



A COLLABORATION WITH



ESCoE Research Seminar

UK Regions in Global Value Chains

Presented by Bart Los
University of Groningen and ESCoE

4 June 2019



UK Regions in Global Value Chains

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**ESCoE

ESCoE Research Seminar, June 4, 2019

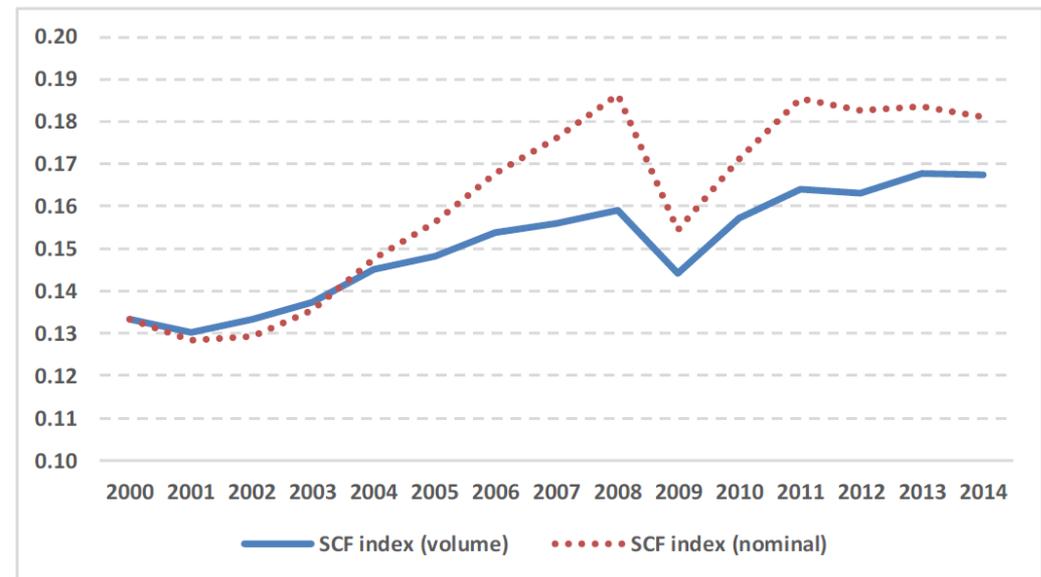


Nature of international trade has changed: “international fragmentation of production processes” or “emergence of global value chains” (GVCs)

Along the vertical scale: global trade in intermediate products (in \$) induced by \$1 of final demand

Source: Timmer et al. (2019, *mimeo*)

Figure 1 Index of supply chain fragmentation (all goods and services)



This phenomenon has policy implications: e.g. UK car manufacturing particularly threatened by post-Brexit trade barriers

This paper:

Quantitative evidence (for 2000-2010) about

(1) the importance of GVCs for UK *regional* economies,

(2) *regional* GVC competitiveness and

(3) *regional* risks due to Brexit in a world of GVCs

Measurement: *macro*-approach feasible thanks to global input-output tables (World Input-Output Database, OECD Trade in Value Added Initiative)



GVC: “All activities required to produce a final *manufactured* product” (Timmer et al., 2013 *EconPol*; 2014 *JEPersp*; Los et al., 2015 *JRegSci*)

Important: GVCs *do* include activity in primary industries and business services (as far as used directly and indirectly to produce manufactured products)

Employment data: Levell (2018, for ESCoE), based on ONS Business Structure Database)

Needed: Global input-output tables with (inter)regional detail (see next slide)

EUREGIO: WIOD, but EU-countries regionally disaggregated at NUTS2 level. (Thissen et al., 2018, Tinbergen Institute DP)



			Country A				Country B				ROW		Country A		Country B		ROW	Gross Output							
			Reg A1		Reg A2		Reg B1		Reg B2				Reg A1	Reg A2	Reg A1	Reg A2									
			I1	I2	I1	I2	I1	I2	I1	I2	I1	I2	FD	FD	FD	FD	FD								
Country A	Reg A1	I1	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Z</p> <p>Values of intermediate input transactions</p> </div> <div style="text-align: center;"> <p>Y</p> <p>Values of final product transactions</p> </div> </div>										<p>X</p>												
		I2																							
Country B	Reg A2	I1																							
		I2																							
Country B	Reg B1	I1																							
		I2																							
Country B	Reg B2	I1																							
		I2																							
ROW		I1																							
		I2																							
Value Added														<p>w'</p>										<p>Value added</p>	
Gross Output														<p>x'</p>										<p>Gross output</p>	

Industry detail: 14 sectors; Basic prices; Market exchange rates used

40 countries (EU minus Croatia, major economies, plus “Rest of the World”)



	Focal region in UK	Other regions in UK	Regions in other EU countries	Countries outside the EU	Focal region in UK	Other regions in UK	Regions in other EU countries	Countries outside the EU	Gross output
Focal Region in UK	Z^{rr}	Z^{ru}	Z^{re}	Z^{ro}	f^{rr}	F^{ru}	F^{re}	F^{ro}	x^r
Other regions in UK	Z^{ur}	Z^{uu}	Z^{ue}	Z^{uo}	f^{ur}	F^{uu}	F^{ue}	F^{uo}	x^u
Regions in other EU countries	Z^{er}	Z^{eu}	Z^{ee}	Z^{eo}	f^{er}	F^{eu}	F^{ee}	F^{eo}	x^e
Countries outside the EU	Z^{or}	Z^{ou}	Z^{oe}	Z^{oo}	f^{or}	F^{ou}	F^{oe}	F^{oo}	x^o
Value added	$w^{r,v}$	$w^{u,v}$	$w^{e,v}$	$w^{o,v}$					
Gross output	$x^{r,g}$	$x^{u,g}$	$x^{e,g}$	$x^{o,g}$					

Source:
Adapted
from Chen
et al.
(2018)



A: $RN \times RN$ matrix of intermediate input coefficients: $\mathbf{A} = \mathbf{Z}(\hat{\mathbf{x}})^{-1}$

L: $RN \times RN$ Leontief inverse, $(\mathbf{I} - \mathbf{A})^{-1}$

F: $RN \times RC$ matrix of final demand transaction values

f: $RN \times 1$ vector with final demand levels ($\mathbf{F}\mathbf{i}$, with \mathbf{i} $RC \times 1$ summation vector)

\mathbf{v}^r : $RN \times 1$ vector of value added to gross output ratios for region r , zeros elsewhere

\mathbf{d}^r : $RN \times 1$ vector of employment to gross output ratios for region r , zeros elsewhere

GVC Income region r : $\mathbf{i}' \text{diag}(\mathbf{v}^r) \mathbf{L} (\mathbf{f} \circ \mathbf{e})$, \circ : elementwise multiplication

GVC Jobs region r : $\mathbf{i}' \text{diag}(\mathbf{d}^r) \mathbf{L} (\mathbf{f} \circ \mathbf{e})$

e: $RN \times 1$ vector with ones for manufacturing industries and zeros elsewhere



See Timmer et al. (2015, *RevIntEc*)

			Final products of a global value chain, identified by country-industry of completion						Value added
			Country 1		...	Country M			
			Industry 1	...	Industry N	...	Industry 1	...	
Value added from country- industries participating in global value chains	Country 1	Industry 1		
		...							
		Industry N							
							
	Country M	Industry 1		
		...							
Industry N									
Total final output value								World GDP	

GVC Income:
sum of VA
contributions
to value of
final
manufactures

↑ ↑ ↑ ↑

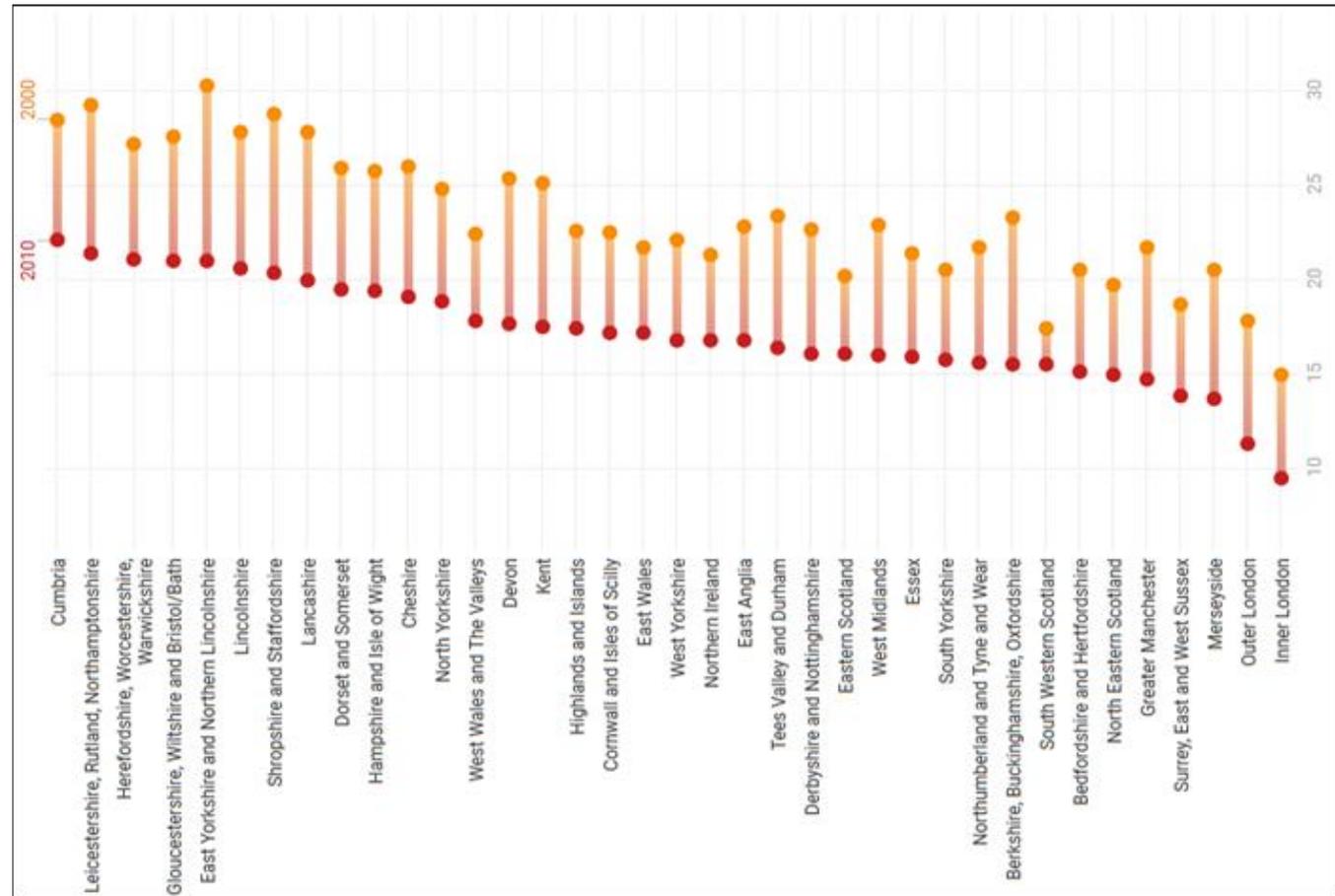
Final output value: sum
of value added
contributions in GVC

Only part of
GDP is GVC
Income!



Indicator: *Shares of regional GDP generated by GVC participation*

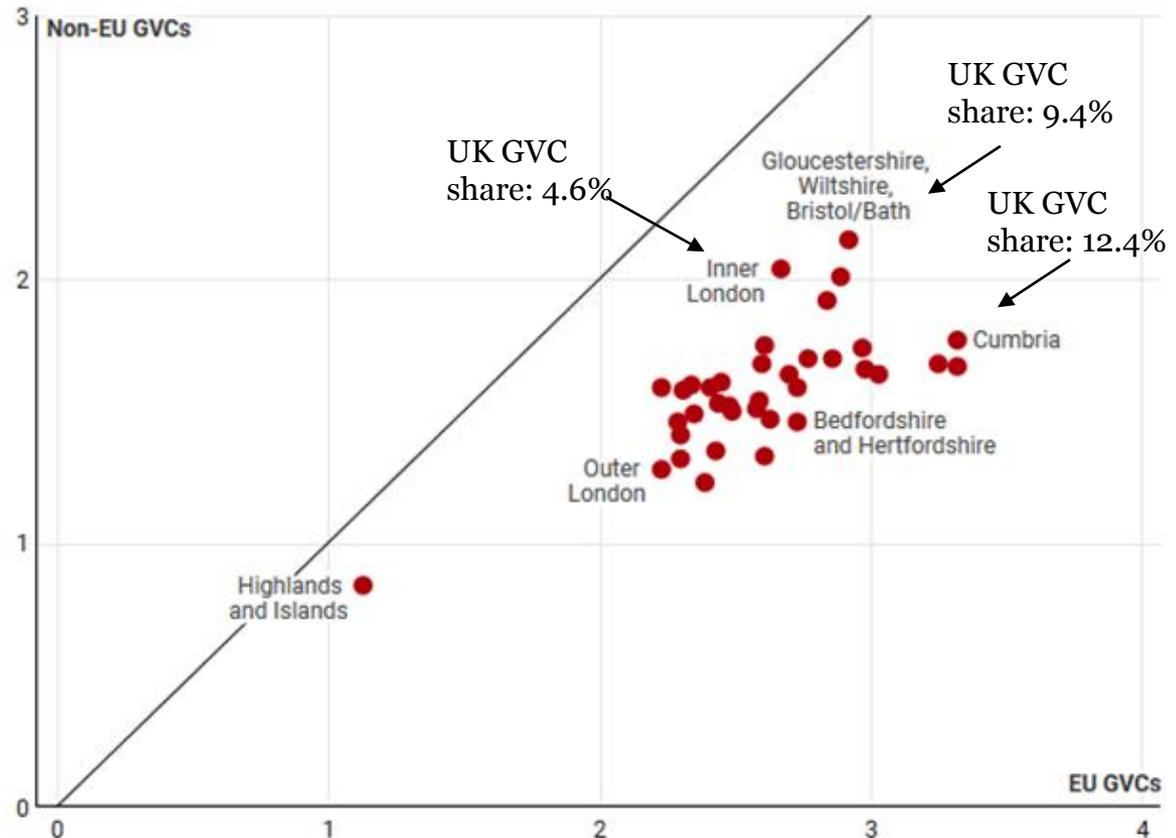
- Shares have declined in all regions (cf. IJtsma et al., 2018, *FiscStud*)
- London considerably less dependent on GVCs





Indicator: Shares (%) of regional jobs generated by GVC participation, by “location-of-completion”, 2010 (see Los et al., 2015, *JRegSci*).

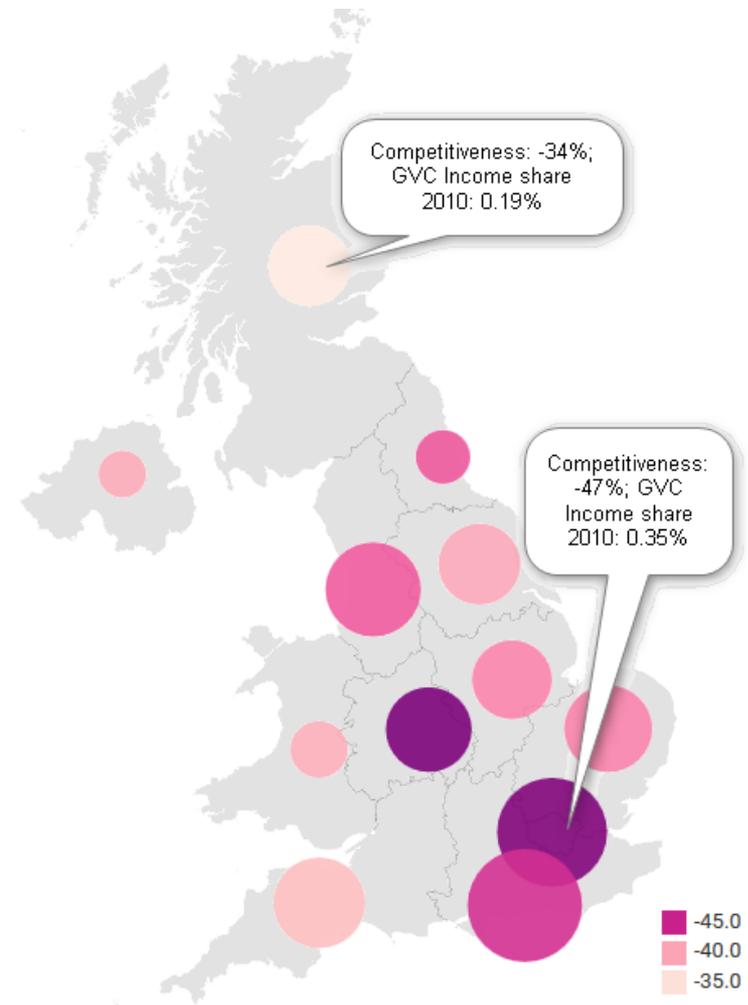
- EU-GVCs more important than non-EU GVCs (for all regions)
- UK GVCs are much more important for jobs in UK regions than non-UK GVCs (Inner London is an exception)





Indicator: Change in share (%) of regional GVC income in *global value of manufactured products* (2000-2010) (cf. Timmer et al., 2013, *EP*)

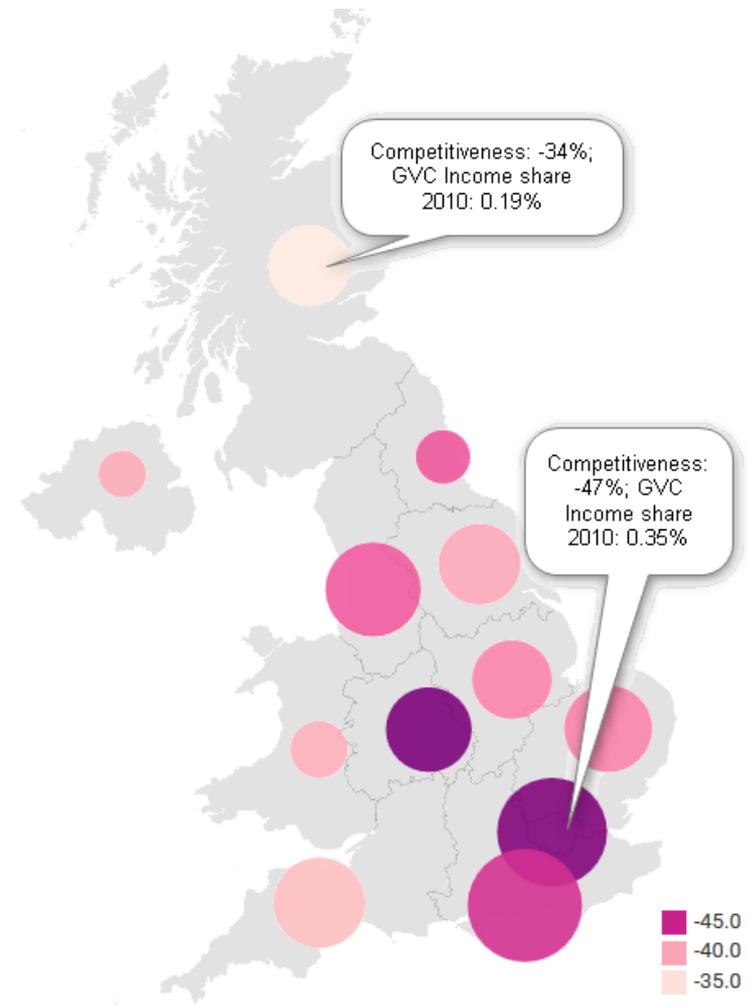
- Nationwide, competitiveness indicator dropped from 4.3% to 2.4% (-43%)
- All UK regions experienced substantial reductions in competitiveness (-34% to -47%, NUTS1).
- NUTS2: Relatively well-performing Cornwall (-29%), NE-Scotland, SW-Scotland and S-Yorkshire (-34%). Worst performance: Berkshire (-50%), West Midlands (-51%), Outer London (-55%).





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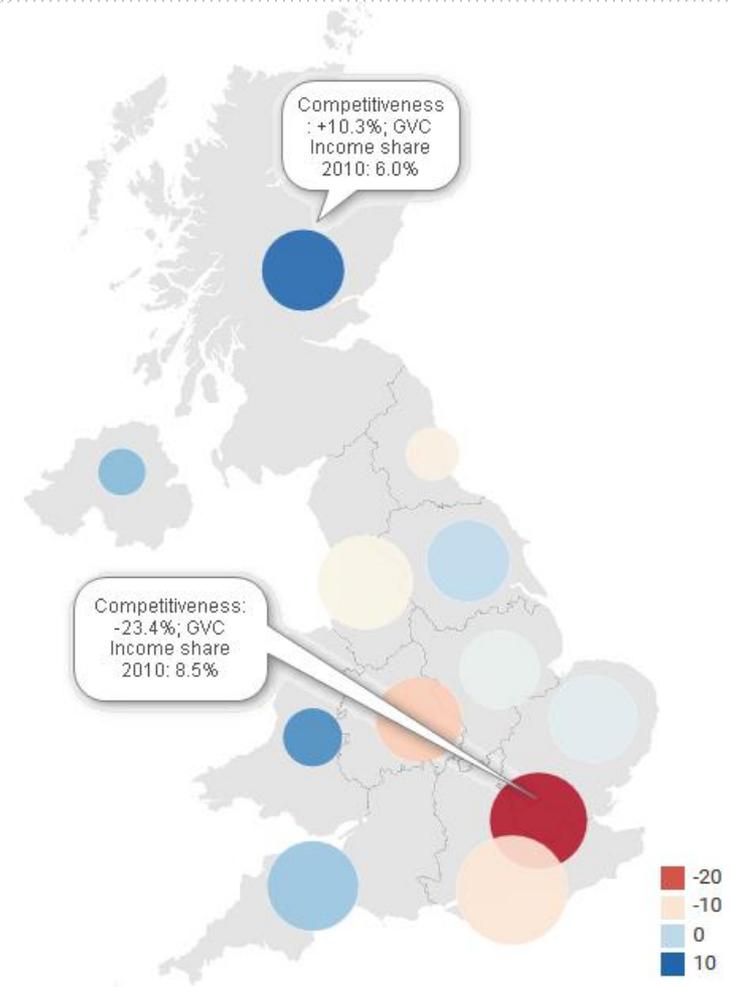
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Indicator: Change in share (%) of regional GVC income in value of *UK's* manufactured products (2000-2010)

- Nationwide, competitiveness indicator dropped from 78.5% to 73.4% (-6.5%)
- Some NUTS1 regions experienced substantial competitiveness reductions (London -23%), others gained (Scotland +10%, Wales +7%).
- NUTS2: Relatively well-performing Cornwall (+17%), NE-Scotland, SW-Scotland, W-Wales and Cumbria (+9%). Worst performance: Inner London (-19%), West Midlands (-19%), Outer London (-30%).





Estimating trade *effects* of Brexit is hard; trade elasticities required

Measuring export-related *risks* of Brexit is possible with EUREGIO (based on methods proposed in Los et al., 2016, *AER*; Los and Timmer, 2018, NBER WP; Chen et al., 2018, *PiRS* has applications):

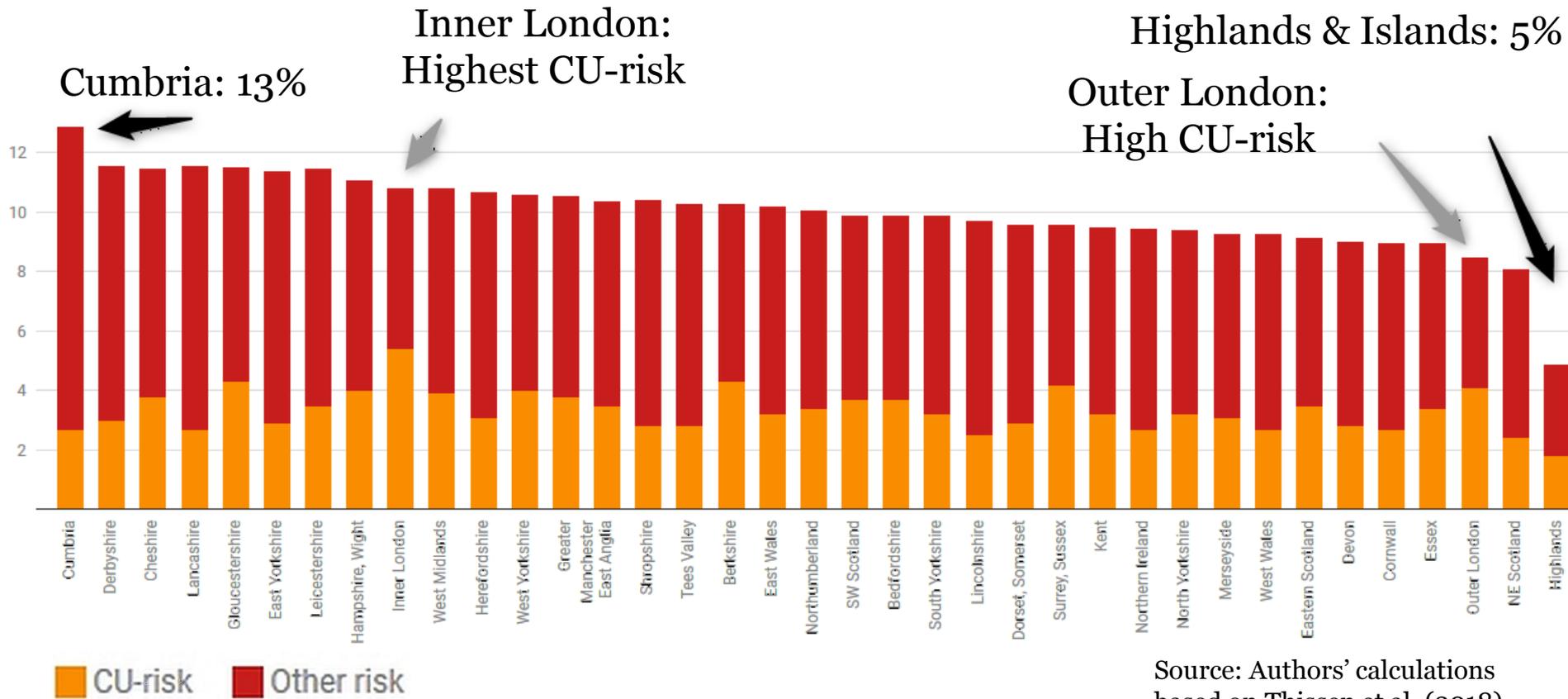
- Compute labour demand for situation in which exports from all UK regions to EU are set to zero in input coefficients matrix and in final demand matrix, using Leontief's model (*no prediction of new situation, measurement only*). Exports to non-EU countries unchanged.
- Subtract hypothetical demand from true employment: employment at risk

CU risk: no UK-EU exports of services after Brexit, other exports untouched

CU risk + Other risk: no UK-EU exports at all after Brexit



Indicator: Proportions of regional jobs at risk due to Brexit (%)



Source: Authors' calculations based on Thissen et al. (2018)



- Regional shares of value added and employment contributing to GVCs have declined. Substantial regional differences: some regions >20%, London 9-12%
- UK GVCs clearly more important than foreign GVCs (Inner London an exception) for jobs. EU GVCs more important than non-EU GVCs.
- In worldwide network of GVCs, all UK regions lost competitiveness. London and West Midlands were the most notable problematic regions
- Brexit's export risks for employment highest in North-English regions. Customs Union membership would reduce risks substantially, but less so for regions in and around London



- Industry detail is limited (14 industries). Due to search for “lowest common denominator” across EU-countries. For UK in specific, more detailed data could be constructed (but data on links to non-UK regions should be sacrificed and be replaced by UK region to country links);
- Inter-regional trade difficult to measure. For goods: transportation survey data, accounting for “hubs” to arrive at “true” origins and destinations. For services: Rough approximation based on business class travel. Better alternatives available?
- Bilateral trade in services data even problematic at country level;
- Some people feel that data on trade in gross value terms should be *replaced* by trade in value added data. Wrong: gross trade figures essential ingredient into construction process of trade in value added data! See OECD Trade in Value Added and Eurostat’s Figaro projects.