Tracing the value added in exports of Italy: an integrated multi-country, interregional analysis

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Background

- With the rising fragmentation of production networks in global value chains (GVCs), gross foreign exports and interregional trade constitute a less and less meaningful tool so as to understand the competitiveness of countries and regions.
- Moreover, within countries, regions differentiate from each other in the participation to the international supply chains and in the intersection between international and interregional supply chains.
- In particular, the Italian economy is widely known for the "geographical" heterogeneity of its degree of development.
- When it comes to regional economics, the role of interregional trade in the international division of labor (and tasks) is theoretically hardly understood

Related studies

International trade evolving from trade in final goods to trade in parts, components, tasks...

- *From theory*...
  i. Business and organizational studies on GVCs management (e.g., Gereffi, 1999)
  ii. International trade models (Grossman & Rossi-Harnsberg, 2008; Costinot et al., 2013)
- *...to empirics*
  i. Case studies: e.g., Apple iPod (Dedrick et al., 2010) and the automotive industry (Escait et al., 2010; Feenstra,1998)
  ii. Approaches via I-O tables: e.g., Hummels et al. (2001), Johnson & Noguera (2012), Dietzenbacher et al. (2013), Timmer et al. (2013), and Koopman et al. (KWW, 2014); Meng et al. (2013) $\rightarrow$ development of World I-O databases (e.g., WIOD, GTAP, ICIO etc.)

Our work

CONTRIBUTION

i. We enlarge Irpet multi-regional I-O model with EU area, US, Canada and Japan (Row as residual flows; less than 40% of gross exports)
ii. We build on existing literature about gross exports decomposition and decompose bilateral inter-product exports and interregional trade (hereafter, outflows)
iii. We document the heterogenous participation of Italian regions through inter-area trade to international GVCs

RESULTS

i. Italian regions highly differ in terms of openness to international trade
ii. Moreover, the degree of embeddness of Italian regions in GVCs varies much, especially when comparing Northern to Southern areas
iii. Interregional trade activated by the regional participation to GVCs emphasizes the lower VA content of Southern areas flows

The MRIO model

We start from an "augmented" Chenery-Moses type of model:

$$
\begin{aligned}
x + mr + mw + tax + tir &= Ax + df + er + ew \\
mw &= MAx = M_f df \\
mr &= \hat{Q}(I - M)Ax + \hat{Q}_f(I - M_f)df \\
er &= \check{Q}(I - M)Ax + \check{Q}_f(I - M_f)df \\
tax &= S(Ax + df) \\
tir &= N_w mw + N_r mr
\end{aligned}
$$

and move to a quasi-Isard metric representation
$x = (I - R)^{-1}(dfR_f + ew)$, with $R = A[T(I - M(I + N_w)) - S]$
and $R_f = [T_f(I - M_f(I + N_w)) - S]$

The data

i. Reference year: 2012

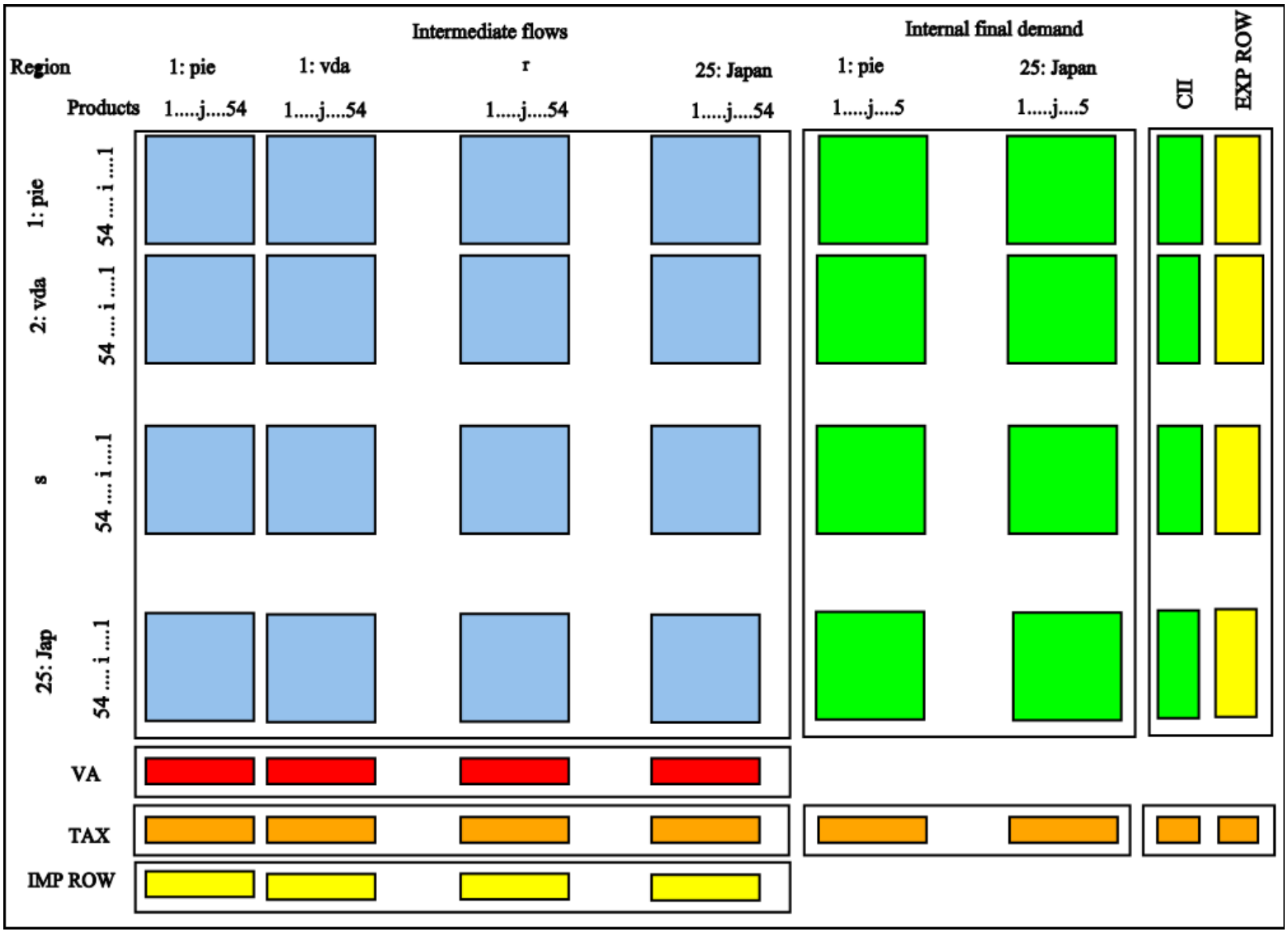
ii. Starting point: availability of Italian multi-regional and country specific *SUT* (Data from national statistical offices; Eurostat for EU)

iii. Estimates of *country-by-country* intermediate and final product flows (OECD Trade by commodities, Eurostat Comext, OECD Trade in services by partner country)

iv. Balancing trade flows

v. Symmetrization via *product-by-product* industry technology

The Supermatrix



Decomposing inter-product/bilateral flows: A receipt

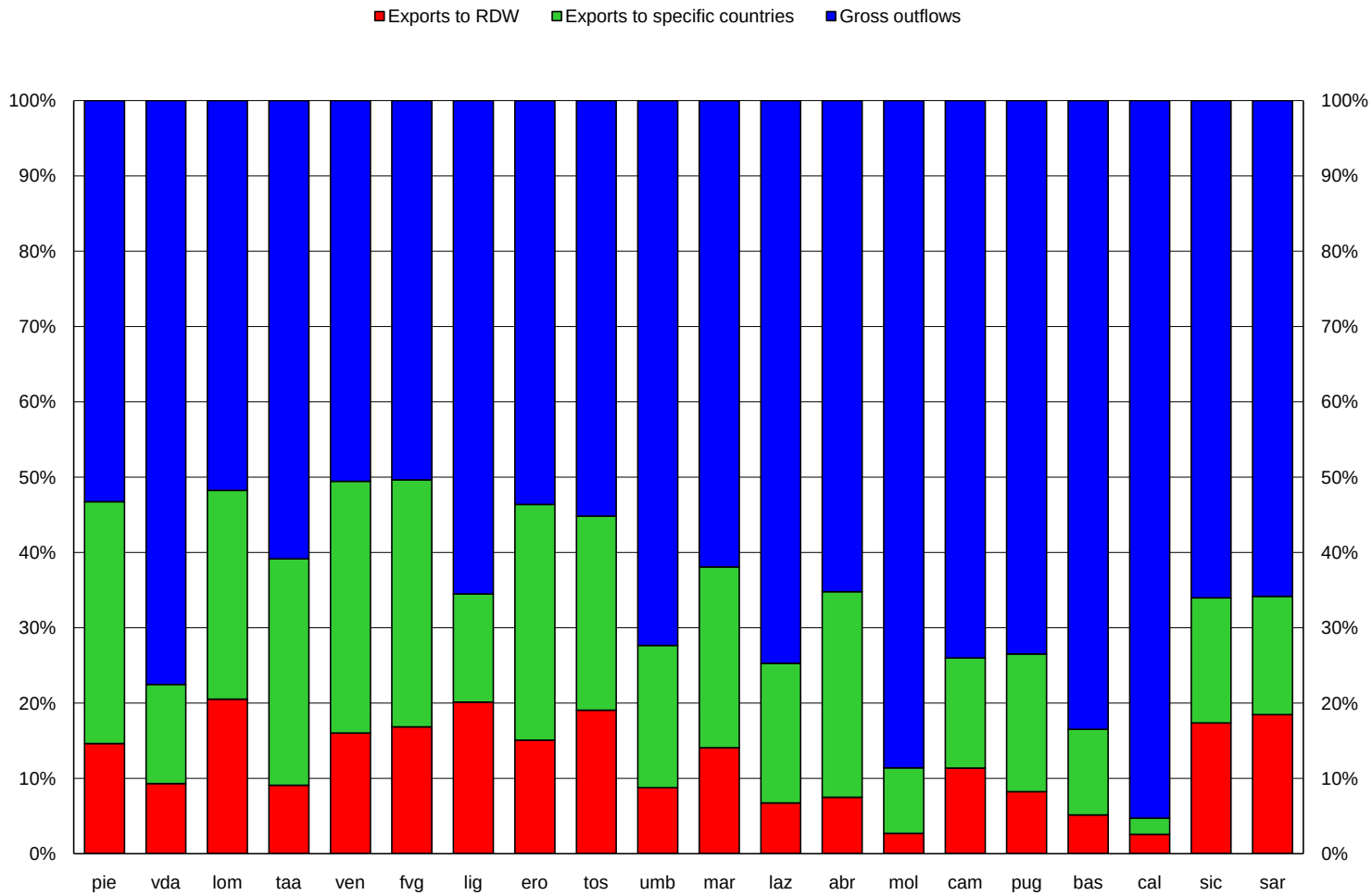
i. We start from inter-product bilateral flows
ii. We disentangle *outflows* and *exports* (hereafter, EOs)
iii. We distinguish *national* and *foreign* value added of EOs
iv. We pin down *domestic* vis-à-vis *international* segments of GVCs
v. We recover domestic value added, reimported VA, double counted term, foreign and other regions' VA and dc term for EOs

We start from the decomposition for inter-product bilateral exports between countries (Wang et al., 2013; WWZ). We pin down exports and outflows, domestic and international segments of GVCs following an approach à la Meng et al. (2013; MWK)

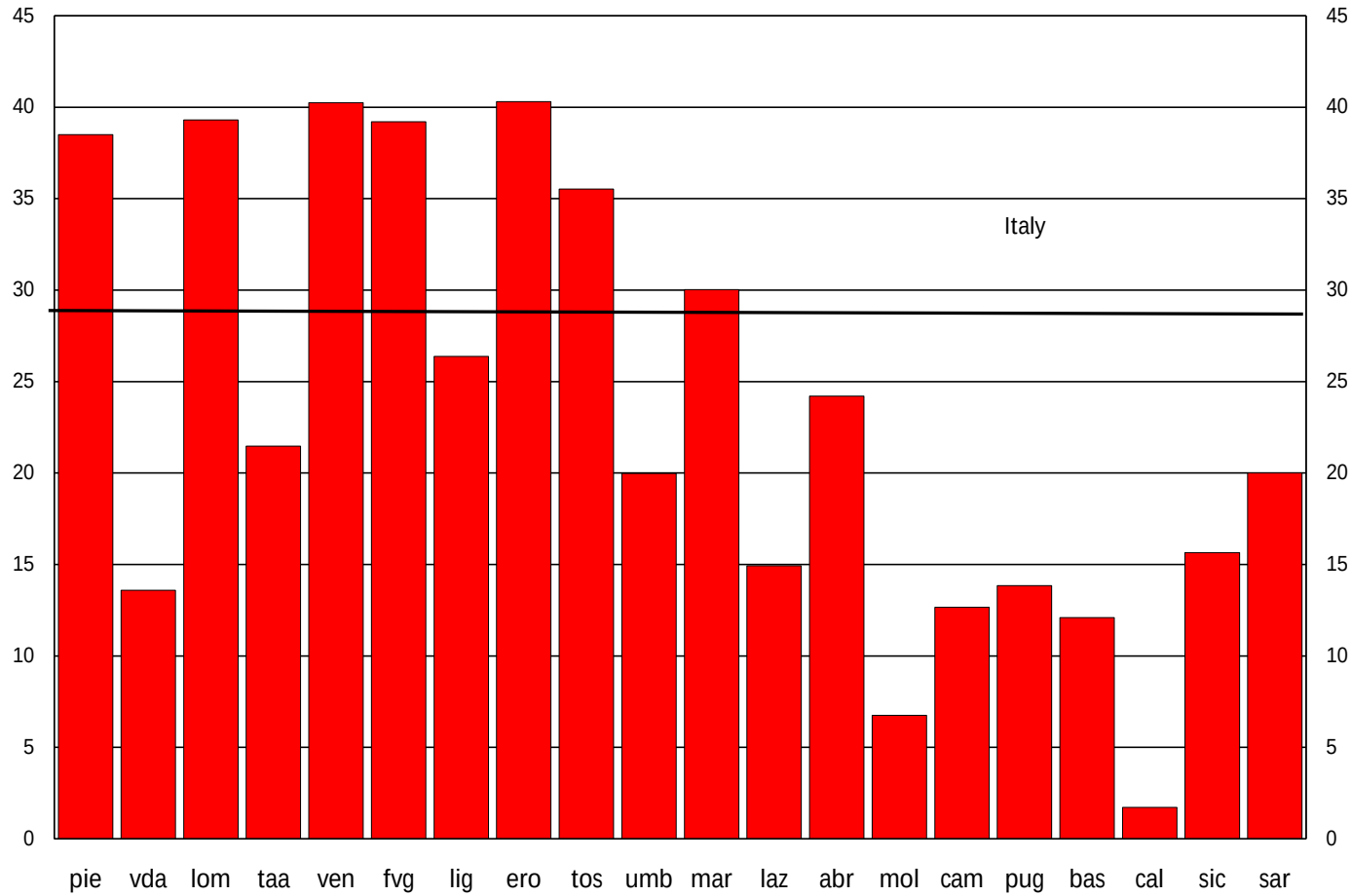
An example: DVA in inter-product bilateral outflows

$$
\begin{aligned}
DVA^{sr} &= (\textstyle\sum_{i=1}^{N} I_i Y^{sr} i_i)(V^s B_d^{ss})' + [\sum_{i=1}^{N} I_i (R^{sr} B_d^{rr} Y^{rr}) i_i](V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{t\neq s,r}^{g} B_d^{rt} Y^{tt}) i_i](V^s L^{ss})' + [\sum_{i=1}^{N} I_i (R^{sr} B_d^{rr} \sum_{t\neq s,r}^{g} Y^{rt}) i_i](V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{t\neq s,r}^{g} \sum_{u\neq s,t}^{g} B_d^{rt} Y^{tu}) i_i](V^s L^{ss})' \\
&+ (\textstyle\sum_{i=1}^{N} I_i Y^{sr} i_i)[V^s (B^{ss} - B_d^{ss})]' + \{\sum_{i=1}^{N} I_i [R^{sr} (B^{rr} - B_d^{rr}) Y^{rr}] i_i\}(V^s L^{ss})' \\
&+ \{\textstyle\sum_{i=1}^{N} I_i [R^{sr} \sum_{t\neq s,r}^{g} (B^{rt} - B_d^{rt}) Y^{tt}] i_i\}(V^s L^{ss})' \\
&+ \{\textstyle\sum_{i=1}^{N} I_i [R^{sr} (B^{rr} - B_d^{rr}) \sum_{t\neq s,r}^{g} Y^{rt}] i_i\}(V^s L^{ss})' \\
&+ \{\textstyle\sum_{i=1}^{N} I_i [R^{sr} \sum_{t\neq s,r}^{g} \sum_{u\neq s,t}^{g} (B^{rt} - B_d^{rt}) Y^{tu}] i_i\}(V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{T}^{G} \sum_{u\neq s}^{g} B^{rT} Y^{Tu}) i_i](V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} B_d^{rr} \sum_{T}^{G} Y^{rT}) i_i](V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{t\neq s,r}^{g} \sum_{U}^{G} B_d^{rt} Y^{tU}) i_i](V^s L^{ss})' \\
&+ \{\textstyle\sum_{i=1}^{N} I_i [R^{sr} (B^{rr} - B_d^{rr}) \sum_{T}^{G} Y^{rT}] i_i\}(V^s L^{ss})' \\
&+ \{\textstyle\sum_{i=1}^{N} I_i [R^{sr} \sum_{t\neq s,r}^{g} \sum_{U}^{G} (B^{rt} - B_d^{rt}) Y^{tU}] i_i\}(V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{T}^{G} B^{rT} Y^{TT}) i_i](V^s L^{ss})' \\
&+ [\textstyle\sum_{i=1}^{N} I_i (R^{sr} \sum_{T}^{G} \sum_{U\neq T}^{G} B^{rT} Y^{TU}) i_i](V^s L^{ss})'
\end{aligned}
$$

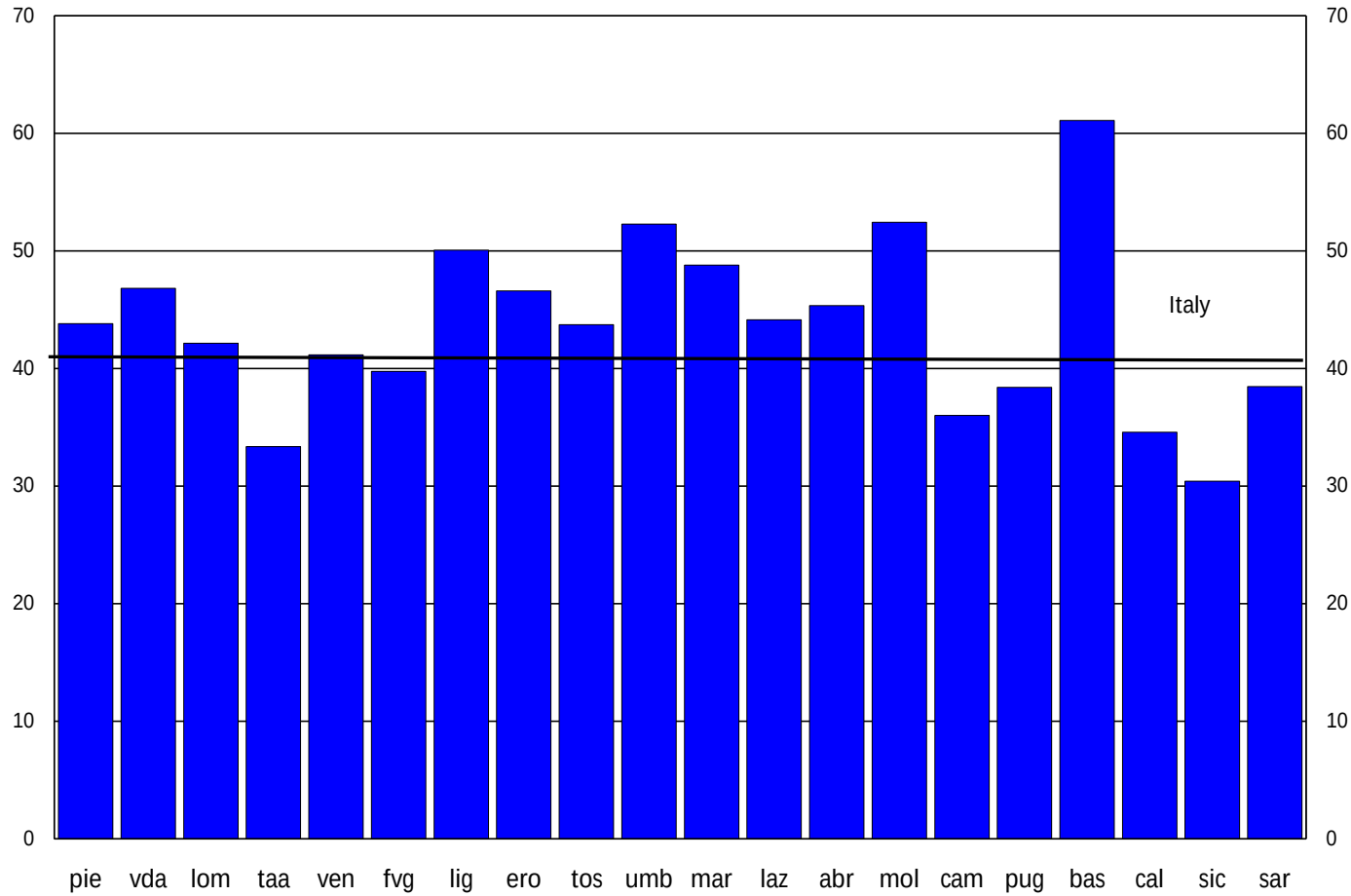
Share of gross exports and gross outflows, by Italian region



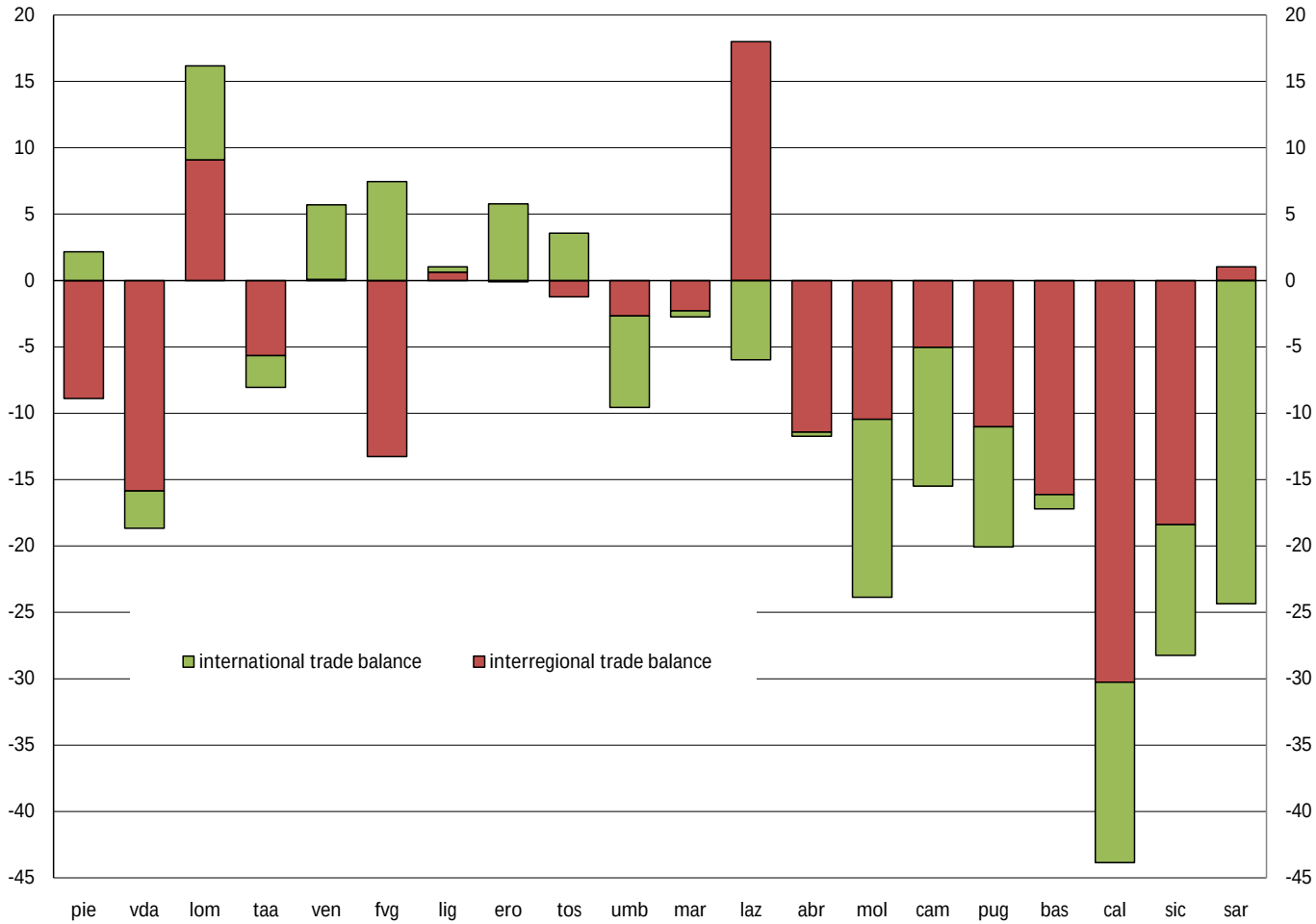
Exports as a % of regional value added



Outflows as a % of regional value added



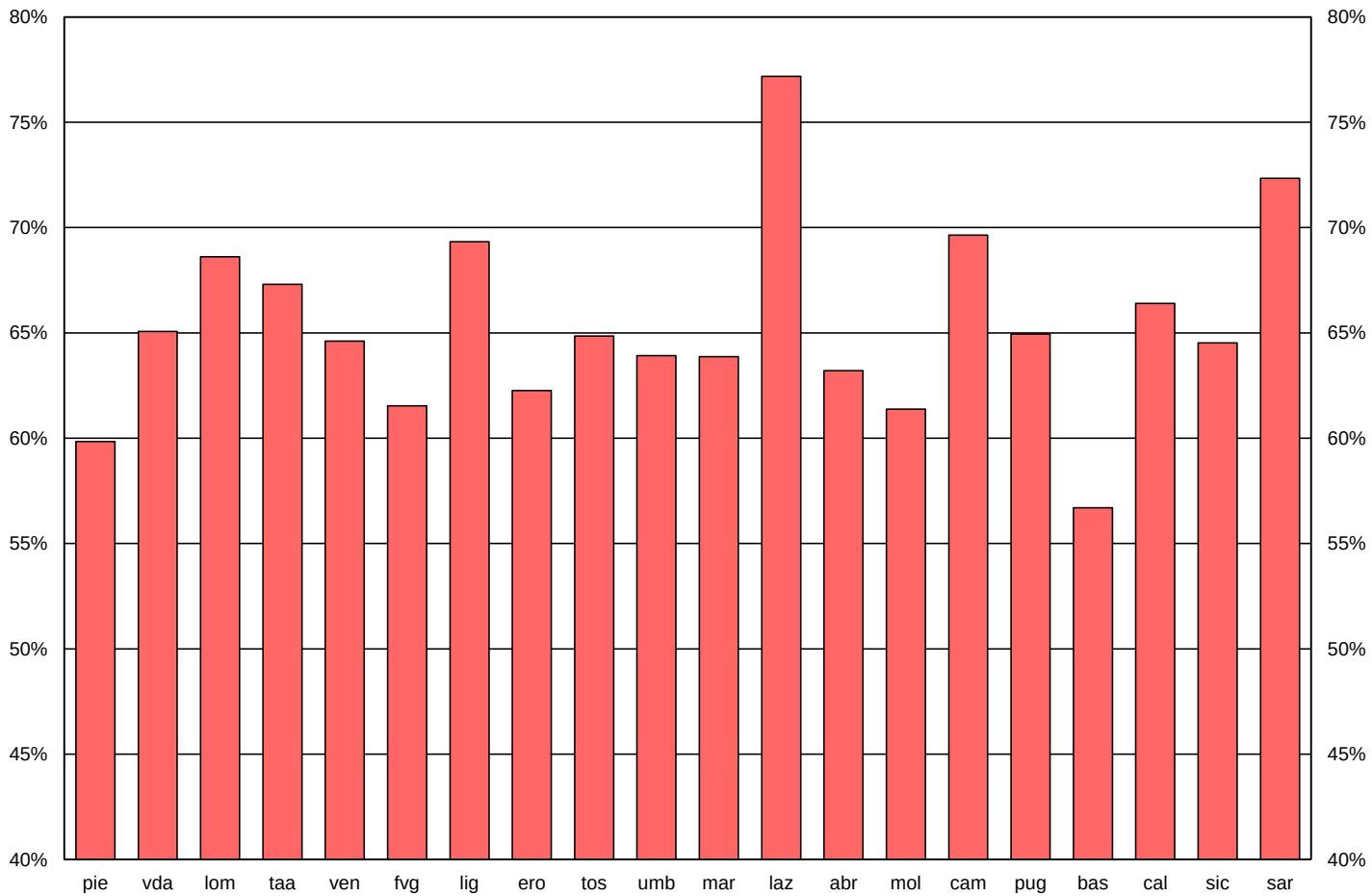
Interregional and international trade balance in % of VA



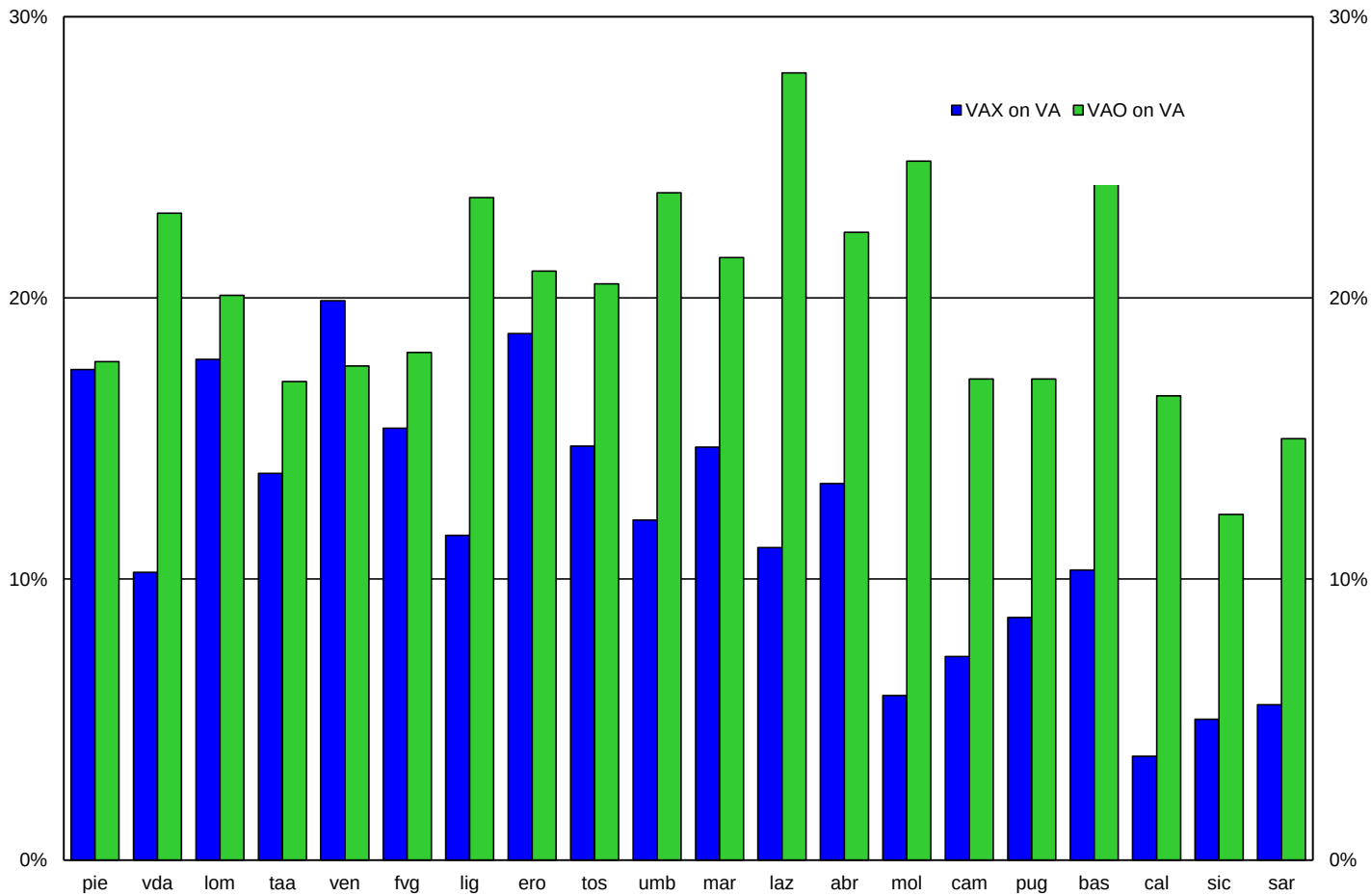
KWW decomposition of gross EOs

Italian regions	Domestic content						Foreign content			Share total EO
	Domestic value added			Re-imp. DVA		Pure DC	in EO of final	in EO of interm.	Pure DC	
lom	46.527	46.724	24.930	990	1.953	3.638	18.936	14.106	14.445	67,8
taa	4.301	4.008	2.346	14	21	33	2.023	1.518	1.568	83,4
ven	21.145	17.108	11.252	178	334	687	11.555	6.716	7.655	71,2
fvg	5.523	3.099	1.813	8	14	28	3.125	1.698	1.651	68,8
lig	5.716	5.561	3.440	28	55	80	2.345	1.833	2.172	66,3
ero	21.420	19.077	10.489	176	336	766	13.068	8.596	7.963	73,3
tos	14.391	12.480	7.007	99	194	316	7.486	5.176	5.093	68,5
umb	2.745	2.481	1.666	6	13	20	1.490	1.028	1.334	77,6
mar	5.828	4.357	2.663	18	31	60	3.131	1.962	2.067	71,7
laz	29.506	23.746	10.766	263	423	581	6.984	5.674	5.002	85,8
abr	5.029	3.261	1.931	16	25	47	2.594	1.579	1.690	81,3
mol	983	455	321	0	1	1	602	219	284	84,6
cam	9.772	7.895	4.322	97	160	164	4.129	2.356	2.682	71,9
pug	7.719	5.459	3.360	46	81	110	3.553	2.303	2.832	75,9
bas	1.331	1.179	1.036	3	6	15	1.171	562	951	86,2
cal	2.302	2.225	1.408	20	34	24	1.124	771	1.030	83,8
sic	6.344	4.316	2.999	65	107	115	2.762	1.937	2.523	58,2
sar	2.690	1.969	1.455	8	15	12	849	570	884	48,4

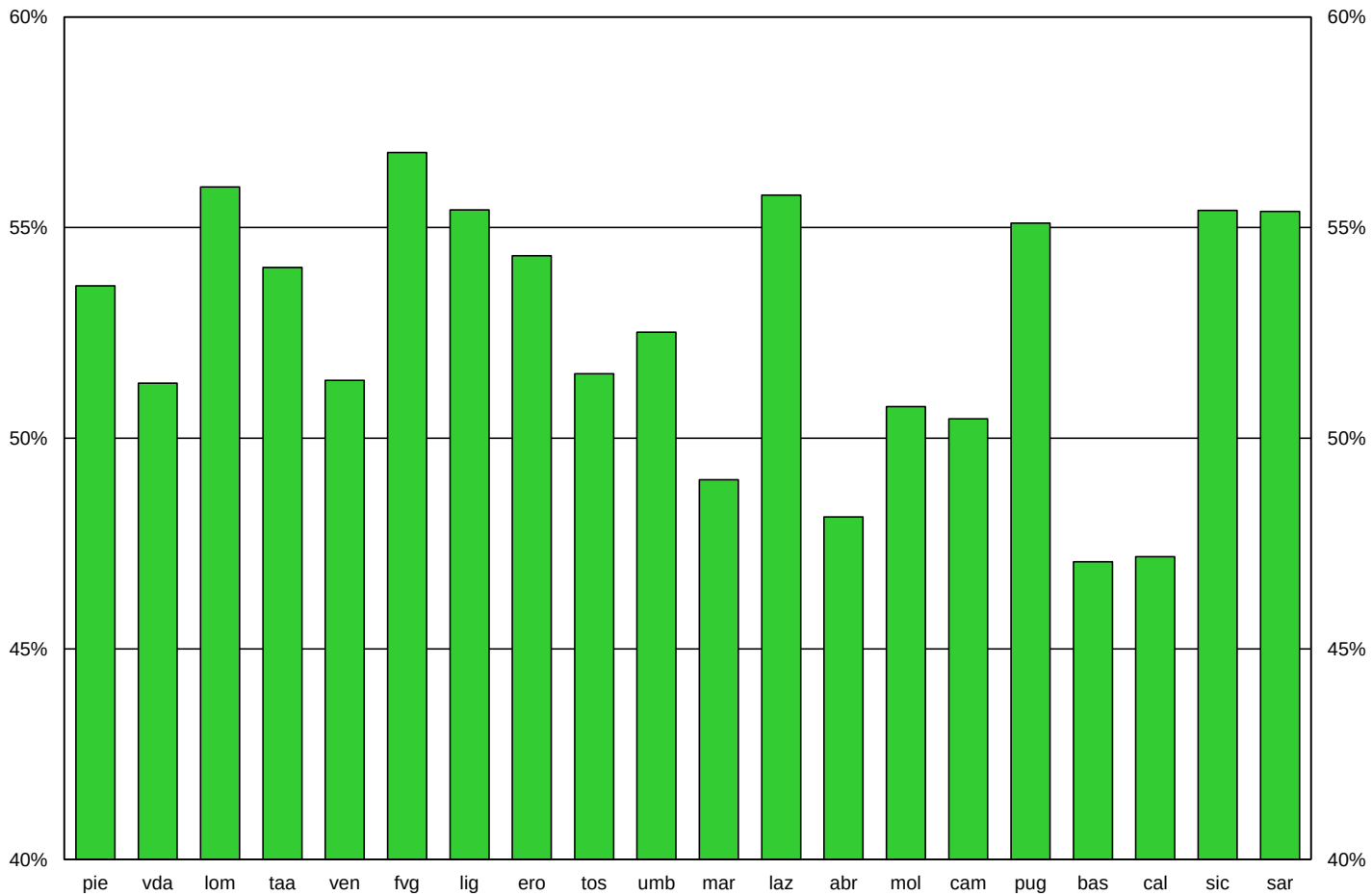
DVA as % of the "explained" level of EOs



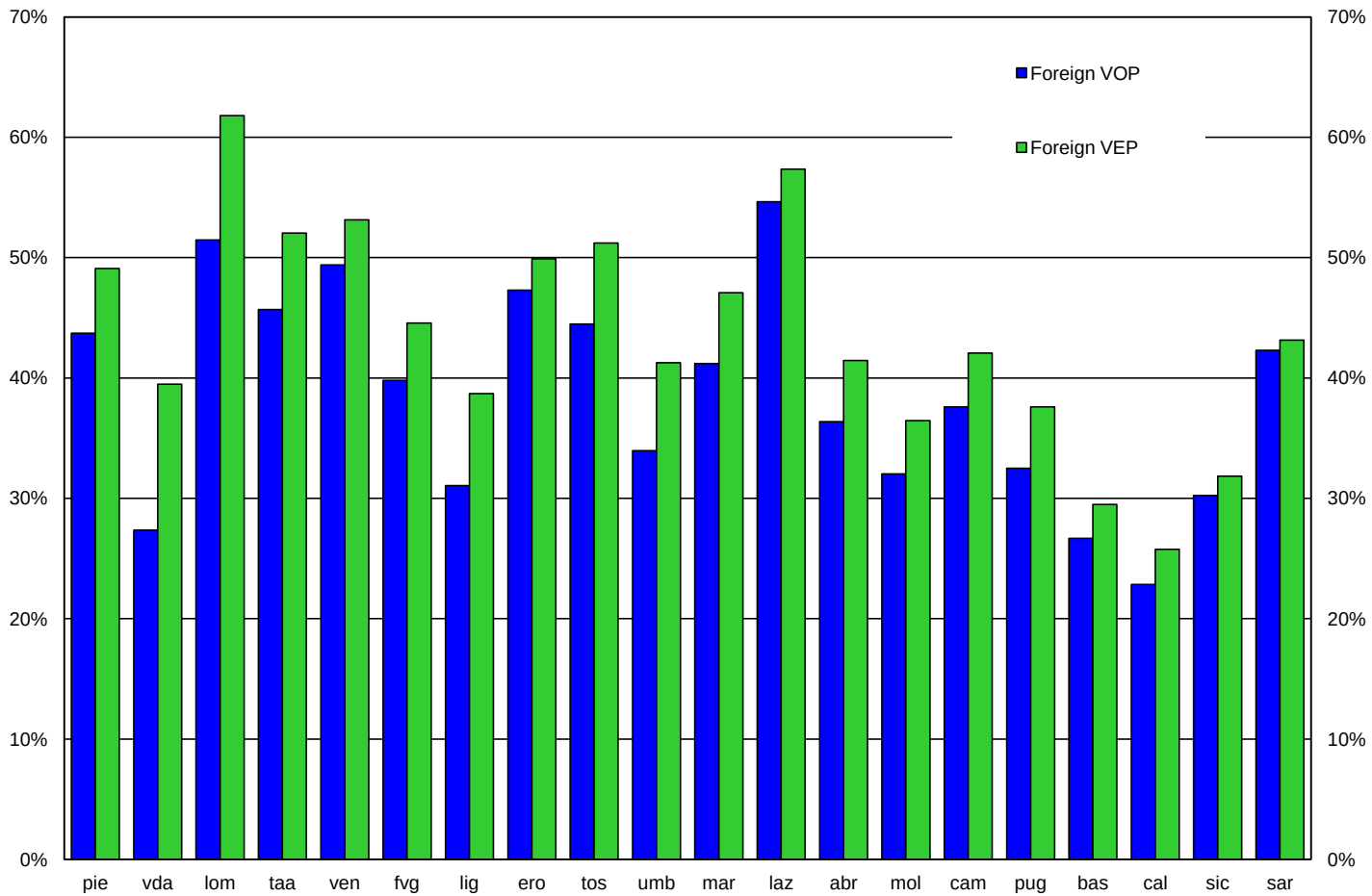
EOs DVA as a % of value added



DVA in exports due to international segments of GVCs



Foreign value added in EOs



Concluding remarks and further research

- *So far so good...*
  i. Starting from an "augmented" version of IRPET MRIO model, we buildup a framework to study the structure of gross exports and ouflows of Italian regions
  ii. We exploit existing literature on exports decompositions via I-O tables and move further so as to measure the degree of embedness of Italian regions in GVCs
  iii. We document the heterogenous participation of Italian regions in GVCs, stressing in particular the existing differences between Northern vis-à-vis Southern areas
- ...further steps
  i. *more results, more topics, more data, more countries, more years...*
  ii. *more results, more topics, more data, more countries, more years...*