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What drives export diversification? New evidence from a panel of developing countries

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Abstract

This paper examines the role of domestic production structure, natural resource endowments and infrastructure availability in export diversification and concentration in developing countries, with an emphasis on the least developed countries. The results suggest that diversifying the production structure of an economy and providing better access to infrastructure and services are essential for promoting export diversification. They also suggest that natural resource endowments contribute to export concentration in developing countries. These findings are particularly important for least developed countries and Africa, which are in general endowed with natural resources, have high export concentration, and where weaknesses in trade performance reflect weaknesses in domestic production structure and infrastructural constraints.

Key words: Exports diversification; trade policy; trade openness; structural economic transformation; SSA
JEL classification numbers: C33, F63, O19, O55

Contents

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1. Introduction

The new conventional wisdom in the development literature is that poor developing countries should trans their production and export structures to achieve sustained growth and poverty reduction (UNIDO, 2015; Weiss, 2017). The Sustainable Development Goals (SDGs), the Istanbul Programme of Action for the Least Developed Countries (LDCs), and the African Union's Agenda 2063 emphasize the importance of export diversification and structural transformation in achieving national development objectives (United Nations, 2011 and 2015; AUC, 2015). Given the crucial role that diversification is expected to play in transforming economies and achie goals expounded in national, regional and global development initiatives, it is necessary to examine the determinants of export diversification in developing countries, particularly those in Africa and LDCs. While many papers have been written on the subject, existing studies do not account simultaneously for the role of energy infrastructure and services, weak domestic production structure, and natural resource endowmen the diversification process. This is an important limitation, particularly in the case of African countries LDCs, because poor energy services have been identified as binding constraints to production and export in these groups of countries. For example, Osakwe (2018) suggests that poor energy infrastructure has a negative impact on industrialization and growth in Nigeria because it reduces capacity utilization rates, makes dom firms less competitive, and discourages banks and finance houses from lending to local manufacturing fir Similar energy infrastructure challenges are faced in other African countries and LDCs (UNECA, 2017). regard to domestic production structure, there are indications that weaknesses in export performance in LDCs are associated with weaknesses in industrial performance (United Nations, 2016). In particular, countries t have weak domestic production structures, as reflected in weak industrial capacity, generally lack the capability to produce varieties of goods and services and so have weak trade performance. In this con there is the need to incorporate the roles of poor energy infrastructure and services and a weak dome production structure in studies on the determinants of diversification in Africa and LDCs. There is also the nee to take into account the role of natural resource endowments given the fact that many countries in Africa LDCs are resource-rich and the economic literature suggests that resource endowments play a role in the growth and diversification process of developing countries (Sachs and Warner, 1995; Wood and Berge, 19

This paper attempts to fill the existing gap in the literature. It uses a large sample of developing countries and different regression techniques to analyse the role of various factors on export diversification in developing countries, particularly those in Africa and LDCs.[1] Two measures or indicators of export diversification are used in the study: the number of export lines and the Relative Theil index (widely used to capture export concentration).[2] With regards to explanatory variables, six blocks of independent variables are used in the paper: (i) a measure of domestic production structure and industrial performance by the share of manufacturing value added in gross domestic product (GDP); (ii) a measure of natural resource endowments (captured by the ratio of mineral rents to GDP); (iii) indicators of infrastructure, namely energy consumption and the number of telephone line subscriptions, (iv) financial depth, (v) market size, and (vi) openness to trade and foreign direct investment (FDI) inflows.

The results of the regression analyses show that domestic production structure is a determinant of export specialisation patterns in developing countries. In particular, an increase in the share of manufacturing value added in GDP is positively associated with export diversification, while the share of mineral rents in GDP results in a more concentrated export structure. Infrastructure, both physical and information technology-related, as well as financial depth and openness to trade, also foster export diversity. However, mixed results are obtained about the effect of FDI. In some estimations, FDI inflows appear to have a positive effect on export diversity while in other cases it has a negative effect. This may capture the fact that in

[1] See section 3 for a detailed description of the empirical strategy.

[2] It should be noted that export concentration is the opposite of export diversification.

developing countries in Africa and LDCs, most FDI goes to specific industries (mining) and more generally the extractive sector of an economy.

The present study is a complementary addition to the growing literature on the determinants of exp diversification. Cadot, Carrère and Strauss-Kahn (2011a, hereafter CCSK) find an inverted-U-shaped relationship between export diversification and the level of income[3] – in other words, the number of a country's export products increases with its income up to a threshold (the "diversification cone") beyond which it decreases to reflect the country's comparative advantage (the "reconcentration"[4]). In a subsequent study, CCSK (2011b) shed light on other drivers of export diversification. Using OLS and negative binomial estimations, they s that FDI and remoteness to main trading partners contribute to export concentration. Conversely, market s infrastructure, human capital, good institutions and preferential trade agreements favour export diversificati[5]. Based on a system GMM (generalised method of moments) estimation, Agosin, Alvarez-Cuadrado and Bravo (2012, hereafter AABO) use different indices of export concentration and find that openness to trade indu export specialisation, while higher schooling or education contributes to export diversification. As in CC (2011b), they also find that the higher the distance to main trading partners the more specialised is the ex structure.

The key contribution of this paper to the extant literature is that it incorporates simultaneously the r domestic production structure, natural resource endowments, and energy infrastructure and services in ex diversification in developing countries. The incorporation of measures of domestic production structure energy infrastructure captures the well-known idea that poor energy services and weak domestic production structures are binding constraints to exports, diversification and development in Africa and LDCs. T incorporation of natural resource endowments is justified because many countries in Africa and LDCs resource-rich and economic theory suggests that resource endowments play a role in the diversificatio process. The rest of the paper is organized as follows. Section 2 describes the data while Section 3 presents the empirical strategy and the regression analyses. Section 4 contains concluding remarks and policy implications.

2. Data description and analyses

Two indicators of a country's export structure are used in the empirical estimation: a count variable that g the number of goods a country exports in each year as in CCSK (2011 a. & b.); and the relative Theil index used by Parteka (2010), Parteka and Tamberi (2013a & b) and Basile, Parteka and Pittiglio (2017). Par (2010) argues that the relative Theil (Theil) index is a preferred measure over the absolute Theil (Theil) index because the latter describes the degree of export concentration with no comparison to world trends, while former measures the specialisation of a given country's export structure in the comparison with[6] the world. In the empirical analyses, the word "diversification" would be used to refer to the count variable an "concentration" to the relative Theil index. In principle, both notions should convey similar qualitati information since an increase in diversification corresponds to a decrease in concentration. To build these indicators, we rely on the BACI2002 disaggregated trade data provided by CEPII (Centre d'Etudes Prospectives

[3] They use similar indicators of export structure: the Theil entropy index and the number of export lines at the 6-digit level of Harmonized System classification (HS6). For Parteka (2010), the hump shape is due to the omission of cross-country heterogeneity; the hump shape disappears once she introduces fixed effects.

[4] Mau (2016) provides new evidence that casts doubt on the reconcentration process using the system GMM with data on manufacturing goods.

[5] Parteka and Tamberi (2013) find similar results about the effects of market size and remoteness on manufacturing export diversification, using the relative Theil entropy index in an instrumental variable – two stage least square (IV-2SLS) estimation with SITC Rev.2 3 digit manufacturing data.

[6] The term "world" refers to the set of economies included in the dataset.

et d'Informations Internationales).[7] The dataset distinguishes 5,219 products at the HS6 level and encompasses 145 developing countries over the years 2003–2015 in an unbalanced panel due to irregular reporting from several developing countries.[8] The following explanatory variables where used in the regression analyses:[9]

- Manufacture/GDP: is the manufacturing value added as a share of GDP. This variable is a proxy for the extent of diversification of a country's production structure.
- Mineral rents/GDP: corresponds to the share of mineral rents in GDP. It captures the role of natural resource endowments and also the extent to which a country has a diversified production structure.
- ln(energy use): is energy use per capita in a given country in logarithm. It captures the role of energy and, more generally, infrastructure in the diversification process.
- ln(fixed telephones): refers to the number of fixed telephone subscriptions in logarithm. It is widely used in the economic literature as a measure of the state of infrastructure.
- Credit/GDP: corresponds to the share of financial resources given to the private sector by financial corporations (domestic credit) in GDP. This indicator measures financial development.
- ln(population): is the logarithm of a country's population. It is a proxy for the size of the economy.
- Openness: is a traditional indicator of openness to trade. It is computed as the sum of exports and imports of goods and services as a share of GDP.
- FDI/GDP: Inflows is net inflow of foreign direct investment as a share of GDP. It captures the impact of foreign capital flows or technology transfer.

Data on all explanatory variables are taken from the World Development Indicators database. Table 1 presents the summary statistics. In the table, Rents (Total) is the "concentration" variable and Number of products is the "diversification" variable. Their logarithms are also reported as ln(Rents) and ln(Number of products) respectively. ln(Number of products)> 10k corresponds to the "diversification" variable for which a threshold of US$10,000 is imposed for a given product to be counted. The imposition of a threshold follows Mau (2016) and provides a robustness check in the regression analysis.

[7] BACI is the World trade database built by the CEPII from the COMTRADE database (United Nations Statistical Division). It is developed through an original procedure that reconciles the declarations of the exporter and the importer.

[8] The list of countries included in the dataset is presented in Table 7.

[9] Following CCSK (2011 a.), most studies include the logarithm of GDP per capita (PPP) as a measure of income in the regression. We do not follow this practice, because of high correlation between this variable and ln(fixed telephones).

Table 1. Summary statistics

		(1)	(2)	(3)	(4)	(5)
VARIABLES		mean	sd	min	max	observations
RelTheil	overall	3.531	1.753	0.422	9.901	N = 1,851
	between		0.619	3.424	3.657	n = 13
	within		1.752	0.362	9.932	T-bar = 142.39
Number of products	overall	1,629	1,451	29	5,182	N = 1,851
	between		79.38	1419.96	1711.87	n = 13
	within		1448.55	-22.46	5359.45	T-bar = 142.39
lnRelTheil	overall	1.123	0.554	-0.862	2.293	N = 1,851
	between		0.021	1.0889	1.163	n = 13
	within		0.553	-0.902	2.306	T-bar = 142.38
ln(number of products)	overall	6.879	1.138	3.367	8.553	N = 1,851
	between		0.104	6.589	6.955	n = 13
	within		1.134	3.299	8.837	T-bar = 142.39
ln(number products >10k	overall	6.399	1.370	2.398	8.546	N = 1,851
	between		0.126	6.066	6.498	n = 13
	within		1.365	2.316	8.871	T-bar = 142.38
ln(population)	overall	15.17	2.488	9.187	21.04	N = 1,847
	between		0.061	15.072	15.27	n = 13
	within		2.487	9.177	21.08	T-bar = 142.08
ln(energy use)	overall	6.811	1.105	4.030	9.997	N = 1,090
	between		0.288	6.609	7.732	n = 13
	within		1.094	3.927	10.199	T-bar = 83.85
ln(fixed telephones)	overall	12.30	2.426	5.011	19.72	N = 1,790
	between		0.116	12.068	12.50	n = 13
	within		2.424	4.951	19.80	T-bar = 137.69
Credit/GDP	overall	0.368	0.308	0.00559	2.332	N = 1,571
	between		0.048	0.305	0.454	n = 13
	within		0.305	-0.060	2.275	T-bar = 120.85
Openness	overall	0.896	0.538	0.00167	4.426	N = 1,632
	between		0.035	0.832	0.945	n = 13
	within		0.537	-0.047	4.416	T-bar = 125.54
Mineral rents/GDP	overall	0.0185	0.0511	0	0.446	N = 1,715
	between		0.007	0.005	0.029	n = 13
	within		0.051	-0.011	0.445	T-bar = 131.92
FDI/GDP inflows	overall	0.0544	0.136	-0.299	4.666	N = 1,685
	between		0.014	0.035	0.092	n = 13
	within		0.135	-0.290	4.628	T-bar = 129.62
Manufacture/GDP	overall	0.117	0.0693	0.00237	0.325	N = 1,420
	between		0.006	0.110	0.130	n = 13
	within		0.069	-0.003	0.323	T-bar = 109.23

The empirical analysis starts with an examination of the correlations between the explanatory variables and the two measures of export concentration and diversification. Since we have two indicators of diversification/concentration, we present two figures (one for each indicator). Note that each figure has eight graphs (numbered from A to H); each one portrays the relationship between export diversification (measured by the number of exported products) and one explanatory variable. Scatter plots describe correlations between the variables, while curves depict a parametric regression of the export diversification measure on each independent variable.[10] In all graphs, a "small blue x" represents a least developed country (LDC), whereas a "hollow grey circle" represents a non-LDC country. It is interesting to note that in contrast to LDCs, the non-LDCs' scatter plots are more spread out across all the graphs (in fact, some hollow grey circles are hidden by the blue "x"s).

Figure 1 presents the correlations between our explanatory variables and export diversification measured by the number of exported products. Except for the variables Mineral rents/GDP and FDI/GDP inflows, all other variables display a positive relationship with the number of exported products. With regard to the proxies for economic structure, it turns out that the higher the industrial base, measured by the ratio of manufactures to GDP (Manufacture/GDP), the higher the number of products exported by a country (Figure 1.A). As a matter of fact, the great majority of LDCs have a Manufacture/GDP ratio smaller than 0.20 and export less than 200 goods between 2003 and 2015. Conversely, many of their non-LDC counterparts export two times more than LDCs over the same period. Interestingly, the ratio of mineral rents to GDP (Mineral rents/GDP) is negatively associated with the number of exported products (Figure 1.B). On the one hand, most countries exporting more than 300 products have a mineral rents' share of GDP smaller than 0.10. On the other hand, countries with a Mineral rents/GDP above 0.40 export less than 100 goods. This suggests that economies that are endowed with natural resources and depend heavily on mineral rents export a small number of products.

[10] These figures are obtained with the Stata command "lfit" on pooled data. Subject to data availability, the sample includes 112 to all 145 countries. R^2 are reported for each graph.

Figure 1.Number of exported products (In) and each of the explanatory variables, 2003-2015