Options for extrapolation / retrapolation of the ICP 2011 benchmark PPPs and linking interim regional updates into a new global comparison

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International Comparison Program

ICP 2017: TF "PPP Computation"
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Users are interested in the PPP time–series

ICP 2005 – ICP 2011 – ICP 2017
What in the meantime?

Two tasks to obtain the Global interim PPPs:

- **The extrapolation / retrapolation of the ICP 2011 PPPs**
- **Linking interim regional updates into a global comparison**

The extrapolation of the 2011 Global PPPs is necessary in any case for all regions:

- Interim updates exist not for all ICP regions and not for all Years 2012 - 2016

- Interim Global Core list was available only for 2015-2016 => input data is still poor and new Global linking is questionable

Extrapolation Database for Years 2012 – 2016 (v14)

CPI	**Consumer price indices (2011 = 100)**
DEF	National account deflators (2011 = 100)
EXP	National accounts expenditures (LCU)
POP	Population
PPP	Purchasing power parities (Global ICP 2011, USD =1) *)
XR	Exchange rate (USD = 1)

*) **Official ICP 2011 PPPs => without changes – only adjustment for the countries who changed national currency (LT, LV)**

The extrapolation of the ICP 2011 PPPs to Y 2012-2016

The following specific tasks should be carried out:

- Reviewing the input data and determining the most feasible estimation approach
- Conducting estimation of the non-benchmark year **PPPs for the main ICP regions** by different aggregation levels
- Conducting estimation of the non-benchmark year **global PPPs** by different aggregation levels
- **Integration** of Regional updates into new Global results
- **Report** on the estimation approach as well as key findings for the review by the WB and the ICP Regional Coordinating Agencies (Autumn 2018?)

Validation of data in the WB Extrapolation DB

The following aspects of the validation:

- **Covering / Availability**
- **Applicability**
- **Within-country consistency (e.g. CPI-Total & NA Def)**
- **Inter-country comparability**

Experience:

All indicators even from the official databases should be checked / analyzed carefully

Validation of CPI data as an example

Covering: 12 main COICOP groups

General points (reservations):

- Applicability as NA deflators?
  - Methodological differences (different price concepts – Health, Education) => Consistency between HH deflators and CPI-Total
- Applicability as PPP extrapolators?
  - (significant) differences between PPP and CPI baskets
  - country's peculiarities in the methodology, etc. =>
  - Limited comparability of the CPI figures between the countries

Technical point:

- CPI figures should be presented with the base 2011 = 100

Applicability (?) of CPI figures as NA deflators

➢ Eurostat exercise for "Health"

- AT PLI (DE = 100) in the ICP 2011 was **133**%
- Health-CPI "2016 / 2011": AT – **112**% & DE – **103**%; =>
- AT 2016 AT PLI (DE = 100) is **118**%!

➢ Eurostat exercise for "Education"

(Output approach; combined input data for HH, NPI, GG)

	PPP 2011 (EU28 = 1)	CPI 2016/2011	PPP 2016 (EU28 = 1)
BE	1.789	**136.2**	1.705
DE	1.322	**96.6**	1.382
EE	0.555	**68.2**	0.692
UK	1.544	**159.4**	1.485

Applicability (?) of CPI figures as Extrapolators (1)

HICP (2015 = 100) - annual data (average index) [prc_hicp_aind]

Last update	17.01.18				17.01.18		
Extracted on	12.02.18				12.02.18		
Source of da	Eurostat				Eurostat		
UNIT	Annual average index			UNIT	Annual average index		
COICOP	Telephone and telefax equipment			COICOP	Telephone and telefax services		
GEO/TIME	2005	2017	2017/2005	GEO/TIME	2005	2017	2017/2005
EU28	325.61	87.97	27.0	EU28	115.77	98.99	85.5
EA19	321.05	89.27	27.8	EA19	119.12	99.24	83.3
Belgium	134.04	92.76	69.2	Belgium	120.47	107.09	88.9
Bulgaria	306.50	79.37	25.9	Bulgaria	114.55	94.18	82.2
Czech R.	721.5	78.4	10.9	Czech R.	123.2	99.2	80.5
Denmark	288.7	88.4	30.6	Denmark	120.5	85.3	70.8
Germany	201.6	99.4	49.3	Germany	119.3	97.5	81.7
Estonia	:	65.65	#WERT!	Estonia	:	97.58	#WERT!
Ireland	:	73.7	#WERT!	Ireland	:	98.7	#WERT!
Greece	195.53	85.95	44.0	Greece	107.40	102.28	95.2
Spain	838.74	83.78	10.0	Spain	116.90	104.88	89.7
France	417.03	83.06	19.9	France	133.12	97.80	73.5
Croatia	157.77	93.55	59.3	Croatia	112.76	96.31	85.4
Italy	363.0	96.0	26.4	Italy	117.8	98.0	83.2
Cyprus	249.50	73.66	29.5	Cyprus	93.39	98.61	105.6
Latvia	436.30	93.83	21.5	Latvia	140.49	107.24	76.3
Lithuania	224.38	82.22	36.6	Lithuania	134.67	96.79	71.9
Luxembourg	197.94	84.85	42.9	Luxembourg	102.55	99.00	96.5
Hungary	:	85.28	#WERT!	Hungary	:	97.95	#WERT!
Malta	:	77.49	#WERT!	Malta	:	99.89	#WERT!
Netherlands	:	70.55	#WERT!	Netherlands	:	91.14	#WERT!
Austria	261.32	97.82	37.4	Austria	100.18	96.28	96.1
Poland	:	86.9	#WERT!	Poland	:	100.3	#WERT!
Portugal	303.31	144.68	47.7	Portugal	98.18	105.03	107.0
Romania	99.68	99.44	99.8	Romania	79.04	98.71	124.9
Slovenia	217.60	90.08	41.4	Slovenia	103.19	104.56	101.3
Slovakia	543.50	92.53	17.0	Slovakia	100.54	99.95	99.4
Finland	444.34	64.91	14.6	Finland	116.36	105.42	90.6
Sweden	:	72.76	#WERT!	Sweden	:	97.58	#WERT!
United Kingd	:	:	#WERT!	United Kingd	:	:	#WERT!
European Ec	305.12	88.50	29.0	European Ec	115.95	99.02	85.4
Iceland	186.40	82.22	44.1	Iceland	60.72	71.21	117.3
Norway	36.7	110.4	300.8	Norway	138.4	103.7	74.9
Switzerland	243.43	97.94	40.2	Switzerland	127.97	96.79	75.6
Serbia	:	125.2	#WERT!	Serbia	:	104.3	#WERT!
Turkey	221.60	97.22	43.9	Turkey	74.62	106.94	143.3

Applicability (?) of CPI figures as Extrapolators (2)

HICP (2015 = 100) - annual data (average index) [prc_hicp_aind]			
Last update	23.02.18		
Source of data	Eurostat		
UNIT	Annual average index		
COICOP	Garments		
GEO/TIME	2005	2016	2016/2005
EU28	101.10	100.17	0.991
Euro19	95.40	100.39	1.052
Belgium	92.99	100.76	1.084
Bulgaria	80.70	100.26	1.242
Czech Republic	124.8	100.8	0.808
Denmark	110.5	95.8	0.867
Germany	92.2	100.3	1.088
Estonia	70.13	103.78	1.480
Ireland	158.3	97.5	0.616
Greece	94.70	97.41	1.029
Spain	95.51	100.85	1.056
France	97.17	100.43	1.034
Croatia	115.85	100.53	0.868
Italy	94.3	100.5	1.066
Cyprus	115.05	100.84	0.876
Latvia	116.38	99.88	0.858
Lithuania	128.87	101.32	0.786
Luxembourg	94.82	101.06	1.066
Hungary	98.86	100.26	1.014
Malta	99.59	97.59	0.980
Netherlands	101.59	100.76	0.992
Austria	93.09	100.72	1.082
Poland	168.2	95.0	0.565
Portugal	121.84	99.43	0.816
Romania	79.99	101.26	1.266
Slovenia	107.47	98.63	0.918
Slovakia	96.70	99.92	1.033
Finland	97.07	98.98	1.020
Sweden	90.31	103.73	1.149
United Kingdom	123.8	100.3	0.810
EEA31	101.39	100.24	0.989
Iceland	68.42	95.43	1.395
Norway	138.3	105.1	0.760
Switzerland	90.76	106.83	1.177
Serbia	:	99.4	#WERT!
Turkey	63.83	106.58	1.670

Consistency (?) of CPI-Total and HH Deflators

CPI-Total figures and HH-deflators can be different due to different concepts but the differences should not be very high

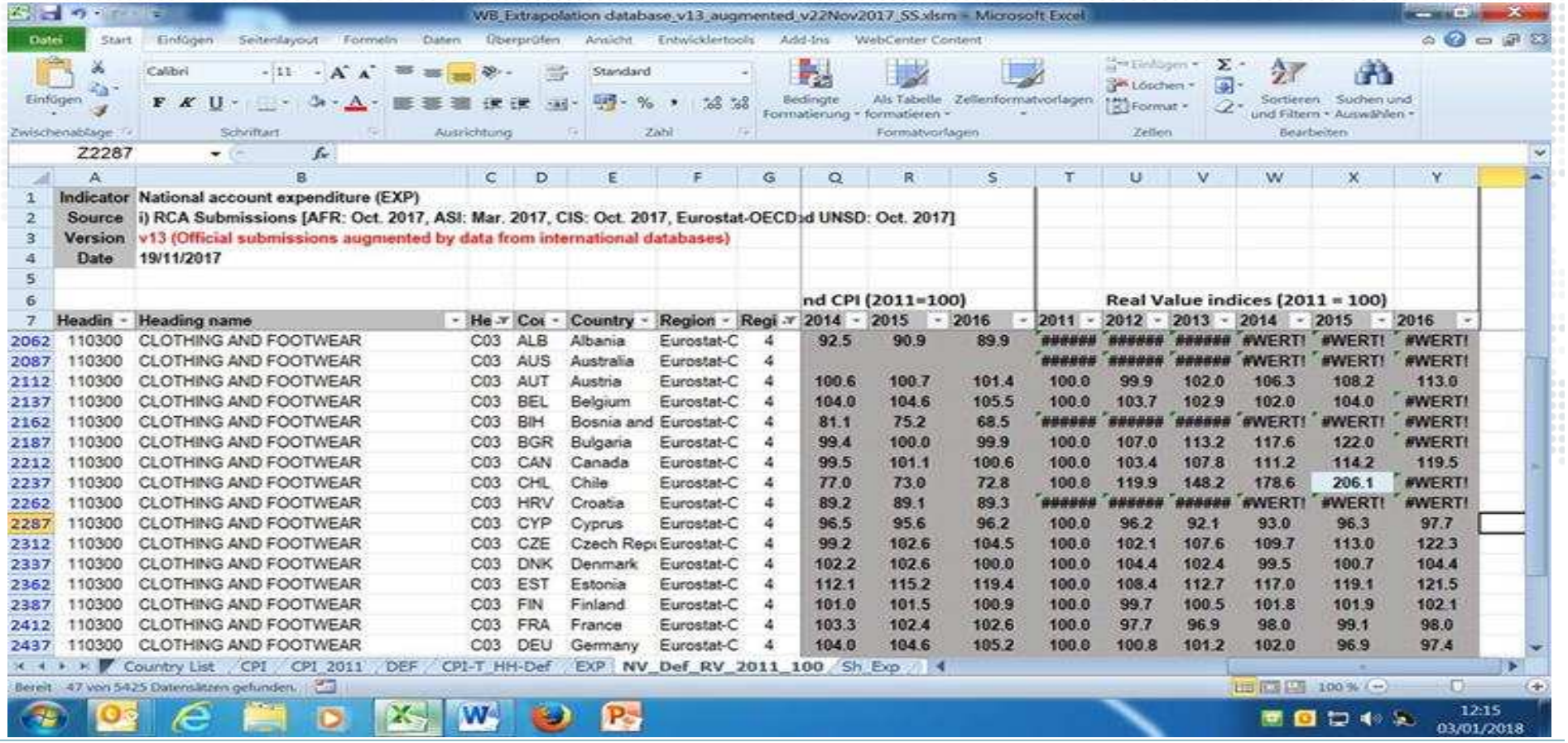
Indicator	National Accounts HH Deflators (DEF) & CPI-Total
Source	i) RIA Submissions (AFR: Sep. 2017, ASI: Mar. 2017, CIS (indexed - chainlinked series): Feb. 2018, LAC: Jan. 2017, WAS: Sep. 2015, EUO: Oct. 2017)
Version	v14 (Official submissions augmented by data from international databases)
Date	26/02/2018
Notes:	

Heading c	Heading name	Head	Count	Country na	Region	Reg	2011	2012	2013	2014	2015	2016	Nc
110000	Def HH / CPI-Total	M01	TCD	Chad	Africa	1	1.000	0.989	0.989	1.191	1.147	#WERT!	10
110000	Def HH / CPI-Total	M01	COD	Congo, Dem.	Africa	1	1.000	1.092	0.986	0.919	0.874	#WERT!	12
110000	Def HH / CPI-Total	M01	EGY	Egypt, Arab I	Africa	1	1.000	1.148	1.119	1.144	1.144	1.064	16
110000	Def HH / CPI-Total	M01	GHA	Ghana	Africa	1	1.000	1.034	1.111	1.241	1.233	1.293	21
110000	Def HH / CPI-Total	M01	GIN	Guinea	Africa	1	1.000	0.929	0.879	0.844	0.815	#WERT!	22
110000	Def HH / CPI-Total	M01	LBR	Liberia	Africa	1	1.000	1.001	1.028	1.056	0.855	#WERT!	26
110000	Def HH / CPI-Total	M01	RWA	Rwanda	Africa	1	1.000	0.964	0.941	0.936	0.899	0.865	37
110000	Def HH / CPI-Total	M01	STP	São Tomé an	Africa	1	1.000	1.005	1.363	1.285	1.281	#WERT!	38
110000	Def HH / CPI-Total	M01	LAO	Lao PDR	Asia and th	2	1.000	1.128	1.126	1.151	1.172	1.100	60
110000	Def HH / CPI-Total	M01	KAZ	Kazakhstan	CIS	3	1.000	1.009	1.112	1.100	1.159	1.166	77
110000	Def HH / CPI-Total	M01	EGZ	Egypt, Arab I	Western A:	6	1.000	1.141	1.113	1.138	1.138	1.058	148
110000	Def HH / CPI-Total	M01	SDO	Sudan (WAS)	Western A:	6	1.000	1.134	1.123	1.084	1.159	#WERT!	156

Reliability of CPI figures, NA Def & consistency with NA exp.

Indirect evaluation via the calculation of the country's Real Volume indices (2011 = 100) for M aggregates and C categories

"Real value index = "Nominal value index" / "CPI or NA deflator"



WB_Extrapolation database_v13_augmented_v22Nov2017_SS.xlsm - Microsoft Excel

	A	B	C	D	E	F	G	Q	R	S	T	U	V	W	X	Y
1	Indicator	National account expenditure (EXP)														
2	Source	i) RCA Submissions [AFR: Oct. 2017, ASI: Mar. 2017, CIS: Oct. 2017, Eurostat-OECD and UNSD: Oct. 2017]														
3	Version	v13 (Official submissions augmented by data from international databases)														
4	Date	19/11/2017														
5																
6								nd CPI (2011=100)			Real Value indices (2011 = 100)					
7	Headin	Heading name	He	Cou	Country	Region	Regi	2014	2015	2016	2011	2012	2013	2014	2015	2016
2062	110300	CLOTHING AND FOOTWEAR	C03	ALB	Albania	Eurostat-C	4	92.5	90.9	89.9	######	######	######	#WERT!	#WERT!	#WERT!
2087	110300	CLOTHING AND FOOTWEAR	C03	AUS	Australia	Eurostat-C	4				######	######	######	#WERT!	#WERT!	#WERT!
2112	110300	CLOTHING AND FOOTWEAR	C03	AUT	Austria	Eurostat-C	4	100.6	100.7	101.4	100.0	99.9	102.0	106.3	108.2	113.0
2137	110300	CLOTHING AND FOOTWEAR	C03	BEL	Belgium	Eurostat-C	4	104.0	104.6	105.5	100.0	103.7	102.9	102.0	104.0	#WERT!
2162	110300	CLOTHING AND FOOTWEAR	C03	BIH	Bosnia and	Eurostat-C	4	81.1	75.2	68.5	######	######	######	#WERT!	#WERT!	#WERT!
2187	110300	CLOTHING AND FOOTWEAR	C03	BGR	Bulgaria	Eurostat-C	4	99.4	100.0	99.9	100.0	107.0	113.2	117.6	122.0	#WERT!
2212	110300	CLOTHING AND FOOTWEAR	C03	CAN	Canada	Eurostat-C	4	99.5	101.1	100.6	100.0	103.4	107.8	111.2	114.2	119.5
2237	110300	CLOTHING AND FOOTWEAR	C03	CHL	Chile	Eurostat-C	4	77.0	73.0	72.8	100.0	119.9	148.2	178.6	206.1	#WERT!
2262	110300	CLOTHING AND FOOTWEAR	C03	HRV	Croatia	Eurostat-C	4	89.2	89.1	89.3	######	######	######	#WERT!	#WERT!	#WERT!
2287	110300	CLOTHING AND FOOTWEAR	C03	CYP	Cyprus	Eurostat-C	4	96.5	95.6	96.2	100.0	96.2	92.1	93.0	96.3	97.7
2312	110300	CLOTHING AND FOOTWEAR	C03	CZE	Czech Repu	Eurostat-C	4	99.2	102.6	104.5	100.0	102.1	107.6	109.7	113.0	122.3
2337	110300	CLOTHING AND FOOTWEAR	C03	DNK	Denmark	Eurostat-C	4	102.2	102.6	100.0	100.0	104.4	102.4	99.5	100.7	104.4
2362	110300	CLOTHING AND FOOTWEAR	C03	EST	Estonia	Eurostat-C	4	112.1	115.2	119.4	100.0	108.4	112.7	117.0	119.1	121.5
2387	110300	CLOTHING AND FOOTWEAR	C03	FIN	Finland	Eurostat-C	4	101.0	101.5	100.9	100.0	99.7	100.5	101.8	101.9	102.1
2412	110300	CLOTHING AND FOOTWEAR	C03	FRA	France	Eurostat-C	4	103.3	102.4	102.6	100.0	97.7	96.9	98.0	99.1	98.0
2437	110300	CLOTHING AND FOOTWEAR	C03	DEU	Germany	Eurostat-C	4	104.0	104.6	105.2	100.0	100.8	101.2	102.0	96.9	97.4

Country List | CPI | CPI_2011 | DEF | CPI-T_HH-Def | EXP | NV_Def_RV_2011_100 | Sh_Exp

Bereit 47 von 5425 Datensätzen gefunden.

12:15 03/01/2018

Inter-country comparability (?) of NA data

- SNA 2008 vs. SNA 1993 concepts
- Structural analysis - the shares of NA aggregates and categories within the GDP and HH

Indicator	National account expenditure (EXP) - Shares (%) in GDP
Source	i) RIA Submissions [AFR: Oct. 2017, ASI: Mar. 2017, CIS: Feb. 2018, Eurostat-OECD: Oct. 2017, LAC: Nov. 2016, WAS: Sep. 2015]; ii) Intl database [WB WDI
Version	v14 (Official submissions augmented by data from international databases)
Date	26/02/2018

eading	Heading name	Head	Cou	Country na	Regi	Re	2011	2012	2013	2014	2015	2016
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		BDI	Burundi	Africa	1	82.5	85.2	88.5	83.9	101.5	
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		SLE	Sierra Leone	Africa	1	95.3	89.0	106.8	100.0	101.5	101.3
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		BRN	Brunei Darussa	Asia and	2	12.8	13.8	15.3	15.5	19.8	
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		KGZ	Kyrgyzstan	CIS	3	83.4	95.8	97.2	96.0	90.5	87.4
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		LUX	Luxembourg	Eurosta	4	31.3	32.2	31.7	30.3	30.0	30.3
110000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOM1		VEN	Venezuela, Bo	Latin An	5	55.2	59.3	85.1	75.3	121.3	

Main current actions

- **Finalization of the Extrapolation DB (May 2018?)**

- **Extrapolation of Global and Regional 2011 PPPs**
  (GDP, M1 + M3-M5; C1 – C12): May - June 2018?
  [All calculations without Regional fixity]

- **Main aim of the experiments -**

<u>To evaluate</u> - What the aggregated level (GDP deflator & HH-Def, C1-C13+M1-M7, M1-M7) is the most appropriate / practicable for the extrapolation? What are differences between results obtained by different aggregated levels?

Extrapolation of Global and Regional PPPs
(GDP, M1 + M3-M5; C1 – C12)

Extrapolated Global PPP to USD:

Global PPP "Country X / USA" for year (2011+t) =
Global PPP "Country X / USA" for year 2011 * (Def $X^{2011+t/2011}$ / Def $USA^{2011+t/2011}$)

Regional PPPs to Base currency:

Regional PPP "Country X / Reg.B" for year (2011+t) =
Regional PPP "Country X/Reg.B" year 2011*(Def $X^{2011+t/2011}$/Def $Reg.B^{2011+t/2011}$)

- **Extrapolation of Global and Regional is done separately for GDP, C1-C12, M1-M5**
  - NA deflators - for GDP and M1-M5 aggregates
  - CPI data – for Consumer Headings (C1-C12)
  - Yearly XRs – for M7 („Net exports") and C13 („Net touristic consumption"), M6 („Changes in inventories and valuables") – ref. PPPs or XRs

If there is no new Global price data then the extrapolation of ICP 2011 Linking Factors is not necessary

Aggregation of extrapolated PPPs: possible approaches

Three approaches are more or less feasible:

- **No aggregation** = **Global extrapolation** => **G version:**
  G (GDP) and G(HH) by HH-Def or CPI-T

- **Intermediate version** => EKS at the M level (M1 & M3-M7)
  => **M version** (6 categories)

- **Detailed version** => EKS for the combination of C1-C13 & M3-M7
  => **C+M version** (13+5 = 18 categories)

Conclusions on the extrapolation from former experiments

- **From the theoretical point of view, the C+M version would be preferable.** However applicability of CP figures for some important HH categories and the comparability of detailed figures between the countries are questionable

- **Version M seems to be the best practicable version**

[The Eurostat-OECD experience shows that if there is no new price data then the Global extrapolation at the GDP level (and the HH) brings very close results as the aggregation of extrapolated PPP.

The main advantage of the M version is that this allows to take into account the consistency with the official ICP methodology – the use of XRs for "Net exports"

(a kind of the consideration of "Changes in terms of trade")

Scope of the M aggregation

Depend on the availability and reliability of input data

Full version

11-120000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HH and NPI	M1+M2
130000	INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT	M3
140000	COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT	M4
150000	GROSS FIXED CAPITAL FORMATION	M5
160000	CHANGES IN INVENTORIES & VALUABLES	M6
170000	BALANCE OF EXPORTS AND IMPORTS	M7

Reduced version

11-120000	INDIVIDUAL CONSUMPTION EXPENDITURE BY HH and NPI **(C)**	M1+M2
13-140000	INDIVIDUAL & COLLERCTIVE CONSUMPTION EXPENDITURE BY GG **(G)**	M3+M4
15-160000	GROSS CAPITAL FORMATION **(I)**	M5+M6
170000	BALANCE OF EXPORTS AND IMPORTS **(X - M)**	M7

Further experiments 2012-2016 for M and C+M versions

- **The Global and Regional EKS aggregations for M version (and/or for C+M version)**
- **Aggregated results for HFCE, AIC, GDP**
- **Regional fixity of new Regional results):**

- **CAR-Volume Approach:** **VI "Country / World" =**

VI "Region / World" [*global comparison*] × VI "Country / Region"
[*regional comparison*]

- **CAR-PPP Approach:** **PPP "Country / World" =**

PPP "Region / World" [*global comparison*] × PPP "Country / Region"
[*regional comparison*]

Interim Regional activities: 2012-2016

- **Africa => HHC 2015 – 2016 (not finalized)**
- **Asia (w/o China) => GDP 2016 (not finalized)**
- **CIS => GDP 2014 (multilateral linking with EUO by the EKS aggregation; linking BH-PPPs – via RUS)**
- **EUO => Eurostat – yearly *(general NA & PPP revision 1995-2012)***
  OECD – yearly from 2014 (at least, for HH)
- **LAC = > No interim activities**
- **WAS => GDP 2012-2013 (finalized); GDP 2014-2016 (not finalized)**

Linking interim regional updates into a new global set (1)

Problems for obtaining a new set of Global results

- Not all Regions and not all countries in the Regions carried out the interim activities *(Asia – without China!)*
- Differents years and different NA indicators (HH, GDP)
- Availability and applicability of data from the Interim Regional updates for the Global update is unknown for the moment => careful validation at the BH level together with the RC is necessary !
- Especial problematic areas: Consumer segments with rapid technical changes; Rents; Health; Education; Construction

Linking interim regional updates into a new global set (2)

Conclusions from the analysis of the problems

- **The extrapolation of the 2011 Global benchmark PPPs is necessary in any case**
- **There are not many options for Linking interim regional updates into a global set**
- **Most realistic version:**
  - **Global extrapolation to link all Regions together**
  - **Partially-Global comparison for the Regions having interim results on the basis a "new" Global list**
  - **All new available results are integrated in the Global extrapolated results with fixity of regional updates (CAR-Volume or CAR-PPP approaches)**

Determination of the final goals of the exercise

- How close do we need to be to the 2017 round, to the 2011, or to the interim results from whatever year they were? Which consistency do we care for most?
- The most likely answer is the 2017 one. But what do we do with the consistency with 2011? Do we smooth it?
- What about the interim updates?

Once the results for the 2017 comparison are available, we could compare the extrapolated (from the ICP 2011) PPPs for 2017 with the new global comparison 2017 PPPs

Assuming we want to take the global BH PPPs for 2017 as the "truth", then

- Should we revise backward the 2017 PPPs to the years 2012-2016 or to use some interpolation of 2011 and 2017 PPPs?

Further steps

- All Regional interim updates should be finalized as soon as possible
- Regional updates (PPPs, etc.) should be collected by GIU
- Detailed price data from Global lists collected by the Regions during updates should be analysed “BH by BH” together with the ICP Regional coordinators
- Practicable solutions for Rents, Health, Education, Construction, … should be found
- Computations: partially-Global comparison and integrated its results in the Global extrapolated results with fixity of regional updates

Thanks for listening