1

Cultural employment metadata

Annex 2

Detailed description of the estimation algorithm

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The way for computing cultural employment is based on the cross-classification of NACE and ISCO nomenclatures: all workers with a cultural occupation (ISCO) are included whatever the economic activity (NACE) they are employed in, while all workers employed in a cultural economic activity are included regardless the cultural status of their occupation.

A first difficulty is to deal with NACE and ISCO codes which are only partly cultural. A second difficulty lies in the level of detail (i.e. number of digits of the NACE and ISCO codes) provided by the countries: the minimal requirement is 3 digits for ISCO; 2 digits for NACE, but a significant part of the countries provide more detailed categories (4 digits for ISCO, 3 for NACE). Such detailed data allow more accurate estimation of cultural employment.

A broad category (i.e. 3 digits for ISCO; 2 digits for NACE) can be entirely allocated to the cultural sphere in the simplest cases. Regarding ISCO08, this is the case for categories 216, 262, 264, and 265, which are fully cultural. As regards the NACE categories, this is the case for codes 59, 60, 90 and 91. Since the minimal level of detail in LFS is 2 digits for NACE and 3 digits for ISCO (NACE2D*ISCO3D), the cultural coefficients matrix would be made up of culture-relevant "NACE2D" categories (59, 60, 74, 90 and 91) as columns and "ISCO3D" relevant categories as rows (see Figure 1 below).

Figure 1 - Initial cultural coefficients matrix at the minimal required level of codification in LFS (2 digits for NACE; 3 digits for ISCO)

NACE Rev. 2 - 2 digits

		Fully cultural				Partly		Not cultural		
		59	60	90	91	58	74	(… other NACE codes)		
	262	1	1	1	1	1	1	(…)	1	1
Fully cultural — 264	264	1	1	1	1	1	1	(…)	1	1
	265	1	1	1	1	1	1	(…)	1	1
	216	1	1	1	1	1	1	(…)	1	1
	235	1	1	1	1	x	x	(…)	z	z
Partly cultural	343	1	1	1	1	x	x	(…)	z	z
	352	1	1	1	1	x	x	(…)	z	z
	441	1	1	1	1	x	x	(…)	z	z
	731	1	1	1	1	x	x	(…)	z	z
	(… other ISCO codes)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)
Not cultural		1	1	1	1	y	y	(…)	0	0
		1	1	1	1	y	y	(…)	0	0

ISCO08 - 3 digits

NACE 59, 60, 90 and 91, as well as ISCO08 216, 262, 264, and 265 categories are deemed 100% cultural: all related cultural coefficients are 1, as employment in those segments is deemed cultural. In addition, there are NACE2D and ISCO3D codes which are only "partly" cultural and for which the cultural weight should be estimated. Figure 1 shows the initial state of the cultural coefficients matrix, where the x's, y's and z's denote cultural coefficients to be estimated, for every country and every reference year.

The **y coefficients** relate to partly cultural NACE codes crossed with non-cultural occupations (i.e. ISCO08 codes other than 216, 262, 264, 265, 235, 343, 352, 441 or 731). More specifically, "partly

cultural NACE codes" refer to NACE2D codes (i.e. NACE Rev2 codes at the 2nd digit level) which are partly cultural and for which there is at least one sub-category (NACE3D code) which is fully cultural. This is the case of only two NACE2D codes: 74 (Other professional, scientific and technical activities) and 58 (Publishing activities). Regarding NACE code 74, for example, it is sub-divided into three fully cultural categories (74.1 Specialised design activities, 74.2 Photographic activities and 74.3 Translation and interpretation activities) and another category not cultural (74.9). From the countries providing the NACE codes at the 3rd digit level, this culture-related part (74.1+74.2+74.3) may be isolated and the cultural coefficient directly computed without estimation.

The **z coefficients** aim at estimating the cultural weight of partly cultural occupations outside the cultural sectors (i.e. NACE codes other than 59, 60, 90, 91, 58 or 74). As for the partly cultural NACE2D codes, "partly cultural occupations" similarly refers to ISCO3D codes non-fully cultural for which there is at least one ISCO4D sub-category which is fully cultural: this is the case for ISCO08 codes 235, 343, 352, 441, 731. For example, code 352 (Telecommunications and broadcasting technicians) includes fully cultural occupations 3521 (Broadcasting and audio-visual technicians) as well as non-cultural occupations 3522 (Telecommunications engineering technicians). Only the 3521 part should intervene with the 352 code when computing Cultural employment statistics. This requires a codification detail of 4 digits for ISCO.

The **x coefficients** target those individuals who work in a partly cultural NACE2D sector (NACE 74) and report a partly cultural occupation (ISCO08 codes 235, 343, 352, 441, 731).

Whenever the level of detail provided by a country for NACE or ISCO is not sufficient, those three types of cultural coefficients have to be estimated from all EU countries providing a sufficient level of detail.

1) Y coefficients
   Those coefficients are computed for all countries which provide 3 digits for NACE codes (NACE3D). In 2011 there were 21 Member States, accounting for 93% of the population in employment of all EU-28 countries. The share stood at around 85% in 2009 and 2010 and 70% in 2008.
   The coefficients are simply obtained by calculating the share of NACE codes 74.1+74.2+74.3 in the whole NACE code 74, to be computed for each not cultural ISCO3D category. The obtained coefficients will therefore be used in other countries which provide less than 3 digits in their NACE coding.

2) Z coefficients
   Those coefficients are computed for all countries providing 4 digits for ISCO codes (ISCO4D). In 2011 there were 18 Member States, accounting for 53% of the population in employment of all EU28 countries. Before 2011, about 40% of the population in employment was covered at that ISCO4D level of detail.
   The z coefficients are computed using a similar methodology as for Y coefficients. For example, for each NACE2D category (except 59, 60, 90, 91, 58 and 74), the ratio ISCO3521/(ISCO3521+ISCO3522) provides the cultural coefficients related to the row ISCO 352.

3) X coefficients
   The X coefficients are also calculated in a similar way to Y and Z coefficients. However, it is a bit more complex and a detailed example is needed.

For instance, let's consider the X coefficient to be estimated at the intersection of ISCO 352 row and NACE 74 column. This coefficient is denoted $x_{74,352}$ while the weighted sample size (observed number of individuals classified in that cell, and weighted) is denoted (74,352). Figure 2 below is a zoom in on that part of the cultural matrix shown above in Figure 1.

Figure 2 Computation of x coefficients: example for $x_{74,352}$

			NACE 74			
			Fully cultural sub-codes			Partly or Not cultural
			741	742	743	749
ISCO 352	Fully cultural sub-codes	3521	A			B
	Partly or Not cultural	3522	C			D

Individuals classified in the white cells in Figure 2 (i.e. A + B +C) are included in Employment statistics (since they either have a fully cultural occupation, or they work in a fully cultural sector), whereas the grey-shaded cell (D) i.e. weighted sample size (749, 3522) is not included.

The estimation of the x cultural coefficients depends on the level of detail provided by countries in their NACE and ISCO codification.

- Regarding countries providing data at NACE3D*ISCO4D (i.e. 3 digits for NACE codes; 4 digits for ISCO), the computation of the cultural coefficient is direct, without any estimation needed: $x_{74,352} = (A+B+C)/(A+B+C+D)$.

Regarding other levels of detail, estimation is unavoidable: the estimated part will vary according to the level of detail provided by countries. It has been decided to opt for an approach reducing as much as possible the estimated part of the final estimates. This principle results in the following procedures for each type of codification detail profile.

- NACE3D*ISCO3D countries: the (A+C) part may be directly computed; only the B part is to be estimated. It is therefore estimated from all EU-28 countries providing a NACE3D*ISCO4D codification detail.

- NACE2D*ISCO4D countries: the (A+B) part may be directly computed; only the C part is to be estimated. It is therefore estimated from all EU-28 countries providing a NACE3D*ISCO4D codification detail.

- NACE2D*ISCO3D countries: at this minimal requirement level of codification, 2 procedures may be envisaged. On the one hand, the (A+B+C) part may be computed from all NACE3D*ISCO4D countries and applied to NACE2D*ISCO3D countries. On the other hand, only the C part would be estimated from EU-28 NACE3D*ISCO4D countries. The remaining (A+B) part would be estimated from all EU countries providing at least 4 digits for ISCO (i.e. NACE3D*ISCO4D and NACE2D*ISCO4D countries). The second option was preferred.

It has to be noted that, for some countries, there are unclassified statistical units ("no answer").
For example, for a country providing *mainly* data at ISCO 4 digits and NACE 3 digits, the code "No answer" may appear for NACE in conjunction with ISCO codes at the most detailed level (4 digits). In such cases, the values are not used for estimating the cultural coefficient to be extrapolated to countries with a lower level of detail, and are simply ignored. In other words, those missing codes (No answer) are assumed to be missing at random (and therefore distributed across all NACE*ISCO patterns in the same way as other statistical units).

ANNEX

Detailed culture-related NACE Rev.2and ISCO-08 codes

Table A: *Economic activities (NACE Rev. 2 at 2, 3 and 4 digits) which are included in the scope of cultural employment, according to the ESSnet-culture 2012 report and revision agreed in 2016*

NACE code	Description	Cultural coefficient
18	Printing and reproduction of recorded media	1**
18.1	Printing and service activities related to printing	1**
18.2	Reproduction of recorded media	1**
32	Other manufacturing	x
	(…)	
32.2	Manufacture of musical instruments	1**
47	Retail trade, except of motor vehicles and motorcycles	x
	(…)	
47.6	Retail sale of cultural and recreation goods in specialised stores	x
47.61	Retail sale of books in specialised stores	1**
47.62	Retail sale of newspapers and stationery in specialised stores	1**
47.63	Retail sale of music and video recordings in specialised stores	1**
47.64	Retail sale of sporting equipment in specialised stores	0
47.65	Retail sale of games and toys in specialised stores (…)	0
58	Publishing activities	x
58.1	Publishing of books, periodicals and other publishing activities	1**
58.11	Book publishing	1
58.12	Publishing of directories and mailing lists	0
58.13	Publishing of newspapers	1
58.14	Publishing of journals and periodicals	1
58.19	Other publishing activities	0
58.2	Software publishing	x
58.21	Publishing of computer games	1
58.29	Other software publishing	0
59	Motion picture, video and television programme production, sound recording and music publishing activities	1
59.1	Motion picture, video and television programme activities	1
59.11	Motion picture, video and television programme production activities	1
59.12	Motion picture, video and television programme post-production activities	1
59.13	Motion picture, video and television programme distribution activities	1
59.14	Motion picture projection activities	1
59.2	Sound recording and music publishing activities	1
59.20	Sound recording and music publishing activities	1
60	Programming and broadcasting activities	1
60.1	Radio broadcasting	1
60.10	Radio broadcasting	1
60.2	Television programming and broadcasting activities	1
60.20	Television programming and broadcasting activities	1
63	Information service activities	x
63.1	Data processing, hosting and related activities; web portals	0
63.9	Other information service activities	x
63.91	News agency activities	1
63.99	Other information service activities n.e.c.	0

71	Architectural and engineering activities; technical testing and analysis	x
71.1	Architectural and engineering activities and related technical consultancy	x
71.11	Architectural activities	1
71.12	Engineering activities and related technical consultancy	0
71.2	Technical testing and analysis	0
73	Advertising and market research	x
73.1	Advertising	x
73.11	Advertising agencies	x
73.12	Media representation	0
73.2	Market research and public opinion polling	0
74	Other professional, scientific and technical activities	x
74.1	Specialised design activities	1
74.10	Specialised design activities	1
74.2	Photographic activities	1**
74.20	Photographic activities	x
74.3	Translation and interpretation activities	1**
74.30	Translation and interpretation activities	x
74.9	Other professional, scientific and technical activities n.e.c.	0
77	Rental and leasing activities	x
	(…)	
77.2	Renting and leasing of personal and household goods	x
77.21	Renting and leasing of recreational and sports goods	0
77.22	Renting of video tapes and disks	1**
77.29	Renting and leasing of other personal and household goods (…)	0
85	Education	x
	(…)	
85.5	Other education	x
85.51	Sports and recreation education	0
85.52	Cultural education	1
85.53	Driving school activities	0
85.59	Other education n.e.c. (…)	0
90	Creative, arts and entertainment activities	1
90.0	Creative, arts and entertainment activities	1
90.01	Performing arts	1
90.02	Support activities to performing arts	1
90.03	Artistic creation	1
90.04	Operation of arts facilities	1
91	Libraries, archives, museums and other cultural activities	1*
91.0	Libraries, archives, museums and other cultural activities	1
91.01	Library and archives activities	1
91.02	Museums activities	1
91.03	Operation of historical sites and buildings and similar visitor attractions	1
91.04	Botanical and zoological gardens and nature reserves activities	1*

* In the ESSnet-culture 2012 report, code NACE 91 was considered as partly cultural (91.04 excluded from the cultural scope). However, the whole code was accepted in 2015 by the Working Group 'Culture statistics' to be taken into account for the calculation of cultural employment (because of the non-availability in the EU-LFS of data at 4-digits of NACE).

** Those codes were added to the scope of cultural employment, according to the conclusions of the meeting of the WG 'Culture statistics' held at Eurostat in 2016.

Table B: *Occupations (ISCO-08 at 3 and 4 digits) which included in the scope of cultural employment, according to the ESSnet-culture 2012 report and revision agreed in 2016*

ISCO 08 Code	Description	Cultural coefficient
122	Sales, marketing and development managers	x
1221	Sales and marketing managers	0
1222	Advertising and public relations managers	x
1223	Research and development managers	0
134	Professional services managers	x
1341	Child care services managers	0
1342	Health services managers	0
1343	Aged care services managers	0
1344	Social welfare managers	0
1345	Education managers	0
1346	Financial and insurance services branch managers	0
1349	Professional services managers not elsewhere classified	x
143	Other services managers	x
1431	Sports, recreation and cultural centre managers	x
1439	Services managers not elsewhere classified	0
216	Architects, planners, surveyors and designers	1*
2161	Building architects	1
2162	Landscape architects	1
2163	Product and garment designers	1
2164	Town and traffic planners	1*
2165	Cartographers and surveyors	1*
2166	Graphic and multimedia designers	1
231	University and higher education teachers	x
2310	University and higher education teachers	x
232	Vocational education teachers	x
2320	Vocational education teachers	x
233	Secondary education teachers	x
2330	Secondary education teachers	x
234	Primary school and early childhood teachers	x
2341	Primary school teachers	x
2342	Early childhood educators	0
235	Other teaching professionals	x
2351	Education methods specialists	0
2352	Special needs teachers	0
2353	Other language teachers	1*
2354	Other music teachers	1
2355	Other arts teachers	1
2356	Information technology trainers	0
2359	Teaching professionals not elsewhere classified	0
251	Software and applications developers and analysts	x
2511	Systems analysts	0
2512	Software developers	0
2513	Web and multimedia developers	x
2514	Applications programmers	0
2519	Software developers and analysts not elsewhere classified	0
262	Librarians, archivists and curators	1
2621	Archivists and curators	1

2622	Librarians and related information professionals	1
263	Social and religious professionals	x
2631	Economists	0
2632	Sociologists, anthropologists and related professionals	x
2633	Philosophers, historians and political scientists	x
2634	Psychologists	0
2635	Social work and counselling professionals	0
2636	Religious professionals	0
264	Authors, journalists and linguists	1
2641	Authors and related writers	1
2642	Journalists	1
2643	Translators, interpreters and other linguists	1
265	Creative and performing artists	1
2651	Visual artists	1
2652	Musicians, singers and composers	1
2653	Dancers and choreographers	1
2654	Film, stage and related directors and producers	1
2655	Actors	1
2656	Announcers on radio, television and other media	1
2659	Creative and performing artists not elsewhere classified	1
333	Business services agents	x
3331	Clearing and forwarding agents	0
3332	Conference and event planners	0
3333	Employment agents and contractors	0
3334	Real estate agents and property managers	0
3339	Business services agents not elsewhere classified	x
343	Artistic, cultural and culinary associate professionals	x
3431	Photographers	1
3432	Interior designers and decorators	1
3433	Gallery, museum and library technicians	1
3434	Chefs	0
3435	Other artistic and cultural associate professionals	1
352	Telecommunications and broadcasting technicians	x
3521	Broadcasting and audio-visual technicians	1
3522	Telecommunications engineering technicians	0
441	Other clerical support workers	x
4411	Library clerks	1
4412	Mail carriers and sorting clerks	0
4413	Coding, proof-reading and related clerks	0
4414	Scribes and related workers	0
4415	Filing and copying clerks	0
4416	Personnel clerks	0
4419	Clerical support workers not elsewhere classified	0
511	Travel attendants, conductors and guides	x
5111	Travel attendants and travel stewards	0
5112	Transport conductors	0
5113	Travel guides	x
731	Handicraft workers	x
7311	Precision-instrument makers and repairers	0
7312	Musical instrument makers and tuners	1
7313	Jewellery and precious-metal workers	1
7314	Potters and related workers	1
7315	Glass makers, cutters, grinders and finishers	1

7316	Sign writers, decorative painters, engravers and etchers	1
7317	Handicraft workers in wood, basketry and related materials	1
7318	Handicraft workers in textile, leather and related materials	1
7319	Handicraft workers not elsewhere classified	1
752	Wood treaters, cabinet-makers and related trades workers	x
7521	Wood treaters	0
7522	Cabinet-makers and related workers	x
7523	Woodworking-machine tool setters and operators	0

* Those codes were added to the scope of cultural employment, according to the conclusions of the meeting of the WG 'Culture statistics' held at Eurostat in 2016.