space. * p<0.1; ** p<0.05; *** p<0.01

Table 6 shows the impacts of some of these variables on diversification on finished goods, taking diversification in raw commodities from previous periods into account. The results confirm the importance of these factors for diversification (i.e. property rights, credit size, quality of the business environment, electricity production, road density, quality of infrastructure). Yet they also point to a more universal relationship between commodity diversification and manufacturing diversification as the former remains an important variable in all specifications. Hausmann and Hidalgo's (2011) concept of productive capabilities that are embedded in a country's exports may explain the persistent importance of commodity diversification even when controlling for common determinants of export success.

V. CONCLUSION

This paper analyses how export diversification patterns of unprocessed, semi processed and finished goods correlate with each other. In addition to the measures commonly used to study diversification, this paper applies two new filters based on the concept of revealed comparative advantage following Balassa (1965). The RCA-based measures turn out to be stronger filters for the competitiveness of exports than the pure number of export lines.

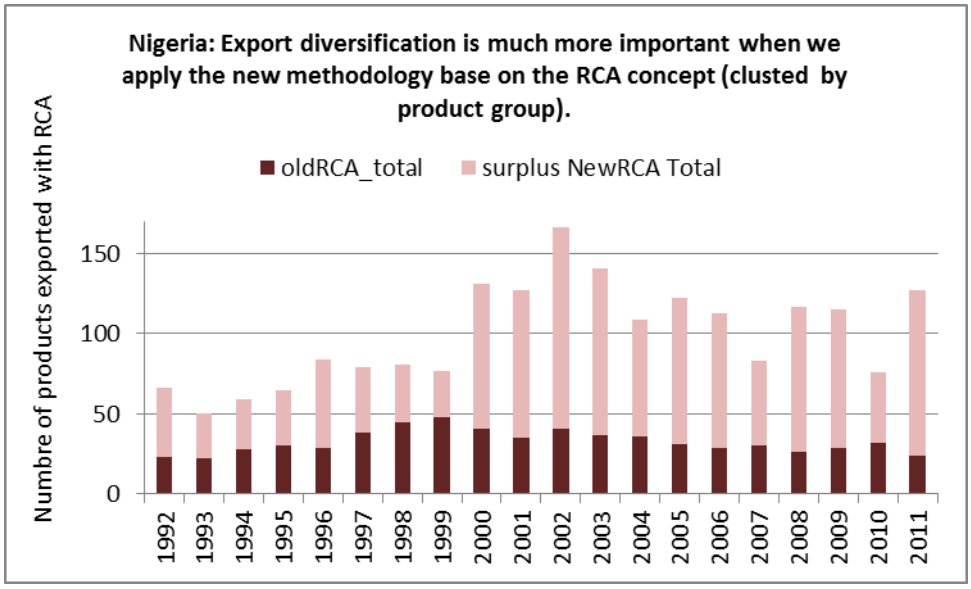
We find that there are similar patterns in the diversification of commodities and diversification of higher-order manufacturing. In particular, diversification in a large range of raw commodities is a strong predictor of an expansion in the number of RCA among intermediate goods and final goods. The relationship is stronger when using the RCA filters than using all export lines. This finding is robust to the inclusion of a range of controls accounting for size, geography and the business environment such as finance and infrastructure. Our result also suggests that discoveries in exports play an important role for long-term growth and this holds for all level of manufacturing content.

These results indicate that, first, there seems to be no trade-off between commodity diversification and diversification among goods with higher manufacturing intensity. The two processes seem to be covariant and mutually reinforcing trends in many growing countries. In particular, there is no evidence for a pattern of leaving behind commodity exports as a country moves into products with higher manufacturing content. To the contrary, growing countries continue to add new commodities to their exports basket until they reach high levels of GDP per capita.

Second, diversification based on the basic tenets of comparative advantage is a stronger predictor of development than pure diversification. For countries where commodities are reflective of comparative advantage, expanding the spectrum of commodities that are exported is likely to bring about an expansion of non-commodity exports, and boost their structural transformation. Well-known 'mechanisms' through which a diversified primary sector can help develop new productive capacities in sectors that are more intensive in manufacturing are: *i)* the concepts of nearby 'new' industries, which simplifies the redeployment of existing productive capabilities and knowledge , and *ii)* the importance of learning processes by the local actors and cumulative know-how.

ANNEX

Figure A.1. Comparing two methods of measuring export diversification: The example of Nigeria



Note: The results are based on the SITC-rev3 classification (4-digits)

Source: Authors' calculations based on UN COMTRADE (2013), via http://wits.worldbank.org/wits/.

Table A.1. **Export diversification in semi-processed products**

	Applying different filter to explain Export diversification in semi-processed products				Semi-processed + Fully processed products
	Filter = (***Nline_raw***)	Filter = (sign_raw)	Filter = (**NRCA_*Raw***)	Filter = (ClusterRCA_raw)	Filter = (NRCA_raw)
Diversif. in Raw(Av.Performance over the 3-previous years)	**0.51**	**0.58**	**1.04**	**1.26**	**2.16**
	[0.01]***	[0.01]***	[0.04]***	[0.03]***	[0.14]***
Dependence (Raw exports / GDP)t-1	**-0.17**	**-0.17**	**-0.2**	**0**	**-1.02**
	[0.04]***	[0.04]***	[0.04]***	[0.01]	[0.19]***
GDPpcap(cst PPP)	0	0	0	0	0
	[0]	[0]***	[0]***	[0]**	[0]***
GDPpcap^2	0	0	0	0	0
	[0]	[0]*	[0]***	[0]**	[0]***
Openess(Trade / GDP) t-1	-0.02	-0.02	0.03	-0.08	0.15
	[0.01]***	[0.01]***	[0.01]***	[0.01]***	[0.02]***
ToT (D1) t-1	-0.05	-0.05	-0.04	0.02	-0.22
	[0.02]**	[0.02]**	[0.02]**	[0.02]	[0.08]***
Population size	0.02	0.01	0.05	0.02	0.16
	[0.00]***	[0.00]***	[0.00]***	[0.00]***	[0.01]***
Landlocked==1	1.4	2.45	-1.49	-0.7	-15.34
	[0.60]**	[0.57]***	[0.56]***	[0.53]	[1.88]***
Constant	27.59	40.86	44.47	22.97	141.84
	[3.34]***	[3.35]***	[3.96]***	[3.53]***	[11.06]***
N	2295	2295	2295	2295	2295
R2_A	0.76	0.79	0.71	0.78	0.69
Econometric methods	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*	*Panel, with robust SE*
Number of Countries	176	176	176	176	176
Country specific effects	*Yes (FE)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*	*Yes (geography, and income group)*
Time effect	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*	*Yes (4 sub-periods)*
Period	1992-2011	1992-2011	1992-2011	1992-2011	1992-2011

Note: The dependent variable is the RCA in manufacturing exports (NRCA_semi). Each column uses a different measure of Diversification among commodities (the header row). Standard errors of the coefficients are indicated in square brackets. Controls include GDP per cap, GDP per cap squared, the population size, time period (1992-96, 1997-01, 2002-06, 2007-11).

Country fixed effects (FE') are being landlocked, and countries' income groups. Theses FE are not reported in order to save space.
* p<0.1; ** p<0.05; *** p<0.01

Table A.2. **Descriptive statistics about the SITC 4-digits data quality for each country or territory between 1992 and 2011**

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
AFG	Afghanistan	93.6	6.8	13	20
ALB	Albania	97.6	1.8	20	20
DZA	Algeria	83.7	6.4	1	20
ASM	American Samoa	97.5	2.1	12	12
AND	Andorra	95.1	4.3	17	20
AGO	Angola	98.9	0.8	20	20
AIA	Anguilla	91.7	7.4	14	20
ATG	Antigua	95.9	3.5	19	20
ARG	Argentina	96	2.8	20	20
ARM	Armenia	97.7	2.3	20	20
ABW	Aruba	46	42.8	7	20
AUS	Australia	97.2	1.1	20	20
AUT	Austria	93.1	2.9	17	20
AZE	Azerbaijan	85.6	10.2	7	20
BHS	Bahamas	77.2	20.2	8	20
BHR	Bahrain	71.2	13.3	3	20
BGD	Bangladesh	99.4	0.3	20	20
BRB	Barbados	88	15.3	13	20
BLR	Belarus	43.7	25	3	20
BEL	Belgium	89.3	2.4	5	13
BLZ	Belize	96.4	3	19	20
BEN	Benin	86	15.2	11	20
BMU	Bermuda	88.1	8.8	11	20
BTN	Bhutan	94.7	9.6	17	20
BOL	Bolivia	98.4	1.2	20	20
BIH	Bosnia and Herzegovina	96.7	2.7	19	20
BWA	Botswana	92	23.3	11	12
BRA	Brazil	96.8	1.3	20	20
IOT	British Indian Ocean Territory	92.6	8	14	20
VGB	British Virgin Islands	86.4	11.5	10	20
BRN	Brunei Darussalam	98.8	1.2	20	20
BGR	Bulgaria	89.7	4.5	6	20
BFA	Burkina Faso	99.2	0.9	20	20
BDI	Burundi	99.1	1.4	20	20
CPV	Cabo Verde	96.9	4.9	19	20
KHM	Cambodia	97.8	6.4	19	20
CMR	Cameroon	97.4	1.8	20	20
CAN	Canada	93.2	1.9	20	20

Table A.2. *cont.*

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
CYM	Cayman Islands	91.5	13.3	16	20
CAF	Central African Republic	99.3	1.6	20	20
TCD	Chad	96.5	4.7	19	20
CHL	Chile	98.6	0.8	20	20
CHN	China (People's Republic of)	98	1.8	20	20
CXR	Christmas Island	96.1	5	16	20
CCK	Cocos (Keeling) Islands	94.2	8.7	16	20
COL	Colombia	95	2.3	20	20
COM	Comoros	99.6	0.5	20	20
COG	Republic of the Congo	97.3	2.6	20	20
COK	Cook Islands	95.7	6.2	18	20
CRI	Costa Rica	98.4	0.8	20	20
CIV	Côte d'Ivoire	93.6	3.7	17	20
HRV	Croatia	94.7	2.5	20	20
CUB	Cuba	84	18.9	12	20
CYP	Cyprus[10]	91.7	7.2	15	20
CZE	Czech Republic	95.2	2.7	19	19
PRK	Democratic People's Republic of Korea	95.8	3.2	19	20
COD	Democratic Republic of the Congo	96.8	3.7	19	20
DNK	Denmark	93	3	17	20
DJI	Djibouti	88.8	10.5	10	20
DMA	Dominica	96.3	4.5	19	20
DOM	Dominican Republic	96.8	1	20	20
ECU	Ecuador	97.4	1.7	20	20
EGY	Egypt	88.1	7.2	10	20
SLV	El Salvador	96.8	2	20	20
GNQ	Equatorial Guinea	99.1	1.1	20	20
ERI	Eritrea	97.2	2.3	19	19
EST	Estonia	89.5	7.2	9	20
ETH	Ethiopia	98.6	0.9	19	19
FRO	Faroe Islands	98.3	0.5	20	20

[10] Note by Turkey:

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Table A.2. *cont.*

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
FJI	Fiji	95.5	2.9	19	20
FIN	Finland	93.2	3.9	16	20
MKD	Former Yugoslav Republic of Macedonia	93.4	5.7	13	19
FRA	France	94.5	1.6	20	20
GUF	French Guiana	94.3	1.2	4	4
PYF	French Polynesia	97	1.5	20	20
ATF	French Southern and Antarctic Lands	94.7	10.1	16	20
GAB	Gabon	99.2	0.6	20	20
GMB	Gambia	97.8	2.7	19	20
GEO	Georgia	84.6	9.5	6	20
DEU	Germany	96	1.6	20	20
GHA	Ghana	96.8	2.3	20	20
GIB	Gibraltar	83.3	19.8	7	20
GRC	Greece	91.1	7.2	10	20
GRL	Greenland	97.6	0.8	20	20
GRD	Grenada	92.8	13.9	18	20
GLP	Guadeloupe	97.6	1.4	4	4
GUM	Guam	57.5	22.3	2	12
GTM	Guatemala	98.6	0.6	20	20
GIN	Guinea	99.7	0.2	20	20
GNB	Guinea-Bissau	99.8	0.1	20	20
GUY	Guyana	99	0.5	20	20
HTI	Haiti	98	2.1	20	20
VAT	Holy See	86.7	18.1	7	12
HND	Honduras	98.2	1.2	20	20
HUN	Hungary	96	2.3	20	20
ISL	Iceland	98.3	1.2	20	20
IND	India	93.2	5.4	14	20
IDN	Indonesia	96.4	2.4	20	20
IRN	Iran	95.6	3.1	19	20
IRQ	Iraq	97.1	5.3	18	20
IRL	Ireland	97.1	3.3	20	20
ISR	Israel	95.4	2.1	20	20
ITA	Italy	94.8	2.3	20	20
JAM	Jamaica	96.7	1.4	20	20
JPN	Japan	96	2.3	20	20
JOR	Jordan	96.2	1.6	20	20
KAZ	Kazakhstan	91.8	3.5	14	20
KEN	Kenya	93.7	3.7	15	20
KIR	Kiribati	94.1	10	18	20

Table A.2. *cont.*

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
KOR	Korea	94.2	3.3	18	20
KWT	Kuwait	82.3	10.4	6	20
KGZ	Kyrgyzstan	98.2	2.8	19	20
LAO	Lao People's Democratic Republic	95.2	11.4	17	20
LVA	Latvia	80.5	10	6	20
LBN	Lebanon	96	2.4	19	20
LSO	Lesotho	99.7	0.3	12	12
LBR	Liberia	94.1	12.4	17	20
LBY	Libya	92.4	3.2	16	20
LTU	Lithuania	82.3	9.5	6	20
LUX	Luxembourg	92.7	1.9	12	13
MAC	Macau (China)	98.5	1.8	20	20
MDG	Madagascar	98.5	0.8	20	20
MWI	Malawi	99.7	0.3	20	20
MYS	Malaysia	94.8	4.6	15	20
MDV	Maldives	98.9	0.8	20	20
MLI	Mali	97.4	4.3	18	20
MLT	Malta	88.4	12.3	14	20
MHL	Marshall Islands	86.7	17	11	20
MTQ	Martinique	96.7	4.9	3	4
MRT	Mauritania	99.7	0.3	20	20
MUS	Mauritius	99.3	0.5	20	20
MEX	Mexico	95.3	1.4	20	20
FSM	Micronesia	96.7	4.4	19	20
MDA	Moldova	95	4.3	17	20
MNG	Mongolia	99.6	0.4	20	20
MAR	Morocco	97.2	1.7	20	20
MOZ	Mozambique	94.3	5.9	15	20
MMR	Myanmar	99.6	0.3	20	20
NAM	Namibia	94.6	11.3	11	12
NRU	Nauru	98.1	4.4	19	20
NPL	Nepal	99.2	0.3	20	20
NLD	Netherlands	88.9	5.3	10	20
NCL	New Caledonia	98.8	1.4	20	20
NZL	New Zealand	97.6	0.8	20	20
NIC	Nicaragua	98.5	1.2	20	20
NER	Niger	90.2	11.5	14	20
NGA	Nigeria	98.1	1.3	20	20
NIU	Niue	98.5	2.6	20	20
NFK	Norfolk Island	97.5	4.1	19	20

Table A.2. *cont.*

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
MNP	Northern Mariana Islands	85.2	22.2	15	20
NOR	Norway	90.8	5.8	12	20
OMN	Oman	97.6	1.3	20	20
PAK	Pakistan	97.4	2.2	20	20
PLW	Palau	98.2	1.7	20	20
PAN	Panama	93.2	4.3	16	20
PNG	Papua New Guinea	98.6	1.6	20	20
PRY	Paraguay	99	1.1	20	20
PER	Peru	96.7	2.1	20	20
PHL	Philippines	97.7	1	20	20
PCN	Pitcairn	95.5	10.4	18	20
POL	Poland	96.3	2.3	20	20
PRT	Portugal	96.2	4.6	20	20
QAT	Qatar	95.9	2.2	20	20
REU	Réunion	98.4	1.7	4	4
ROU	Romania	91.8	3.4	14	20
RUS	Russia	83.5	6.4	4	20
RWA	Rwanda	97.7	2.7	20	20
SHN	Saint Helena	97.7	3.1	19	20
KNA	Saint Kitts and Nevis	94.5	3.1	16	20
LCA	Saint Lucia	85.7	18.4	13	20
SPM	Saint Pierre and Miquelon	92.4	14	16	20
VCT	Saint Vincent and the Grenadines	99.1	0.9	20	20
WSM	Samoa	83.9	27.6	15	20
SMR	San Marino	96.9	7.5	11	12
STP	Sao Tome and Principe	94.8	10.5	18	20
SAU	Saudi Arabia	94	2.6	20	20
SEN	Senegal	91.2	8.2	15	20
SYC	Seychelles	96.4	2.4	19	20
SLE	Sierra Leone	98.2	1.8	20	20
SGP	Singapore	85.8	10.4	8	20
SVK	Slovak Republic	90.4	3.2	9	19
SVN	Slovenia	97.3	2.5	20	20
SLB	Solomon Islands	99.3	1.4	20	20
SOM	Somalia	97.4	3.4	19	20
ZAF	South Africa	94.3	3	19	20
ESP	Spain	95	2	19	20
LKA	Sri Lanka	98.8	0.7	20	20
SDN	Sudan	99	0.6	20	20
SUR	Suriname	96.7	3.2	19	20

Table A.2. *cont.*

ISO3 code	Name of country or territory	% of total exports specified at the SITC 4-digits level (Average 1992-2011)	Standard deviation (sd)	N years with at least 90% of total exports specified	N years available
SWZ	Swaziland	98.4	1.9	12	12
SWE	Sweden	93.4	3.3	16	20
CHE	Switzerland	95.7	2	20	20
SYR	Syrian Arab Republic	92.5	4.2	13	20
TJK	Tajikistan	98	4.3	19	20
TZA	Tanzania	96.8	2	20	20
THA	Thailand	96.1	2.2	20	20
TLS	Timor-Leste	95.5	11.6	18	20
TGO	Togo	89.5	9.6	12	20
TKL	Tokelau	85.5	15.8	12	20
TON	Tonga	88.7	4	6	20
TTO	Trinidad and Tobago	85.7	9.4	8	20
TUN	Tunisia	97.5	1.5	20	20
TUR	Turkey	95.2	1.8	20	20
TKM	Turkmenistan	85.2	11.8	9	20
TCA	Turks and Caicos Islands	88.7	8.9	11	20
TUV	Tuvalu	98.2	2.5	20	20
UGA	Uganda	98.4	1.5	20	20
UKR	Ukraine	87.3	5.1	5	20
ARE	United Arab Emirates	91.7	4.7	10	20
GBR	United Kingdom	92.5	3.1	15	20
USA	United States	95.4	2.5	20	20
UNS	Unspecified	48.2	14.4	0	20
URY	Uruguay	98.2	1.3	20	20
UZB	Uzbekistan	92.6	5.5	14	20
VUT	Vanuatu	96	13.1	18	20
VEN	Venezuela	87.8	8.7	8	20
VNM	Viet Nam	99	0.6	20	20
WLF	Wallis and Futuna	92	17	17	20
ESH	Western Sahara	97.7	8.4	19	20
World	World	94.4	2.2	20	20
YEM	Yemen	95.5	2.4	19	20
ZMB	Zambia	97.1	2.6	19	20
ZWE	Zimbabwe	98.8	0.5	20	20

Source: Authors' calculations based on UN COMTRADE database (2013), via http://wits.worldbank.org/wits/.

REFERENCES

AfDB, OECD, UNDP and UNECA (2013), *African Economic Outlook 2013*, OECD Publishing, Paris, http://dx.doi.org/10.1787/aeo-2013-en.

AUTY, R. (1990), *Resource-Based Industrialization: Sowing the Oil in Eight Developing Countries*, Oxford University Press, New York.

BELTRAMELLO, A., K. DE BACKER and L. MOUSSIEGT (2012), "The Export Performance of Countries within Global Value Chains (GVCs)", *OECD Science, Technology and Industry Working Papers*, 2012/02, OECD Publishing, http://dx.doi.org/10.1787/5k9bh3gv6647-en.

BRUNNSCHWEILER, C.N. and E.H. BULTE (2008), "Natural resources and violent conflict: Resource abundance, dependence, and the onset of civil wars", *Oxford Economic Papers*, Vol. 61/4, Oxford University Press, pp. 651-674.

CADOT O., C. CARRÈRE and V. STRAUSS-KAHN (2011), "Export diversification: what's behind the hump?" *Review of Economics and Statistics*, Vol. 93/2, pp. 590-605.

CAMERON, A. C., and P. K. TRIVEDI (2005), *Microeconometrics: Methods and Applications*,.Cambridge University Press.

DRISCOLL, J. C., and A. C. KRAAY (1998), "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data", *Review of Economics and Statistics* 80: 549–560.

EASTERLY W. and A. RESHEF (2010), "African exports successes: surprises, stylized facts and explanations", *NBER Working paper* 16597, www.nber.org/papers/w16597.

GELB, A. (1988), *Oil Windfalls: Blessing or Curse?*, World Bank Research Publication, Oxford University Press, New York.

GYLFASON, T. (2007), "The international economics of natural resources and growth", *CESifo Working Paper Series*, No. 1994, CESifo Group Munich.

HAUSMANN, R., C. HIDALGO et al. (2011), "*The Atlas of Economic Complexity – Mapping Paths to Prosperity*", Puritan Books, New Hampshire.

HIDALGO, C. (2011), "Discovering Southern and East Africa's industrial opportunities", *German Marshall Fund Economic Policy Paper Series.*

HIDALGO, C. A.; B. KLINGER; A. L. BARABASI and R. HAUSMANN, 2007, "The product space conditions the development of nations", *Science*, 317(5837), 482-87.

HOECHLE ,D. (2007), "Robust standard errors for panel regressions with cross-sectional dependence", *The Stata Journal*, pp. 281-312, www.stata-journal.com/sjpdf.html?articlenum=st0128.

IMBS, J. and R. WACZIARG (2003), "Stages of diversification", *The American Economic Review*, Vol. 93/1 the American Economic Association, Pittsburgh , pp. 63-68.

KLINGER, B. and D. LEDERMAN (2004), "Discovery and Development: An Empirical Exploration of 'New' Products"; *World Bank Policy Research Working Paper* No. 3450.

KLINGER, B. and D. LEDERMAN (2006), "Diversification, Innovation, and Imitation inside the Global Technological Frontier", *World Bank Policy Research Working Paper* 3872.

LIN, J.Y. (2012), *New Structural Economics: a Framework for Rethinking Development and Policy*, World Bank, Washington DC.

MCMILLAN, M.S. and D. RODRIK (2011), "Globalization, structural change and productivity growth", *NBER Working Paper* No. 17143, www.nber.org/papers/w17143.

NEARY, J., and S. VAN WIJNBERGEN (1986), *Natural resources and the macroeconomy*, Centre for Economic Policy Research/ Blackwell, Oxford, UK, 1986, 352 pp.

NEWEY,W. K., and K. D.WEST, (1987), "A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix", *Econometrica* 55: 703–708.

OECD (2013), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris http://dx.doi.org/10.1787/9789264189560-en.

ROGERS, W. H. (1993),"Regression standard errors in clustered samples", *Stata Technical Bulletin* 13: 19-23, College Station, TX: Stata Press.

RODRIK, D. (2011), "Unconditional convergence", *NBER Working Paper* 17546, National Bureau of Economic Research.

SACHS, J. and A. WARNER (1999), "The Big Rush, Natural Resource Booms And Growth", *Journal of Development Economics* 59: 43-76.

STIJNS, J.-P.C., (2005), "Natural resource abundance and economic growth revisited", *Resources Policy*, Vol. 30/2, Elsevier, Amsterdam, pp. 107-130.

UN COMTRADE (2013), *UN Comtrade Database,* via https://wits.worldbank.org.

VAN DER PLOEG, F. and S. POELHEKKE (2010), "The pungent smell of 'red herrings': Subsoil assets, rents, volatility and the resource curse**",** *OxCarre Research Paper* No. 33, Oxford Centre for the Analysis of Resource Rich Economies, Oxford.

VAN DER PLOEG, F. (2010), "Natural resources: Curse or blessing", *CESifo Working Paper* No. 3125, CESifo Group, Munich.

ZHU, S., N. YAMANO and A. CIMPER (2011), "Compilation of Bilateral Trade Database by Industry and End-Use Category", *OECD Science, Technology and Industry Working Papers*, 2011/06, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k9h6vx2z07f-en.

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