Measures of export diversification

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How export patterns vary across time and countries has become a subject of intense descriptive analysis in recent years. The originality of our work is to compute usual diversification indices using a very large and disaggregated dataset on exports. Export data is from UNCTAD's COMTRADE database at the HS6 level (4'991 lines).

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The baseline sample covers 156 countries representing all regions and all levels of development between 1988 and 2006 (19 years), including 141 developing countries (i.e. non high-income countries, defined by the World Bank as countries with 2006 per-capita GDPs under $16'000 in constant 2005 PPP international dollars). Taking out missing year data the usable sample has 2'797 observations (country-years).

Several measures of export concentration/diversification (diversification being the complement to 1 of concentration) for each country and year are computed: Herfindahl concentration indices, Theil and Gini indices of inequality in export shares.

The Herfindahl index, normalized to range between zero and one, is

$$H^* = \frac{\sum_k (s_k)^2 - 1/n}{1 - 1/n} \quad \text{where} \quad s_k = x_k / \sum_{k=1}^{n} x_k$$

s_k being the share of export line k (with amount exported x_k) in total exports and n is the number of export lines (omitting country and time subscripts).

The following formula for the Gini index is used:

$$G = 1 - \sum_{k=1}^{n} (X_k - X_{k-1})/n \quad \text{where} \quad X_k = \sum_{l=1}^{k} s_l$$

X_k representing the cumulative export shares.

Theil's entropy index (Theil 1972) is given by:

$$T = \frac{1}{n} \sum_{k=1}^{n} \frac{x_k}{\mu} \ln \left(\frac{x_k}{\mu} \right) \quad \text{where} \quad \mu = \frac{1}{n} \sum_{k=1}^{n} x_k$$

Observe that Gini indices are very high. The reason has to do with the level of disaggregation: we use a very disaggregated trade nomenclature. At that level we have a large number of product lines with small trade values, while a relatively limited number of them account for the bulk of all countries' trade (especially so of course for developing countries but even for industrial ones).

Using the different diversification measures, both the existence of a turning point in export concentration and its location around a GDP per capita of about $22'000-27'000 at PPP in constant 2005 international dollars —a very late point in the development process— are fairly robust.

The following Figure depicts the "Gini" curve, which is fitted using quadratic polynomial regressions of the Gini index on per-capita GDP. The curve is convex and decreasing at the origin, but increasing after the turning point, showing diversification and subsequent re-concentration processes.
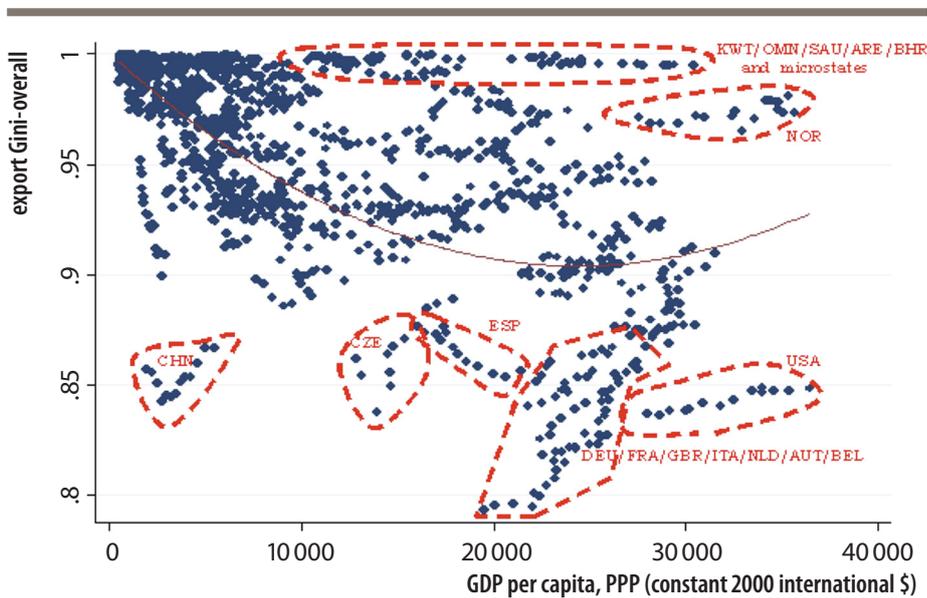
Gini coefficients and GDP per capita, whole sample

The method has been presented in details in:
- **Olivier Cadot**, **Céline Carrère**, **Vanessa Strauss-Kahn** (2009) Export Diversification: What's behind the Hump? *Études et Documents* 2009.34, CERDI (CNRS-Université d'Auvergne)

In the case you use the data, recommended quotation is:
- **Olivier Cadot**, **Céline Carrère**, **Vanessa Strauss-Kahn** (2009), Measures of export diversification, Available on Ferdi website www.ferdi.fr

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