Export Concentration in Oil-Producing Economies: An Empirical Analysis of a Large Panel

Samppa Rikkilä

Faculty of Economics and Business Studies, Universitat Autònoma de Barcelona

UAB
Universitat Autònoma de Barcelona

1. Introduction

- The low carbon transition threatens the future economic development of some heavily concentrated oil exporters.
- While the general pace of this transition is unknown, **EU is aiming become the first climate-neutral continent by the year 2050 while other countries are expected to follow (European Commission, 2018).**

2. Motivation

- Based on the evidence provided by some authors (e.g., Ross, 2019) the biggest oil-producing countries are some of the most concentrated economies in the world.
- **Is this problem extended to all oil-producing economies in general?**

3. Literature Review

3.1 Previous Methods

- The previous empirical literature was reviewed in order to obtain a clear view on how export concentration had been studied in the past.

3.2 Variables

- Emphasis was put on identifying variables that had been proven to be statistically important in the previous research, in order to include them in this study.

4. Methodology

- A fixed-effects model is estimated in order study whether oil-producing countries have relatively more concentrated exports than other countries.
- Two different approaches are used in order to capture the effect of oil production on export concentration:
  1. **In the first approach, a dummy variable is assigned to countries whose oil production per capita value exceeds $300 dollars in a given year.**
  2. **The second approach uses oil rents as the independent variable, and is used to verify the results obtained in the first approach.**
- To check for the robustness of the findings, the models are estimated using two different indexes of export concentration:
  1. **Herfindahl-Hirschmann**
  2. **Theil**

5. The Data

- The data was combined from different databases.
- Mutual inclusiveness of countries was used as the main criterion: **countries that were not included in all individual data sets were discarded from the analysis.**
- The combined data set is an unbalanced panel that consists from 154 countries, and ranges from 1995 to 2014.

Table 1: Summary statistics.

Statistic	N	Mean	St. Dev.	Min	Max
THEIL	3,029	3.352	1.223	1.174	6.417
HHI	3,077	0.322	0.213	0.045	0.983
ICRG	2,515	0.564	0.203	0.139	1.000
Tele	3,077	18.424	18.887	0.000	74.988
oil_gas_valuePOP_2000	3,080	798.916	3,030.446	0.000	40,814.150
PRODUCER	3,080	0.210	0.408	0	1
population	3,080	40,386,545.000	139,990,452.000	217,167	1,364,270,000
PRIMARY	2,635	1.010	0.160	0.209	1.656
SECONDARY	2,214	0.763	0.310	0.053	1.623
TERTIARY	2,065	0.332	0.258	0.002	1.224
OPENNESS	2,988	0.830	0.485	0.0002	4.373
MANUFACTURING	2,655	0.431	0.317	0.00000	3.729
NAT_RENTS	3,056	0.034	0.059	0.000	0.536
GDPPC	3,061	12,647.330	18,198.890	177.130	111,915.000
OIL_RENTS	3,053	0.049	0.113	0.000	0.863

6. The Model

Fixed-effects regression model:

$$y_{it} = \alpha_i + \lambda_t + X_{it}\beta + u_{it}$$

where;
- y is the dependent variable (measure of export concentration) in logarithms,
- X is the vector of independent variables,
- β is the vector of parameters,
- α and λ account for country and time fixed effects respectively, and
- u is the error term.

7. Results

Table 2: Estimation results with the dummy variable approach.

	Dependent variable:	
	log(THEIL)	log(HHI)
	(1)	(2)
PRODUCER	0.044** (0.022)	0.096 (0.083)
log(population)	−0.137 (0.084)	−0.150 (0.194)
log(GDPPC)	−0.041 (0.070)	−0.082 (0.175)
OPENNESS	0.090** (0.036)	0.187** (0.091)
MANUFACTURING	−0.018 (0.035)	−0.201* (0.109)
PRIMARY	0.046 (0.118)	−0.035 (0.234)
SECONDARY	−0.158* (0.095)	−0.081 (0.210)
TERTIARY	0.166* (0.086)	0.431* (0.252)
Tele	−0.001 (0.001)	0.001 (0.003)
ICRG	0.011 (0.106)	−0.282 (0.210)
NAT_RENTS	0.283 (0.259)	1.308** (0.563)
Observations	1,316	1,325
Cross-sectional units	115	115
Time fixed-effects	Yes	Yes
R²	0.191	0.121
Adjusted R²	0.092	0.014
F Statistic	2.505*** (df = 11; 114)	2.816*** (df = 11; 114)

Note: Robust (HAC) standard errors in parenthesis. *p<0.1; **p<0.05; ***p<0.01

Table 3: Estimation results with the oil rents approach.

	Dependent variable:	
	log(THEIL)	log(HHI)
	(1)	(2)
OIL_RENTS	0.525** (0.215)	0.856* (0.509)
log(population)	−0.149* (0.085)	−0.169 (0.196)
log(GDPPC)	−0.043 (0.069)	−0.082 (0.175)
OPENNESS	0.086** (0.036)	0.182** (0.091)
MANUFACTURING	−0.014 (0.035)	−0.193* (0.107)
PRIMARY	0.034 (0.117)	−0.056 (0.232)
SECONDARY	−0.157 (0.095)	−0.079 (0.211)
TERTIARY	0.172** (0.086)	0.444* (0.252)
Tele	−0.001 (0.001)	0.001 (0.003)
ICRG	0.007 (0.108)	−0.281 (0.216)
NAT_RENTS	0.307 (0.259)	1.353** (0.563)
Observations	1,316	1,325
Cross-sectional units	115	115
Time fixed-effects	Yes	Yes
R²	0.195	0.122
Adjusted R²	0.096	0.015
F Statistic	2.636*** (df = 11; 114)	2.957*** (df = 11; 114)

Note: Robust (HAC) standard errors in parenthesis. *p<0.1; **p<0.05; ***p<0.01

8. Conclusions

- In both approaches, oil production was associated with higher export concentration and the findings were robust across the two alternative measures of export concentration.
- The effect of oil production on higher export concentration was statistically significant in three out of four models estimated.
- **These findings indicate that export concentration is a problem in major oil-producing countries and needs to be addressed in light of the low-carbon transition's reduced demand for fossil fuels.**

References

- European Commission. (2018). A clean planet for all – a european strategic long-term vision for a prosperous, modern, competitive and climate neutral economy. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773
- Ross, M. L. (2019). What do we know about export diversification in oil-producing countries? The Extractive Industries and Society, 6(3), 792-806. doi: https://doi.org/10.1016/j.exis.2019.06.004