Backward linkages between natural resources and KIBS in GVCs

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Natural resources and export diversification

- Export diversification is an established policy goal for developing countries.
  It has been argued to be particularly relevant for countries with a specialisation in natural resources (NR).

- Natural resource curse (Sachs and Warner (1995) and Auty (1994)).

- This idea has however been questioned in the more recent years (Lederman and Maloney (2006), Stijns (2000) and Ding and Field (2005)).

Challenging the enclave view.

- While export diversification seems key to development, NR specialisation is an obstacle to this, at least in the dominant view.
- NR has long been viewed as an enclave:
  - Little linkages with the rest of the economy.
  - Can even undermine other sectors' competitiveness (Dutch Disease).
- NR is located in a sparse area of the product space (Hausmann et al (2006, 2008)) -> strong critique of beneficiation and the use of forward linkages à la Hirschman.
- This view has also been challenged, especially through qualitative studies at the country level (Morris et al 2012, Bloch and Owusu 2012 etc.)

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Research question and contributions

- Can backward linkages be a driver of export diversification for NR abundant countries?

- Can domestic intermediate demand provided by the NR sector spur exports of other sectors, in particular KIBS?

- This paper revives the role of domestic backward linkages in a GVC context.

- Provides new quantitative evidence on a large sample of countries.

Data

OECD inter-country input-output (ICIO) tables covering 61 countries, 1995 2000 2005 2008-11.

NR:

- Agriculture (AGR).

- Mining and Quarrying (MIN).

KIBS:

- IT and computer related activities (ITS).

- R&D and other business services (BZS).

Empirical strategy

We compute the following vector of domestic value added in export:

$$V' \, (I-A)_d^{-1} \, E_f$$

From which we take only the KIBS rows to compute our outcome variable, **excluding the indirect export through NR.**

Our explanatory variable is computed using the square matrix:

$$V' \, (I-A)_d^{-1} \, F$$

From which we isolate KIBS domestic contributions (rows) to NR output (columns).

Empirical strategy

We perform our analysis at the geo-sector level and split NR into AGR and MIN.

We test choose an autoregressive model with system GMM, accounting for both geo-sector and year fixed effects (FE), which deals with both reverse causality and serial correlation.

$$\boldsymbol{dvae\_kbs_t} = \alpha + \beta_1 dvae\_kbs_{t-1} + \beta_2 dd\_nr\_kbs_t + \beta_3 schooling_t + \beta_4 internetaccess_t + \varepsilon_t$$

We also look at AGR and MIN separately and focus on geo-sectors in countries with an RCA.

Econometric Results

	NR	NR RCA	AGR	AGR RCA	MIN	MIN RCA
DVAE_KBS$_{t-1}$	1.004***	0.287*	0.975***	0.851***	0.965***	0.644***
DD_NR_KBS	-0.0177	0.488***				
SCHOOLING	0.000917	0.0127	0.000269	-0.00028	0.00473	0.0123
INTERNET	-0.00199	0.00865	-0.00105	0.00286	-0.000072	0.000908
DD_AGR_KBS			0.00762	0.0761		
DD_MIN_KBS					-0.0335	0.221***
N. Obs.	640	262	640	260	640	162
All DVAE_ and DD_ variables in log and per capita– *p<0.10,**p<0.05, ***p<0.01						

Controlling for productivity in the NR sector

RCA could be driven by both productivity of NR or by its size.

The positive effect we detect may kick in only for countries with a minimum NR productivity.

$$\textbf{VAIC = VA/(IC-IC}_{\textbf{KIBS}}\textbf{)}$$

VA= Value added of the NR

IC-IC$_{KIBS}$= intermediate consumption of the NR sector minus NR-KIBS backward linkages.

Controlling for productivity in the NR sector

	NR	NR RCA	AGR	AGR RCA	MIN	MIN RCA
DVAE_KBS$_{t-1}$	0.940***	0.463***	0.947***	0.618***	0.985***	0.717***
DD_NR_KBS	0.0386*	0.549***				
SCHOOLING	0.00059	0.00513	-0.00091	0.0148	0.00212	0.0119
INTERNET	-0.0015	-0.00239	-0.00092	0.0152	-0.00217	0.000822
VAIC_NR	-0.135**	0.0663				
DD_AGR_KBS			0.0366	-0.0285		
VAIC_AGR			-0.0866	0.161		
DD_MIN_KBS					0.000861	0.166**
VAIC_MIN					-0.0642	0.00435
N. Obs.	640	262	640	260	640	162

All DVAE_ and DD_ variables in log and per capita – *p<0.10,**p<0.05, ***p<0.01

Endowment of natural and mining resources.

World Bank index of NR rent rent as % of GDP, as well as its homologue for the MIN sector.

The index seems to be driven by price rather than endowment but countries above the median form a rather stable group.

Endowment of natural and mining resources.

	NR endowment	MIN endowment
DVAE_KBS$_{t-1}$	0.703***	1.019***
DD_NR_KBS	0.0832**	
SCHOOLING	-0.0064	-0.0306*
INTERNET	0.0138**	-0.00238
DD_MIN_KBS		0.157*
N. Obs.	304	320
All DVAE_ and DD_ variables in log and per capita *p<0.10,**p<0.05, ***p<0.01		

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Using Leontieff Inverse coefficients

Using per capita measures may introduce some bias in sectoral level analysis.

We try to use Leontieff Inverse coefficients as alternative explanatory variable to capture the strength of domestic backward linkages.

Using Leontieff Inverse coefficients

	NR	NR RCA	AGR	AGR RCA	MIN	MIN RCA
DVAE_KBS$_{t-1}$	0.998***	0.681***	0.959***	1.063***	0.954***	0.444**
B_NR_KBS	0.0474	0.543***				
SCHOOLING	-0.00157	0.00881	-0.00046	-0.00410	0.00186	0.00923
INTERNET	-0.00273	-0.016***	-0.00107	0.00110	-0.00203	0.000212
B_AGR_KBS			0.0343	-0.0488		
B_MIN_KBS					0.0508	0.583***
N. Obs.	640	262	640	260	640	162
All DVAE_ and DD_ variables in log – *p<0.10,**p<0.05, ***p<0.01						

Conclusions

This paper revives the role of backward linkages as a driver of the emergence of new sectors in countries' export.

It focuses on KIBS and NR in particular, using input-output methodology to measure the strength of inter-sectoral linkages.

From a policy perspective the implication is not necessarily to deepen countries' specialisation in NR, but rather to foster inter-sectoral linkages in order to spur the emergence of new sectors.

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