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Some considerations on production and publishing ICP additive results

(ICP TAG meeting / VC, Nov 2021)

The EKS results are non-additive and therefore are not very appropriate for the structural analysis. However, the ICP will not change the official aggregation method. Therefore, there are the proposals to produce and publish two sets of the results: official EKS results for volume and price level inter-country comparisons[1] and non-official results by an additive method for structural analyse. Respectively the **MINUTES OF THE ICP TECHNICAL ADVISORY GROUP (**May 17-19, 2021 / Virtual meeting) say on page 5: "*It was noted that, while the ICP has opted to maintain its PPP estimation methods,* ***this should not prevent research being conducted on the use of alternative estimation methods and approaches***." This refers, first of all, to the use of additive methods to allow straightforward structural analysis.

Some considerations on potential production and publishing ICP additive results are presented in this notice. The following points are considered:

1) Choice of the most appropriate additive method

The following additive methods were used in the ICP in the past:

- **Geary-Khamis (GK)** – ICP 1970-1985
- **Ikle-Dikhanov-Balk (IDB) –** Africa (AfDB) 2005
- **Gerardi (G)** – Eurostat 1975

All these methods are based on the average international prices[2] obtaining from national prices:, GK – Arithmetic Mean with quantity weights, IDB – Harmonic Mean with expenditure weights, G – unweighted GM[3].

The author of this notice calculated the Average absolute % difference: ICP 2017 PPPs by additive methods (without regional fixity) vs "Official EKS-PPPs with fixity" (W143=1) for GDP. Domestic absorption and Household consumption expenditure (domestic)[4]:

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[1] The official GEKS method should not be considered as an "ideal" method. Fisher-PPP satisfies the economic approach to index number theory (F-PPP can be presented also as the PPP based on average arithmetic unweighted international prices of both countries => F-PPPs is a bilateral case of the Van Yzeren approach). The GEKS is based on binary superlative F-PPPs but the GEKS per se is a fully mechanical construction from direct and indirect bilateral PPPs and many of them have no any economical sense.

[2] There are several other methods based on the international average prices (e.g., Van Yzeren, CPD-Rao) but they are not strictly additive.

[3] Speaking strictly the Gerardi method is based on the averaging of national price ratios (price structures) but not on the averaging of the national prices. There are other additive methods using structural prices - see the paper published on the ICP World Bank web-site: S. Sergeev "*Aggregation methods on the basis of structural international prices*" Joint World Bank - OECD Seminar on PPPs „Recent Advances in Methods and Applications" (Washington, D.C.; 30.01-02.02 2001)

http://pubdocs.worldbank.org/en/368801510177722619/pdf/ICP-TF-PCC01-Doc-Aggregation-methods-on-the-basis-of-structural-international-prices-Sergeev-2001.pdf

Aggregation methods on the basis of structural international prices described in the paper (MPCP = Maximal Possible Characteristic Prices and SS = Standardized structure) are additive and are based on price structures which are characteristic for all countries. One may not necessarily want similarity with countries exhibiting high variances due to errors but this different topic. Present analysis bases on the official ICP data (validated and approved). Obviously, these data is not ideal (and problematic points are known) but for a more adequate analysis it is necessary, firstly, to eliminate errors and solve problematic points in the official calculations.

[4] BH data from the Global 2017 ICP for 143 countries participating in the Global linking were included.

Table 1:

Average absolute % difference: PPPs by additive methods vs official EKS-PPPs with fixity (W143=1)

	Abs % difference	Abs % difference	Abs % difference	Abs % difference	Abs % difference	Abs % difference
	Gerardi	SS	Ikle	GK	MPCP	EKS / EKS fix
GDP-Av	2.9	3.0	2.9	4.0	2.8	1.2
GDP-Max	21.3	19.8	23.9	24.2	19.5	7.8
DA-Av	2.9	3.0	2.6	3.5	2.5	1.0
DA-Max	17.8	16.9	14.3	23.5	19.7	8.0
HHd-Av	2.7	2.8	2.4	3.5	2.6	1.2
HHd-Max	19.2	23.5	16.4	27.5	14.2	7.9

Table 1 shows that the average absolute differences of PPPs (W143=1 / unweighted GM scaling) by any additive method and official Global EKS-PPPs with Regional fixity are rather moderate but the differences for individual countries can be very high.

What additive methods is preferable from the point of view of structural analysis?

The G-K is a very attractive additive which can be interpreted in clear economic terms. However, the G-K was replaced by the EKS method after "Great debates" (1988-1989) because of potential Gerschenkron effect (the gravitation of international average prices to prices of large or more developed countries and respectively to the overestimation of volumes for less developed countries). This point was discussed in details on the basis of the ICP 2011 / 2017 data during the recent TAG virtual meting:

https://thedocs.worldbank.org/en/doc/8df7ba7d75d1fe02610e0c88449cb8e8-0050022021/original/2-02-RA-Item-05-The-Gerschenkron-effect-in-ICP-2011-and-ICP-2017-Dikhanov-2.pdf

https://thedocs.worldbank.org/en/doc/48818fe7861193e612d314d50456bd56-0050022021/original/2-02-RA-Item-05-The-Gerschenkron-effect-in-ICP-2011-and-ICP-2017-Sergeev-Comment-2.pdf

The paper prepared by Y. Dikhanov examined the Gerschenkron effect on the ICP 2011 and ICP 2017 data by the comparison of the results obtained by the official "*unbiased*" Gini-Éltető-Köves-Szulc (GEKS) ICP approach with the results using two additive approaches based on average international prices: the Geary-Khamis (GK) and Ikle-Dikhanov-Balk (IDB). It was found that, when contrasted to earlier ICP exercises, the Gerschenkron effect was significantly weaker in 2011 and 2017 in the case of the GK, and in the case of the IDB index it was not easily identifiable. The following main reasons were indicated (p. 5): "… *China and India are now influencing the GK international price vector much more so one can reasonably expect that the Gerschenkron effect would diminish. Convergence of price structures around the world through expansion of international trade and globalization processes would be another consideration that could diminish the effect. And finally, an important factor in reduction of the Gerschenkron effect was the adoption of productivity adjustment for government services in the ICP starting in 2005*".

The degree of the Gerschenkron effect on aggregated PPPs depends on similarity of country's price structure with international prices and also on similarity of country's expenditure structure (shares). Therefore, it is desirable to measure the deviations of the country's price structures from a reference price structure as well as the differences of national price structures. It is possible to use for this purpose the coefficients of similarity of price structures[5]. These

[5] S. Sergeev "*Measures of the inter-country price similarities and their practical application in international comparisons*" - A paper for the UN ECE Consultation on the ECP (Geneva, 12.11 – 14.11.2001). This paper contains also the description of the coefficients of similarity of national GDP expenditure structures (expenditure shares).

indicators are between 0 and 1 like the correlation coefficients (with many other similar properties): the values which are closer to 1 show higher similarity. The author of this notice calculated the coefficients of similarity of national price and expenditure structures "Each country with Each country" for the GDP and HH (domestic) for the 143 countries participating in the Global linking of the ICP 2017[6].

The calculations showed that GK prices gravitate more to the price structures of the EU-OECD and LA countries. However, the ICP 2017 data did not confirm the statement that the G-K prices gravitate to the price structure of the large countries. Not USA or CHN have the highest similarity of price structures with the G-K average prices[7] but rather small countries or the countries with the middle level of economic development: CYP, ESP, EST, GRC, SVN, HKG, PER - see Table 2 below:

Table 2 Ten highest coefficients of similarity of price structures
(national with G-K international)

GDP: 10 highest coefficients of similarity of price structures (national with GK international prices)

	GK	Ikle	CPD-Rao	ShGK-Rao	SS Str	MPCP	Gerardi
CYP	0.9095	0.8170	0.8510	0.8686	0.8725	0.8023	0.8514
ESP	0.8987	0.7901	0.8302	0.8487	0.8442	0.7493	0.8208
EST	0.9081	0.8629	0.8920	0.8994	0.9078	0.8116	0.8971
GRC	0.9226	0.8814	0.9028	0.9095	0.9161	0.8551	0.9049
PRT	0.8921	0.8397	0.8816	0.8994	0.8985	0.7752	0.8745
SVK	0.8868	0.8655	0.8883	0.8915	0.8964	0.7901	0.8889
SVN	0.8994	0.8328	0.8692	0.8826	0.8898	0.7822	0.8702
HKG	0.8971	0.7966	0.8188	0.8329	0.8289	0.8234	0.8141
PER	0.8944	0.8928	0.9152	0.9264	0.9278	0.8649	0.9165

HH (d): 10 highest coefficients of similarity of price structures (national with GK international prices)

	GK	Ikle	CPD-Rao	ShGK-Rao	SS Str	MPCP	Gerardi
CHL	0.9232	0.8627	0.8808	0.8789	0.8591	0.7768	0.8538
CRI	0.8950	0.8922	0.9044	0.9018	0.8991	0.8318	0.8982
CYP	0.8965	0.8384	0.8760	0.8873	0.8901	0.7566	0.8742
EST	0.8964	0.8285	0.8641	0.8723	0.8843	0.7605	0.8722
GRC	0.9006	0.8852	0.9051	0.9039	0.9154	0.8070	0.9104
ITA	0.8823	0.7899	0.8191	0.8263	0.8297	0.7317	0.8171
LVA	0.9052	0.8637	0.8923	0.8963	0.9047	0.7843	0.8965
SVK	0.8881	0.8283	0.8590	0.8614	0.8678	0.7393	0.8606
HKG	0.8913	0.8368	0.8538	0.8649	0.8460	0.8017	0.8344

The potential GK bias due to the gravitation of average prices to prices of large countries then this is rather not drawback of the method but its advantage because these prices can be justified economically (the world prices gravitate generally to the prices of main producers). Of course, to do this statement one should be sure that the BH-PPPs reflect properly actual quality differences in the products. Additionally, not the size of the countries is the main factor, which has the highest impact on the the G-K results but the similarity of price structures. For example, economically USA and Canada have very different size but price structures are very similar and the results "USA - Canada" are very similar by any aggregation method.

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[6] Detailed coefficients are contained in the EXCEL file which is available by the WB ICP unit.
Low coefficients of inter-country similarity of national price structures reflect in some cases actual national peculiarities in prices but in many cases - the weakness of BH-PPPs due to insufficient Quality (consumer products) and Productivity adjustments (non-market services) as well as very different approaches used by the EU-OECD and other ICP Regions for many important areas (Housing rents, Education, Health, Construction).

[7] Of course, USA and China have significant impact on the GK prices. However international GK prices gravitate more to the price structures of relatively small countries with middle level of economic development. Similarity of structure international GK prices with price structures of US (0.787) and China (0.853) is high but not the highest.

The analysis of the BH-PPPs input data shows that the main actual reason for the Gerschenkron effect is not a theoretical drawback of the GK method *per se* but the weakness of BH-PPPs due to insufficient Quality (Consumer products, Construction) and Productivity adjustments (Non-market services) as well as very different approaches used by the EU-OECD and other ICP Regions for many important areas (Housing rents, Education, Health, Construction). If Quality and Productivity adjustments are done properly and the regional methods for Housing rents, Education, Health, Construction are more unified then one should expect that all aggregation methods will produce similar results. For example, the PPPs of the most of the EU-OECD countries calculated by the official EKS and other methods based on the use of average international prices vary in a very moderate degree.

Main disadvantage of the GK as well as of all additive methods based on the simultaneous calculation of PPPs and international average prices is not the potential Gerschenkron effect but the fact that these methods are not sectoral independent: the additivity is achieved if all aggregates compared within the GDP framework. In effect, it is impossible to have independent results for separate aggregates HH, GFCF, etc. because the PPPs for the aggregates are depended on the whole set of data for GDP. For example, international G-K prices for "Food" depend on the GDP-PPPs and therefore on prices for "Construction", etc.

The sectoral dependency is especially problematic for the use of GK in the structural analysis. We want to analyse the price and volume structure at the detailed disaggregated levels but all national prices are recalculated to a common level by the same (high aggregated) PPPs for GDP? Probably, R.Geary proposed his method with the aim to obtain the PPPs for the whole aggregate - What would be the GDP-PPPs if they are obtained from national prices recalculated to a common price level with these GDP-PPPs? In this case, international prices for products (recalculated by GDP-PPPs) are *per se* not exact but they produce correct average GDP-PPPs.

IDB method

IDB method is based on the average international prices obtaining from national prices as Harmonic Mean with country's expenditure weights. The IDB method is equivalent to the GK method when all the countries have the same size in terms of real GDP. i.e. the IDB prices are not affected by the sizes of individual countries. Therefore IDB results do not have a systematic Gerschenkron effect.

However the results by IDB method are also sectoral dependent and even more than the GK results. D.Ikle used the same assumption as R.Geary for the PPPs but introduced a similar assumption also for the Volume indices - What would be the GDP-PPPs if they are obtained from national prices recalculated to a common price level with these GDP-PPPs and the national quantities recalculated to a common level with the GDP Volume indices[8]? So, the double sectoral dependency of the IDB results is problematic for the use of IDB results for the structural analysis.

[8] These double recalculation of prices and quantities to common levels leads to the use of Harmonic mean with country's expenditure weighs during the calculation of average international prices.

Gerardi method[9]

The Gerardi UCW (Unit Country weight) method was used in the Eurostat PPP comparison of Year 1975. The Gerardi method is based on the average international prices obtaining from national prices as unweighted GM without the use of PPPs. The PPPs are not necessary because the Gerardi method is based actually on the averaging of national price ratios (the ratios of prices between the products - price structures) but not on the averaging of the national prices. The price ratios are dimensionless and therefore directly comparable. So, if one wants to have additive results which are sectoral independent (like the GEKS results) then the Gerardi UCW method has an obvious preference.

In the actual PPP exercises with the use of BH data where BH-PPPs are used as quasi-prices the Gerardi results are obtained in the following way:

a) Initial BH-PPPs (Base country =1) are scaled to the base (Region or World = 1) as the ratios to their GM (unweighted). These rescaled BH-PPP can be presented in more understandable form with additional scaling: Product of PPPs = Product of reference XRs (e.g. Euro or USD). For example, Eurostat uses such scaling to Euro – this artificial unit was named as PPS = Purchasing Power Standard
b) Real Values for BHs are obtained as “Nominal BH value in National currency / Scaled BH-PPP”.
c) The RV from b) are additive. Therefore, the RV for any aggregated heading (AH) can be obtained as a simple sum of RV of respective BHs. PPPs for any aggregated heading are obtained as the ratios “Nominal AH value in National currency / Real Value of AH”

The Gerardi results are PPP are additive, invariant, transitive and sectoral independent. So, the Gerardi method seems to be preferable for the structural analysis. The simplicity of Gerardi method is not an obvious drawback (and, maybe, even advantage). The fact that Gerardi international prices are unweighted GM of individual country prices is not a clear drawback. Binary F-PPP is based on unweighted arithmetic mean of prices of two countries and, nevertheless, F-PPP is a superlative index, IDB prices are calculated by the assumption that all the countries have the same size in terms of real GDP.

2) Additivity and Fixity of regional results

There is even more important point concerning the additive results:

- if one wants to use the regional fixity also in the Global GK, IDB, G aggregations then this will distort the additivity in any case,

- if one produces the free Global results by GK, IDB, G then these results will be additive and formally inter-regionally comparable but inconsistent with the regional results. The differences can be very high for many important areas (Housing rents, Education, Health, Construction) due to different approaches used by the EU-OECD and other ICP Regions. This can lead to numerous question and irritations – What results are more reliable?

Let is look on the OECD experience with the producing and publishing of additive results as the supplement to the official GEKS results.

[9]D.Gerardi “Selected problems of inter-country comparisons on the basis of the experience of the EEC”, Review of Income and Wealth. Volume 28, Issue 4:

https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1475-4991.1982.tb00624.x

3) Experience from the OECD with the publishing of two sets of the results (EKS and GK)

Following decision done during the "Great debates " (1988-1989),the OECD started to produce and publish from the 1990 exercise two sets of the PPP results: official EKS results for volume and price level inter-country comparisons and non-official results by the GK method for structural analyse – see, for example, the link to the1990 GK results below:

PPP1990.pdf (worldbank.org)

The comprehensive sets of the GK results (without fixity for EU countries) were published for 1990 and 1993 exercises[10]. However, the GK results were practically not used and additionally there were numerous irritations with the explanation of double results. Therefore, the OECD publishes in the 1996, 1999 and 2002 exercises only two Tables with the GK results: relative PLI and Volume indices (with double base: OECD = 100 and GDP=100), to avoid the irritation with the official Comparative PLI and Volume indices by the EKS approach. However, this did not help. The GK results were practically not used (only the irritations) and the OECD stopped the production and the publication of the GK results.

So, the OECD long-term experience with the production of two sets of the results (GEKS and GK) shows that the production and the publication of two sets of the ICP results (GEKS and by an additive method) is rather problematic. **MINUTES OF THE ICP TECHNICAL ADVISORY GROUP** (May 17-19, 2021 (Virtual meeting) say on page 5: "*Regarding the option to release multiple sets of PPPs, based on different methods, the TAG reaffirmed concerns on user reception, given that understanding the differences require a good understanding of PPP estimation methodology*."

More general point concerning the presence of two different sets of the ICP results: one official for volume and price level inter-country comparisons and another non-official - by an additive method for structural analyse. It seems that it is very problematic to carry out the comprehensive consistent analysis if different (but connected) indicators are calculated by different methods: PPPs and Real values as well as Volume indices are obtained by the EKS method but Relative Volume and Relative Price indices should be based on the PPPs and Real values obtained by the GK or an other additive method. In this aspect - **Is it possible to use the official EKS results also for the structural analyses?** The author of this notice believes that "Yes" (of course, with the reservations) if the official EKS results are presented in an adequate form.

4) Flexible non-additivity of the EKS results and potential use of the official EKS results for structural analysis

The degree of non-additivity of the EKS Real values (percentage differences between Real Values for an Aggregate-Total and the sum of its elements) depends on the currency numeraire used. If a base country currency is used then the degree of non-additivity of the EKS Real values depend of the variation of PPPs for underlying headings and the variation of respective expenditure shares. Generally, one can say that Real values reflect in this case price structure of the base country. On other, side the use of a neutral invariant base can reduce non-additivity drastically.

Let us to illustrate this on one extreme non-additive case occurred in the ADB ICP 2017 exercise for the GFCF. ADB used traditionally HKD as numeraire and the percentage differences between Real Values for GFCF-Total and the sum of its elements in HKD are

[10] The PPPs and Volumes were presented with the neutral basis "OECD=100" and the scaling "Sum of RV by PPPs to USD = Sum of RV by XRs to USD" was done. So, the results were presented with an artificial unit "OECD-$".

varied from -14% till +38%. HKG has very high price level for “Construction” and "normal" for “Machinery and equipment” (MEQ) relatively other ADB countries. In effect, the PPPs "Country / HKG" for MEQ are 2-3-4 times higher than for Construction. Respectively, the degree of non-additivity of the EKS Real values is very high.

If one selects CHN currency as numeraire then the degree of non-additivity of the EKS Real values is not so high and if one selects IND currency as numeraire then the degree of non-additivity of the EKS Real values is rather moderate because PPPs “Country / CNH” and “Country / IND” have no such drastic differences as PPPs “Country / HKG”.

Generally, an "average" neutral regional currency would be desirable for the presentation of the EKS Real values (RV) to have rather moderate degree of non-additivity. What "average" neutral regional currency is recommendable?

The ADB official PPPs to HKD can be scaled to a neutral "average" Asian HKD in two ways:

a) **Scaling with expenditure weights** - like it is used by the EU-OECD for the presentation of official aggregated PPP/PLIs or by the WB by the presentation of the PLI with the base "Word = 100" (Sum of RV by PPPs = Sum of RV by XRs).

b) **Scaling without expenditure weights** - like it is used by the EU-OECD for the presentation of PPP/PLIs in the QTs (Product of PPPs = Product of reference XRs).

Both approaches decrease the degree of non-additivity but the effect of big countries is not eliminated fully by the approach a). Therefore, it is recommendable to use the approach b). The approach b) can be used for any Regional or Global set of EKS-PPPs to obtain the RV in a neutral "average" Regional or Global currency with moderate degree of non-additivity. The Summary of the experiments with the ADB 2017 GFCF data are presented in **Table 3:**

Table 3:
Summary of the experiments for the evaluation of non-additivity of the ADB 2017 results for GFCF by different presentation of the PPPs

ADB ICP 2017																										
Gross Fixed Capital Formation (GFCF) - analysis of thr choice of base currency on the non-additivity EKS Real Values																										
ADB22 2017: Real expenditure data (mio. HKD)																										
	Max	Min	Max-Min	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	
Nod-add (%) = (Sum-T/GFCF-1)*100	37.6	-13.9	51.6	33.7	14.1	32.2	13.6	-13.9	0.0	37.6	7.0	13.4	4.9	0.7	14.7	8.9	0.2	12.7	12.3	-0.2	3.4	-9.1	-8.7	-11.2	26.8	
ADB22 2017: Real expenditure data (mio. CHN)																										
	Max	Min	Max-Min	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	
Nod-add (%) = (Sum-T/GFCF-1)*100	12.6	-9.0	21.5	10.9	1.2	10.4	0.0	-9.0	-1.6	12.6	-1.6	1.1	-2.9	-4.3	1.6	-0.8	-4.5	0.6	0.2	-4.6	-3.0	-5.0	-8.3	-6.4	6.6	
ADB22 2017: Real expenditure data (mio. IND)																										
	Max	Min	Max-Min	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	
Nod-add (%) = (Sum-T/GFCF-1)*100	5.4	-1.9	7.3	3.4	0.1	3.5	-1.9	2.5	5.3	3.4	0.0	0.7	-0.9	0.1	0.4	0.2	-0.2	-0.1	-0.7	-0.2	0.1	5.4	-0.3	4.6	0.5	
ADB22 2017: Real expenditure data (mio. Asian HKD-W)																										
	Max	Min	Max-Min	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	
Nod-add (%) = (Sum-T/GFCF-1)*100	10.3	-6.7	16.9	8.9	0.7	8.6	-0.6	-6.6	-0.2	10.3	-1.4	0.8	-2.5	-3.5	1.0	-0.8	-3.6	0.3	-0.1	-3.7	-2.5	-2.6	-6.7	-3.9	5.0	
ADB22 2017: Real expenditure data (mio. Asian HKD-Unw)																										
	Max	Min	Max-Min	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	
Nod-add (%) = (Sum-T/GFCF-1)*100	5.3	-1.3	6.6	4.2	0.4	4.4	-1.3	1.6	5.0	4.6	0.4	0.9	-0.4	-0.2	0.7	0.4	-0.1	0.4	-0.1	-0.1	0.2	5.3	-0.8	4.3	1.3	

More drastic situation for the GFCF was in the Global ICP 2017. The Real Values in the Global ICP 2017 were presented in USD. Many countries have for “Machinery and Equipment” and ”Construction” very different PPPs to USD as well as expenditure structure. In effect, the non-additivity of the RV for the GFCF is aggregate was extreme. For example, IDN RV for GFCF was **846** mio. USD but alone Construction had RV of **1617** mio. USD. It is very difficult to explain to users such results. Non-experienced users can considered these as mistakes or misprints.

The author of this notice rescaled the official Global EKS PPPs for the 143 countries participating in the Global Linking ICP 2017 to neutral basis ”World143 = 1” with the scaling “Product of PPPs to USD = Product of XRs to USD” – this unit can be named as “World $”.[11] The degree of non-additivity were calculated as “Percentage absolute deviation: GFCF-Total vs Sum of 3 categories”. The same indicators were calculated for the RV in USD as well as for the RVs obtained by the Gerardi method. Detailed Tables for Global ICP 2017 for GFCF are presented in Annex 1. Average as well as maximal values of the degree of non-additivity for the Regions are presented in Table 4:

Table 4: ICP 2017
Average percentage absolute deviations: GFCF-Total vs Sum of 3 categories

	EUO	AFR	ASI	LA	WA	W143
by PPPs scaled by GM-XRs to World = 1	**6.9**	**3.9**	**4.8**	**2.3**	**2.5**	**4.8**
by PPPs to USD	**14.0**	**34.8**	**44.0**	**44.1**	**47.0**	**30.7**
by scaled BH-PPPs (Gerardi)	**7.6**	**4.4**	**5.5**	**2.9**	**4.4**	**5.5**

Maximal percentage devitaions: GFCF-Total vs Sum of 3 categories

	EUO	AFR	ASI	LA	WA	W143
by PPPs scaled by GM-XRs to World = 1	**26.8**	**15.8**	**15.8**	**9.2**	**7.0**	**26.8**
	(USA)	***(AGO)***	***(IDN)***	***(HTI)***	***(OMN)***	***(USA)***
by PPPs to USD	**54.4**	**98.9**	**100.4**	**108.1**	**75.7**	**108.1**
	(ALB)	***(ETH)***	***(IDN)***	***(HTI)***	***(OMN)***	***(HTI)***
by scaled BH-PPPs (Gerardi)	**26.8**	**17.7**	**16.0**	**9.6**	**10.1**	**26.8**
	(CHE)	***(AGO)***	***(IDN)***	***(HTI)***	***(OMN)***	***(CHE)***

Table 4 shows that the presentation in USD brings systematic extreme non-additivity if underlying PPPs and expenditure shares are very different. Average percentage absolute deviations for the GFCF are very high for all Regions because the PPPs for ”Construction” (USA=1) are very high relatively PPPs for “Machinery and Equipment”. On other side, the scaling of official Global EKS-PPPs to the base “World143 =1” brings systematically very moderate degree of non-additivity: 3-5%. Such degrees of non-additivity (3-5%) are sufficient for the reliable structural analysis in the practice. The use of the Gerardi approach with scaling of original BH-PPPs brings very similar degrees of non-additivity.

The considerations above did not say that the use of neutral Regional or World numeraire eliminates non-additivity but they demonstrate on an extreme example that this approach reduce non-additivity drastically with the degree which is sufficient for reliable structural analysis. Of course, if data for some countries contains extreme differences like by IDN for GFCF then the degree of non-additivity can be still remarkable – see the 2nd part of Table 4 with maximal values for the countries within the Regions - but nevertheless not extreme: e.g.,

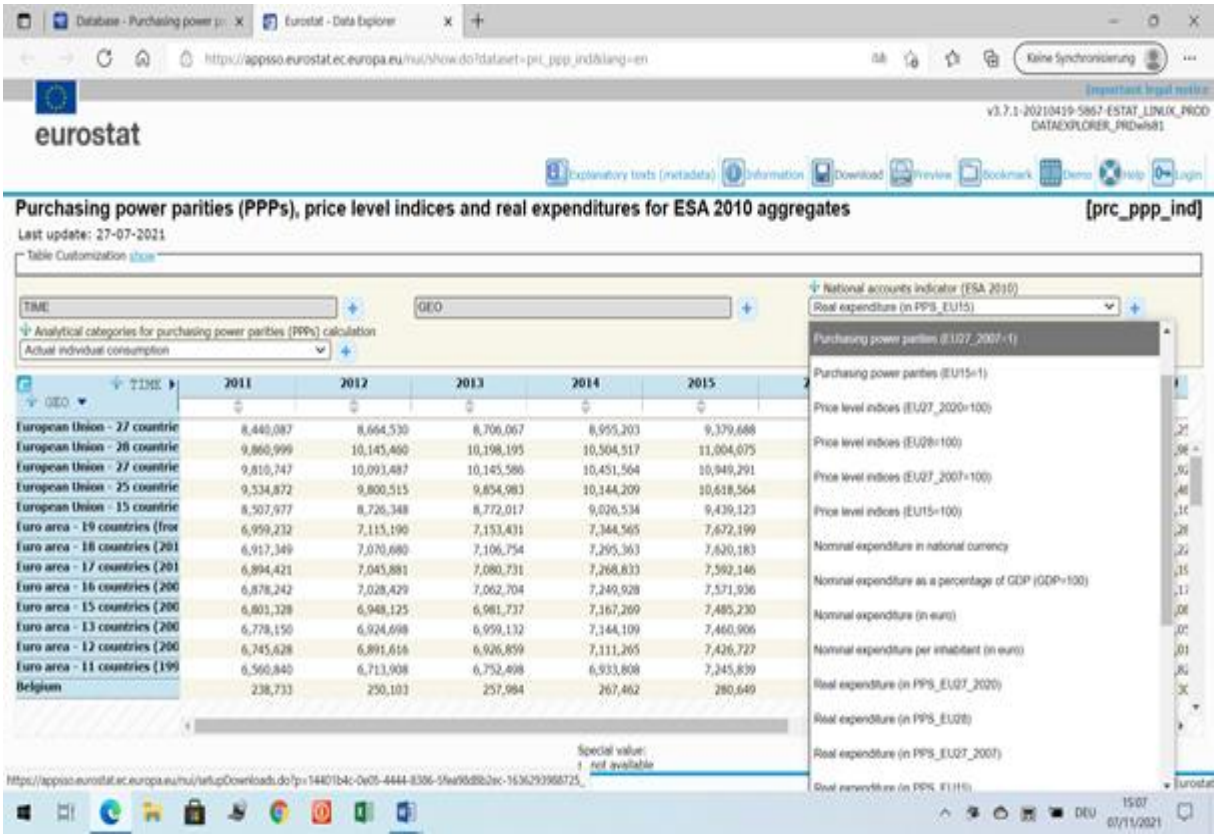
[11] World or Regional “average” numeraires are not easily understood but the same refers to the GK or IDB dollars used in the ICP or PPS used by Eurostat.

IDN – 100% by the use of RV in USD and only 16% by the use of scaled EKS-PPPs for the calculation of RV in the World numeraire.

USA 2017 PPPs for “Construction” obtained by the Eurostat-OECD approach (BoQ) and the ICP approach (ICA) were also very different and this is the main factor for high non-additivity of RV in USD. So, maybe, it is more desirable to focus the efforts on the improvement and unification of the methods used by the Regions for several important areas (Housing rents, Education, Health, Construction) which can bring quasi-additive results than on the production and the publishing of an alternative set of the results.

Obviously, as the Minutes of the recent TAG meeting / VC say, the researchers should have a possibility to produce the ICP results by use of alternative estimation methods and approaches for own analyses and be responsible for these results. However, it is not desirable to produce and publish officially an alternative set of the ICP results. It is better to inform users that non-additivity of the EKS results is relative and the degree of non-additivity depends on the presentation of PPPs and Volumes. Different scaling of official published EKS-PPPs and Volumes can be helpful for the purposes of the different analyses. For example, Eurostat PPP Database contains unweighted and weighted (by exp.) PPPs with the following bases**:** EU37, EU27_2019, EU27, EU25, EU15:

http://ec.europa.eu/eurostat/web/purchasing-power-parities/data/database



Unit of measure http://ec.europa.eu/eurostat/cache/metadata/en/prc_ppp_esms.htm
PPPs can be interpreted as the exchange rates of countries' national currencies against the PPS. They express the number of currency units per PPS. Real expenditures are expenditures in national currency converted to PPS using PPPs. They are thus denominated in PPS. **PLIs and volume indices per capita are indices that, in Eurostat's database, use EU27_2019, EU28, EU27 and EU15 as "base country" (EU27_2019=100, EU28=100, EU27=100 and EU15=100 and depending on the user's choice).**

5) Treatment of Negative expenditure

One additional specific point which should be considered for the PPP methods as well as for the structural analysis. All PPP methods are based on the assumption that price data contains only positive values and expenditure / quantity data – only non-negative values. This is not so in the practice. GDP contains several BHs where negative expenditure can occur. So, the category "Net exports" has very significant negative value in many countries (in some extreme cases, the share of "Net exports" in GDP is minus 30-50%). Additive aggregation methods based on the simultaneous calculation of PPPs and international average prices[12] like the GK or the IDB can be very sensitive to use of negative expenditure values. Distorting effect can be significant. For example, recent version of the PWT10.1 contains several cases where GK GDP-PPPs are negative. Of course, such cases with negative PPPs are rather very rare exceptions but, in any case, negative expenditure bring distorting effect. The size of distortions depends on the aggregation method per se and the size (shares) of negative expenditure as well as the variation of underlying BH-PPP/PLIs.

The EKS method is less sensitive to the presence of negative expenditure. Nevertheless, if the shares of negative expenditure are very high and BH-PPP/PLIs are very different then the bilateral F-PPPs can be not very reliable because of very high difference between L- and P-PPPs. The Table 5 below contains several simplified examples from the Global ICP 2017 of the calculations of the F-PPPs where the countries have very high negative share of "Net exports" or / and very different PLIs for Domestic Absorption (DA), to demonstrate possible distorting effect of the inclusion of the categories with negative expenditure in the PPP calculations.

One example: F-PPP between STP and LUX
STP has very high negative "Net export" (~ - 50%) and very low PLI for DA = ~ 46% (LUX=100). In effect, Paasche-PLI for STP (LUX =100) was outside the PLI for underlying categories. Similar situation is with the calculation of F-PPPs between NPL and CHE.

Second example: F-PPP between SDN and CHE
SDN has moderate share of negative "Net export" (~ - 6%) but SDN has very low PLI for DA = ~ 20% (SHE=100). In effect, Paasche-PLI for SDN (CHE =100) was outside the PLI for underlying categories even the share of negative expenditure is relatively small.

Third example: F-PPP between STP and LSO
Both countries have high share of negative "Net export" (~ - 50% and ~ - 40%), PLI between these counties is close to 100%. In effect, Laspeyres, Paasche and Fisher PLIs for STP (LSO =100) were hgher than the PLI for underlying categories.

[12] Distorting effect by the use of additive aggregation methods based on the simultaneous calculation of PPPs and international average prices (like GK or IDB) refers to all analytical categories (but in different degree). Gerardi method is generally more robust to the presence of negative expenditure because this method is sectoral independent. Distorting effect here refers only to the analytical categories containing BHs with negative expenditure.

Table 5: Several F-PLI examples from ICP 2017

Calculation of bilateral F-PLI from DA and Net exports						
ICP143 Global multilateral results						
		A	B	A	B	
		STP	LUX	STP	LUX	(A+B)/2
	PLI A/B (B=100)	Sh Exp A (%)	Sh Exp B (%)	PLI A (W=100)	PLI B (W=100)	T-Sh
DA	45.8	150.7	64.8	68.7	150.1	1.078
Net exports	100.0	-50.7	35.2	100.0	100.0	-0.078
GDP	50.0	100.0	100.0	67.1	134.2	1.000
Bilateral F-PLI from DA and Net exports						
L-PLI STP/LUX (LUX=100)	64.9					
P-PLI STP/LUX (LUX=100)	35.9					
F-PLI STP/LUX (LUX=100)	48.3					
T-PLI STP/LUX (LUX=100)	43.1					
ICP143 Global multilateral results						
		A	B	A	B	
		SDN	CHE	SDN	CHE	(A+B)/2
	PLI A/B (B=100)	Sh Exp A (%)	Sh Exp B (%)	PLI A (W=100)	PLI B (W=100)	T-Sh
DA	19.7	106.0	89.4	34.8	176.5	0.977
Net exports	100.0	-6.0	10.6	100.0	100.0	0.023
GDP	20.0	100.0	100.0	33.8	169.0	1.000
Bilateral F-PLI from DA and Net exports						
L-PLI SDN/CHE (CHE=100)	28.2					
P-PLI SDN/CHE (CHE=100)	18.8					
F-PLI SDN/CHE (CHE=100)	23.0					
T-PLI SDN/CHE (CHE=100)	20.5					
ICP143 Global multilateral results						
		A	B	A	B	
		NPL	CHE	NPL	CHE	(A+B)/2
	PLI A/B (B=100)	Sh Exp A (%)	Sh Exp B (%)	PLI A (W=100)	PLI B (W=100)	T-Sh
DA	26.2	133.8	89.4	46.2	176.5	1.116
Net exports	100.0	-33.8	10.6	100.0	100.0	-0.116
GDP	25.3	100.0	100.0	42.8	169.0	1.000
Bilateral F-PLI from DA and Net exports						
L-PLI NPL/CHE (CHE=100)	34.0					
P-PLI NPL/CHE (CHE=100)	20.9					
F-PLI NPL/CHE (CHE=100)	26.7					
T-PLI NPL/CHE (CHE=100)	22.4					
ICP143 Global multilateral results						
		A	B	A	B	
		STP	LSO	STP	LSO	(A+B)/2
	PLI A/B (B=100)	Sh Exp A (%)	Sh Exp B (%)	PLI A (W=100)	PLI B (W=100)	T-Sh
DA	110.3	150.7	141.6	68.7	62.3	1.462
Net exports	100.0	-50.7	-41.6	100.0	100.0	-0.462
GDP	112.6	100.0	100.0	67.1	59.6	1.000
Bilateral F-PLI from DA and Net exports						
L-PLI STP/LSO (LSO=100)	114.5					
P-PLI STP/LSO (LSO=100)	116.3					
F-PLI STP/LSO (LSO=100)	115.4					
T-PLI STP/LSO (LSO=100)	115.4					

The presence of negative expenditure brings also the problems for the structural analysis. For example, when A.Heston and P.Rao examined in their paper[13] evolution of economic structures of countries in terms of price and quantity similarity and the global price structures then they excluded all BHs with negative expenditure during the calculation of coefficients of price similarity and all BHs where some countries have zero or negative expenditure during the calculation of coefficients of quantity similarity. Obviously, simple exclusion of some data is not the actual solution of the problem. Further investigations on this topic are desirable.

Conclusions

1) The results by an additive method would be the most appropriate for structural analysis. The Gerardi method can be considered as the most appropriate as sectoral independent. The GK and the IDB methods are less appropriate due to sectoral dependency of the results.

[13] https://thedocs.worldbank.org/en/doc/f60d81b4360769d233c638017e5a5c6b-0050022021/original/1-02-Understanding-the-World-Economy-Insights-from-ICP-2017-Heston-and-Rao.pdf

2) However if one wants to use the regional fixity also in the Global GK, IDB or G aggregations then the attempt to keep fixity will distort the additivity in any case. If one produces the free Global results by GK, IDB or G methods then these results will be additive and formally inter-regionally comparable but inconsistent with the regional results. The differences can be very high for many important areas (Housing rents, Education, Health, Construction) due to different approaches used by the EU-OECD and other ICP Regions. This can lead to numerous question and irritations – What results are more reliable?

3) Additive results produced and published as a supplement to the official GEKS results would be non-official and therefore it is very likely that they will not be broadly used and if they are used then can be numerous irritations. The OECD long-term experience with the production and publishing of two sets of the results (GEKS and GK) shows that the understanding of two sets of the ICP results (GEKS and by an additive method) is rather problematic for users. In effect, the OECD stopped to produce and publish GK results.

4) Generally, it is very problematic to carry out the comprehensive consistent analysis if different (but connected) indicators are calculated by different methods: PPPs and Real values as well as Volume indices are obtained by the EKS method but Relative Volume and Relative Price indices should be based on the PPPs and Real values obtained by the GK or an other additive method.

5) The non-additivity of the official EKS results (with Regional fixity) can be significantly reduced if the official EKS PPPs using for the calculation of Real Values are presented in a "neutral" form with the base "Region or World = 1" (unweighted GM scaling is preferable). So, the scaling of official Global ICP 2017 EKS-PPPs to the base "World143 =1" brings systematically very moderate degree of non-additivity: 2-5%. Such degrees of non-additivity (2-5%) are sufficient for the reliable structural analysis in the practice.

6) The analysis shows that the main actual reason high non-additivity is not the EKS method *per se* but the weakness of BH-PPPs due to insufficient Quality (Consumer products, Construction) and Productivity adjustments (Non-market services) as well as very different approaches used by the EU-OECD and other ICP Regions for many important areas (Housing rents, Education, Health, Construction). It is more desirable to focus the efforts on the improvement and unification of the methods used by the Regions for several important areas (Housing rents, Education, Health, Construction) which can bring quasi-additive results than on the production and the publishing of an alternative set of the results.

7) The researchers should have a possibility to produce the ICP results by use of alternative estimation methods and approaches for own analyses and be responsible for these results. However, it is not desirable to produce and publish officially an alternative set of the ICP results. It is better to inform users that non-additivity of the EKS results is relative and the degree of non-additivity depends on the presentation of PPPs and Volumes. Different scaling of official published EKS-PPPs and Volumes can be helpful for the purposes of the different analyses.

8) Presence of BHs with negative expenditure introduces distorting effect in the PPP calculations as well as in the structural analysis. The investigations on special treatment of negative expenditure in the aggregation procedures and the structural analysis are desirable.

Annex 1: Global ICP 2017: Average percentage absolute deviations: GFCF-Total vs Sum of 3 categories

	ICP 2017 (Global)	Real values (mio.USD-W)	USA	ALB	AUS	AUT	BEL	BGR	BIH	CAN	CHE	CHL	COL	CRI	CYP	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC	HRV	HUN	IRL	ISL	ISR	ITA	JPN	KOR	LTU	LUX	LVA	MEX	MKD	MLT	MNE	NLD	NOR	NZL	POL	PRT	ROU	RUS	SRB	SVK	SVN	SWE	TUR
Gerardi RV	1501000	GROSS FIXED CAPITAL FORMATION	2 969 720	4 402	176 477	82 850	102 926	13 822	4 289	238 047	125 377	58 155	59 165	8 709	5 267	58 798	591 471	52 548	275 745	6 494	37 903	442 181	421 289	28 147	13 576	37 262	104 700	3 260	49 970	346 787	827 325	417 673	10 147	10 108	6 693	260 975	3 604	2 472	1 530	139 506	53 871	27 291	103 955	40 824	62 569	363 064	9 518	21 401	9 771	100 066	398 004
		% Diff G-RV / scaled EKS-RV	26.7	-2.5	5.6	11.0	9.0	0.8	1.3	-4.2	26.8	0.0	-4.5	0.4	11.4	6.8	13.7	13.7	15.8	3.2	4.5	6.0	9.3	7.2	1.4	3.3	22.6	13.4	7.8	6.6	22.0	1.9	3.7	9.3	3.6	0.7	-0.7	3.9	-4.0	10.4	1.1	18.9	3.9	2.7	-0.8	5.9	2.7	5.4	6.8	19.8	4.6
		Calculation by EKS-PPPs scaled to ICP143 by XRs																																																		
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	2 343 010	4 514	167 169	74 650	94 421	13 712	4 236	248 539	98 908	58 140	61 964	8 672	4 730	55 049	520 024	46 231	238 068	6 292	36 264	417 183	385 302	26 252	13 391	36 081	85 380	2 874	46 343	325 184	678 244	410 038	9 783	9 246	6 460	259 087	3 630	2 379	1 594	126 338	53 289	22 946	100 029	39 736	63 043	342 691	9 271	20 307	9 147	83 503	380 554
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	1.705	84.312	2.615	1.167	1.093	1.371	1.334	1.975	1.653	653.466	3228.908	725.062	0.894	22.712	1.280	9.970	0.911	0.938	1.447	1.237	0.927	0.885	5.510	239.227	1.092	199.136	5.705	0.928	191.565	1410.741	0.864	1.153	0.860	18.715	38.299	0.975	0.726	1.177	15.189	2.822	3.486	0.828	3.049	58.019	91.002	0.885	0.861	13.926	2.459
NV	1501000	GROSS FIXED CAPITAL FORMATION	3 995 295	380 551	437 223	87 126	103 172	18 795	5 653	490 903	163 532	37 993 686	200 075 000	6 288 037	4 231	1 250 278	665 889	460 936	216 838	5 899	52 486	515 926	357 080	23 243	73 785	8 631 567	93 260	572 386	264 384	301 831	129 927 900	578 456 893	8 449	10 658	5 554	4 848 788	139 018	2 318	1 157	148 670	809 386	64 751	346 735	32 888	192 239	19 882 646	843 695	17 965	7 875	1 162 845	935 656
RV-EKS	1501100	MACHINERY AND EQUIPMENT	1 369 341	814	60 468	29 743	41 513	5 452	1 781	76 983	51 534	22 868	16 624	3 538	2 262	24 956	252 739	20 317	80 776	2 595	14 395	105 659	133 001	11 901	4 992	17 005	21 822	1 587	15 094	119 013	405 358	137 269	4 250	5 491	2 773	122 300	993	899	487	44 766	15 589	14 662	47 455	10 973	20 435	122 428	3 924	11 623	4 420	40 980	97 095
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	0.841	95.347	1.329	0.788	0.762	1.351	1.484	1.134	0.911	573.533	3144.796	599.054	0.744	19.326	0.718	6.465	0.716	0.727	0.823	0.780	0.603	0.806	5.312	210.499	0.761	112.661	4.180	0.713	101.308	1226.652	0.690	0.773	0.742	16.467	43.021	0.803	0.715	0.788	8.472	1.318	2.848	0.845	3.295	43.039	91.303	0.733	0.725	7.700	2.901
NV	1501100	MACHINERY AND EQUIPMENT	1 151 641	77 644	80 354	23 447	31 625	7 366	2 643	87 273	46 968	13 115 599	52 278 000	2 119 616	1 683	482 286	181 493	131 349	57 869	1 887	11 850	82 407	80 167	9 587	26 517	3 579 525	16 603	178 775	63 091	84 828	41 066 073	168 381 217	2 932	4 244	2 057	2 013 952	42 733	722	348	35 267	132 066	19 319	135 168	9 275	67 338	5 269 135	358 318	8 518	3 204	315 550	281 648
RV-EKS	1501200	CONSTRUCTION	467 894	3 353	61 656	23 347	31 355	6 495	2 279	113 062	20 371	27 088	34 676	3 766	1 735	18 945	153 086	13 772	51 002	2 700	13 660	153 155	126 133	10 190	6 492	15 270	13 574	925	16 375	117 344	157 920	171 103	4 252	3 616	2 850	124 118	2 332	983	951	40 898	23 485	6 528	41 339	19 577	37 220	125 378	3 817	7 445	3 246	20 380	221 258
PPP-EKS	1501200	CONSTRUCTION	3.296	86.892	4.327	1.685	1.537	1.382	1.197	3.009	3.001	764.217	3675.413	897.350	1.041	25.878	2.095	15.703	1.112	1.171	2.268	1.800	1.336	0.941	5.759	262.659	1.501	338.008	8.807	1.166	348.456	1714.696	1.016	1.641	0.985	21.716	36.866	1.170	0.756	1.888	22.826	5.398	4.095	0.831	2.923	76.930	87.317	1.038	0.991	24.634	2.256
NV	1501200	CONSTRUCTION	1 641 291	291 320	266 800	39 343	48 187	8 976	2 728	340 154	61 129	20 708 765	127 449 000	3 379 661	1 806	490 258	320 730	216 268	56 722	3 162	30 975	275 692	168 543	9 593	37 328	4 010 729	20 378	312 812	144 215	136 787	55 028 049	293 390 253	4 316	5 935	2 808	2 695 392	85 972	1 149	719	69 019	536 056	35 237	169 288	16 262	108 801	9 645 316	333 312	7 732	3 218	502 052	499 220
RV-EKS	1501300	OTHER PRODUCTS	1 103 400	136	53 189	29 110	29 559	2 044	235	48 818	52 158	7 578	7 822	1 368	1 000	14 884	184 286	17 819	140 284	1 130	9 993	179 262	159 253	5 407	2 085	5 031	67 177	716	17 930	108 249	271 480	108 177	1 543	581	965	8 122	280	571	136	52 219	13 992	6 025	14 978	10 075	5 431	111 795	1 867	2 411	2 065	38 596	68 864
PPP-EKS	1501300	OTHER PRODUCTS	1.090	85.166	1.693	0.836	0.790	1.200	1.200	1.300	1.063	550.188	2601.498	576.287	0.742	18.659	0.888	6.360	0.729	0.753	0.967	0.880	0.680	0.751	4.767	206.987	0.838	112.887	3.183	0.741	124.627	1078.656	0.777	0.825	0.714	17.169	36.858	0.784	0.664	0.850	10.096	1.692	2.956	0.729	2.965	44.440	81.448	0.711	0.704	8.945	2.248
NV	1501300	OTHER PRODUCTS	1 202 363	11 586	90 069	24 335	23 361	2 453	282	63 476	55 434	4 169 332	20 348 000	788 561	742	277 722	163 666	113 328	102 247	850	9 661	157 826	108 370	4 063	9 940	1 041 313	56 280	80 799	57 078	80 217	33 833 779	116 685 423	1 199	480	689	139 444	10 314	447	90	44 384	141 264	10 194	44 279	7 350	16 100	4 968 195	152 065	1 715	1 453	345 243	154 788
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	2 970 634	4 303	175 313	82 200	102 428	13 991	4 295	238 863	124 082	57 544	59 121	8 673	4 997	58 786	590 111	51 908	272 062	6 425	38 049	438 076	419 387	27 498	13 560	37 305	102 573	3 228	49 400	344 606	834 758	416 549	10 044	9 688	6 588	254 540	3 605	2 452	1 574	137 883	53 066	27 216	103 771	40 626	63 085	359 600	9 609	21 479	9 731	99 957	387 218
		% Difference (RV by scaled EKS-PPP Total =100)																																																		
	1501000	GROSS FIXED CAPITAL FORMATION	26.8	-4.7	4.9	10.1	8.5	2.0	1.4	-3.9	25.4	-1.0	-4.6	0.0	5.6	6.8	13.5	12.3	14.3	2.1	4.9	5.0	8.6	4.7	1.3	3.4	20.1	12.3	6.6	6.0	23.1	1.6	2.7	4.8	2.0	-1.8	-0.7	3.1	-1.3	9.1	-0.4	18.6	3.7	2.2	0.1	4.9	3.6	5.8	6.4	19.7	1.8
		Calculation by EKS-PPPs to USD																																																	
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	3 995 295	7 697	285 056	127 294	161 006	23 382	7 223	423 809	168 658	99 140	105 660	14 788	8 066	93 869	886 744	78 833	405 954	10 729	61 837	711 380	657 016	44 766	22 834	61 525	145 590	4 901	79 023	554 504	1 156 540	699 195	16 682	15 766	11 016	441 795	6 190	4 056	2 718	215 431	90 868	39 127	170 570	67 757	107 500	584 355	15 809	34 627	15 598	142 389	648 919
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	1.000	49.444	1.534	0.684	0.641	0.804	0.783	1.158	0.970	383.232	1883.568	425.207	0.525	13.319	0.751	5.847	0.534	0.550	0.849	0.725	0.543	0.519	3.231	140.293	0.641	116.782	3.346	0.544	112.342	827.318	0.507	0.676	0.504	10.975	22.460	0.572	0.426	0.690	8.907	1.655	2.045	0.485	1.788	34.025	53.368	0.519	0.505	8.167	1.442
NV	1501000	GROSS FIXED CAPITAL FORMATION	3 995 295	380 551	437 223	87 126	103 172	18 795	5 653	490 903	163 532	37 993 686	200 075 000	6 288 037	4 231	1 250 278	665 889	460 936	216 838	5 899	52 486	515 926	357 080	23 243	73 785	8 631 567	93 260	572 386	264 384	301 831	129 927 900	578 456 893	8 449	10 658	5 554	4 848 788	139 018	2 318	1 157	148 670	809 386	64 751	346 735	32 888	192 239	19 882 646	843 695	17 965	7 875	1 162 845	935 656
RV-EKS	1501100	MACHINERY AND EQUIPMENT	1 151 641	685	50 855	25 015	34 913	4 585	1 498	64 744	43 341	19 232	13 981	2 976	1 902	20 988	212 558	17 087	67 934	2 183	12 107	88 861	111 856	10 009	4 199	14 301	18 353	1 335	12 695	100 092	340 913	115 446	3 574	4 618	2 332	102 857	835	756	410	37 649	13 111	12 331	39 910	9 229	17 186	102 964	3 301	9 775	3 717	34 465	81 659
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	1.000	113.370	1.580	0.937	0.906	1.607	1.764	1.348	1.084	681.951	3739.271	712.295	0.885	22.979	0.854	7.687	0.852	0.865	0.979	0.927	0.717	0.958	6.316	250.291	0.905	133.958	4.970	0.848	120.459	1458.532	0.820	0.919	0.882	19.580	51.154	0.955	0.850	0.937	10.073	1.567	3.387	1.005	3.918	51.175	108.563	0.871	0.862	9.156	3.449
NV	1501100	MACHINERY AND EQUIPMENT	1 151 641	77 644	80 354	23 447	31 625	7 366	2 643	87 273	46 968	13 115 599	52 278 000	2 119 616	1 683	482 286	181 493	131 349	57 869	1 887	11 850	82 407	80 167	9 587	26 517	3 579 525	16 603	178 775	63 091	84 828	41 066 073	168 381 217	2 932	4 244	2 057	2 013 952	42 733	722	348	35 267	132 066	19 319	135 168	9 275	67 338	5 269 135	358 318	8 518	3 204	315 550	281 648
RV-EKS	1501200	CONSTRUCTION	1 641 291	11 052	203 247	76 963	103 362	21 411	7 513	372 705	67 152	89 328	114 309	12 416	5 718	62 453	504 643	45 397	168 127	8 902	45 030	504 869	415 794	33 592	21 368	50 336	44 747	3 051	53 980	386 822	520 577	564 037	14 016	11 921	9 395	409 152	7 687	3 239	3 134	134 818	77 416	21 519	136 273	64 536	122 694	413 305	12 583	24 543	10 699	67 183	729 371
PPP-EKS	1501200	CONSTRUCTION	1.000	26.359	1.313	0.511	0.466	0.419	0.363	0.913	0.910	231.829	1114.954	272.216	0.316	7.850	0.636	4.764	0.337	0.355	0.688	0.546	0.405	0.286	1.747	79.679	0.455	102.536	2.672	0.354	105.706	520.161	0.308	0.498	0.299	6.588	11.183	0.355	0.229	0.512	6.924	1.637	1.242	0.252	0.887	23.337	26.488	0.315	0.301	7.473	0.684
NV	1501200	CONSTRUCTION	1 641 291	291 320	266 800	39 343	48 187	8 976	2 728	340 154	61 129	20 708 765	127 449 000	3 379 661	1 806	490 258	320 730	216 268	56 722	3 162	30 975	275 692	168 543	9 593	37 328	4 010 729	20 378	312 812	144 215	136 787	55 028 049	293 390 253	4 316	5 935	2 808	2 695 392	85 972	1 149	719	69 019	536 056	35 237	169 288	16 262	108 801	9 645 316	333 312	7 732	3 218	502 052	499 220
RV-EKS	1501300	OTHER PRODUCTS	1 202 363	148	57 959	31 720	32 210	2 228	256	53 196	56 836	8 258	8 523	1 491	1 090	16 219	200 815	19 417	152 866	1 231	10 890	195 340	173 536	5 892	2 272	5 482	73 202	780	19 538	117 958	295 829	117 879	1 681	633	1 051	8 850	305	622	148	56 902	15 247	6 566	16 321	10 979	5 918	121 821	2 034	2 627	2 251	42 058	75 041
PPP-EKS	1501300	OTHER PRODUCTS	1.000	78.174	1.554	0.767	0.725	1.101	1.101	1.193	0.975	504.903	2387.375	528.855	0.681	17.123	0.815	5.836	0.669	0.691	0.887	0.808	0.624	0.690	4.374	189.951	0.769	103.596	2.921	0.680	114.369	988.874	0.713	0.757	0.655	15.756	33.825	0.719	0.609	0.780	9.265	1.553	2.713	0.669	2.721	40.783	74.744	0.653	0.646	8.209	2.063
NV	1501300	OTHER PRODUCTS	1 202 363	11 586	90 069	24 335	23 361	2 453	282	63 476	55 434	4 169 332	20 348 000	788 561	742	277 722	163 666	113 328	102 247	850	9 661	157 826	108 370	4 063	9 940	1 041 313	56 280	80 799	57 078	80 217	33 833 779	116 685 423	1 199	480	689	139 444	10 314	447	90	44 384	141 264	10 194	44 279	7 350	16 100	4 968 195	152 065	1 715	1 453	345 243	154 788
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	3 995 295	11 885	312 061	133 698	170 466	28 224	9 267	490 645	167 328	116 818	136 813	16 883	8 710	99 660	918 016	81 902	388 928	12 316	68 026	789 071	701 186	49 493	27 839	70 120	136 302	5 165	86 213	604 872	1 157 320	797 362	19 271	17 172	12 778	520 859	8 828	4 617	3 691	229 370	105 774	40 416	192 504	84 743	145 797	638 090	17 919	36 945	16 667	143 707	886 071
		% Difference (RV by EKS-PPP to USD Total =100)																																																	
	1501000	GROSS FIXED CAPITAL FORMATION	0.0	54.4	9.5	5.0	5.9	20.7	28.3	15.8	-0.8	17.8	29.5	14.2	8.0	6.2	3.5	3.9	-4.2	14.8	10.0	10.9	6.7	10.6	21.9	14.0	-6.4	5.4	9.1	9.1	0.1	14.0	16.5	8.9	16.0	17.9	42.6	13.8	35.8	6.5	16.4	3.3	12.9	25.1	35.6	9.2	13.3	6.7	6.9	0.9	36.5

Annex 1: Global ICP 2017: Average percentage absolute deviations: GFCF-Total vs Sum of 3 categories (cont.)

	ICP 2017 (Global)	Real values (mio.USD-W)	AGO	BDI	BEN	BFA	BWA	CAF	CIV	CMR	COD	COG	COM	CPV	DJI	DZA	EGY	ETH	GAB	GHA	GIN	GMB	GNB	GNQ	KEN	LBR	LSO	MAR	MDG	MLI	MOZ	MRT	MUS	MWI	NAM	NER	NGA	RWA	SDN	SEN	SLE	STP	SWZ	SYC	TCD	TGO	TUN	TZA	UGA	ZAF	ZMB	ZWE
Gerardi RV	1501000	GROSS FIXED CAPITAL FORMATION	36 413	437	2 501	3 568	5 974	398	8 080	7 976	16 558	3 810	215	583	840	70 487	59 309	24 549	3 027	14 466	1 634	288	80	1 468	19 555	1 003	689	45 454	2 460	3 089	3 660	2 762	5 012	737	1 965	2 655	47 145	1 927	7 991	5 193	471	98	396	477	1 356	1 151	7 599	12 733	8 952	67 892	10 307	1 828
		% Diff G-RV / scaled EKS-RV	17.7	0.5	-0.3	0.8	13.2	0.6	-3.2	-1.8	8.6	6.3	-2.9	-0.8	-2.8	1.6	3.7	14.6	5.5	-4.5	-3.9	-6.2	-8.7	-4.3	-0.4	2.0	5.2	0.9	6.2	-1.3	7.8	-1.5	-4.6	-4.0	-4.7	-4.5	-3.1	4.5	2.8	-2.4	-3.7	-2.1	-3.4	-5.4	-10.5	0.0	4.4	-3.5	7.5	3.2	5.0	-5.6
		Calculation by EKS-PPPs scaled to ICP143 by XRs																																																			
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	30 925	435	2 508	3 540	5 276	395	8 347	8 120	15 248	3 585	221	588	864	69 406	57 176	21 416	2 868	15 140	1 701	307	86	1 533	19 627	983	655	45 039	2 317	3 130	3 395	2 804	5 256	769	2 061	2 779	48 670	1 844	7 775	5 321	489	101	410	504	1 516	1 151	7 281	13 192	8 328	65 768	9 814	1 837
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	198.256	1765.259	571.563	528.981	9.932	575.013	567.903	575.140	1548.324	856.972	426.660	115.317	212.913	110.813	10.819	22.911	627.450	4.671	9386.887	46.530	567.203	593.340	86.220	127.320	12.681	6.762	3156.016	569.505	55.542	269.219	34.981	780.765	13.777	572.442	347.404	949.779	11.688	586.241	8900.575	22.474	13.028	15.376	586.830	561.890	2.511	2811.002	3838.517	12.439	9.817	1.095
NV	1501000	GROSS FIXED CAPITAL FORMATION	6 131 055	776 671	1 433 749	1 672 842	52 495	227 403	4 740 538	4 670 123	23 606 622	3 072 365	94 810	67 793	183 662	7 691 099	618 584	490 680	1 799 535	70 724	15 970 073	14 666	49 713	894 475	1 692 251	125 217	8 310	304 571	7 313 769	1 782 682	188 585	754 778	183 662	600 049	28 400	1 590 929	16 908 134	1 751 364	90 669	3 119 399	4 354 266	2 251	5 337	7 757	889 495	646 730	18 283	34 444 296	31 966 101	818 094	94 382	2 121
RV-EKS	1501100	MACHINERY AND EQUIPMENT	5 364	170	734	1 474	911	175	3 254	2 532	2 861	549	82	146	504	22 099	21 678	2 779	597	5 519	714	171	35	693	8 666	396	122	13 580	553	940	931	1 347	2 688	378	1 157	1 197	24 089	439	3 843	1 704	253	50	193	310	906	419	1 652	5 747	1 965	24 055	2 074	1 238
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	295.357	2003.372	666.678	617.243	13.524	665.123	675.304	622.824	1881.708	908.535	492.847	121.172	205.456	125.534	13.639	31.323	643.866	5.432	10256.810	59.430	696.103	662.449	107.191	173.497	16.175	7.787	3964.050	672.736	66.138	271.518	39.741	861.348	15.948	710.631	394.345	1064.540	10.766	684.157	10664.260	24.764	16.373	16.839	649.750	664.283	2.980	2765.467	4398.310	16.089	12.239	1.203
NV	1501100	MACHINERY AND EQUIPMENT	1 584 401	340 104	486 450	909 545	12 323	116 168	2 197 335	1 577 164	5 384 463	498 942	40 531	17 644	103 644	2 874 647	299 405	97 059	384 298	29 975	7 323 825	10 190	24 057	459 925	928 950	68 751	1 969	105 749	2 193 976	632 682	61 578	365 831	103 644	325 947	18 448	850 958	9 489 294	457 653	41 370	1 165 725	2 693 812	1 241	3 168	5 227	588 536	276 389	4 922	16 006 915	8 382 351	387 030	35 172	1 488
RV-EKS	1501200	CONSTRUCTION	29 739	248	1 552	1 843	4 915	212	4 357	4 179	13 941	3 340	108	335	291	43 847	35 198	21 022	2 397	6 534	817	120	32	562	11 087	615	466	25 381	1 783	1 691	2 543	995	2 200	287	774	1 236	20 417	1 452	3 966	2 573	217	49	294	148	330	684	5 402	6 106	7 001	43 457	7 089	915
PPP-EKS	1501200	CONSTRUCTION	145.728	1587.487	491.651	452.514	7.886	497.646	475.135	531.308	1297.282	762.653	371.716	109.053	232.435	97.344	8.614	17.821	579.383	4.012	8653.089	38.580	445.731	519.109	68.393	91.211	10.050	5.877	2535.103	479.808	46.904	282.009	30.897	720.917	11.924	447.736	308.233	836.222	12.539	498.911	7334.294	20.476	10.111	14.638	548.472	473.480	2.118	2472.610	3323.788	9.602	7.631	1.025
NV	1501200	CONSTRUCTION	4 333 858	393 727	762 937	834 151	37 780	105 285	2 070 236	2 220 374	18 065 847	2 544 924	40 285	35 571	67 529	4 268 239	303 187	374 635	1 382 841	25 217	7 069 885	4 644	14 113	291 485	758 281	56 128	4 980	149 155	4 469 068	811 215	119 272	280 467	67 529	206 574	9 224	553 247	6 293 159	1 214 221	48 979	1 283 875	1 593 803	1 013	2 058	2 168	181 253	323 840	11 443	15 096 708	23 270 392	417 282	34 097	630
RV-EKS	1501300	OTHER PRODUCTS	722	22	279	214	172	9	702	1 390	74	32	28	111	60	4 396	1 254	927	50	2 679	154	1	15	218	47	2	84	6 388	184	505	116	389	314	79	45	263	2 862	64	48	973	6	0	7	21	185	67	638	1 201	71	851	415	2
PPP-EKS	1501300	OTHER PRODUCTS	294.839	1997.488	650.964	603.878	13.393	657.087	673.912	627.666	1880.876	898.286	497.366	121.996	210.320	124.697	13.550	31.271	642.335	5.424	10258.702	59.239	693.501	659.421	106.716	171.566	16.270	7.774	3973.624	671.062	66.513	271.749	40.469	859.955	16.029	709.689	389.794	1076.466	10.841	688.485	10590.150	24.523	16.509	16.956	645.502	661.289	3.005	2782.265	4394.046	16.167	12.311	1.219
NV	1501300	OTHER PRODUCTS	212 796	43 041	181 323	128 147	2 303	5 960	472 967	972 585	138 312	28 499	13 995	13 577	12 688	548 213	16 982	28 966	32 396	14 532	1 576 563	51	10 503	144 063	5 020	338	1 360	49 667	650 685	338 784	7 735	108 480	12 688	67 527	728	186 724	1 115 681	69 289	520	669 799	66 650	7	112	352	119 706	44 501	1 918	3 340 676	313 448	13 782	5 113	3
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	35 825	439	2 565	3 531	5 099	395	8 313	8 102	16 876	3 920	219	592	855	71 143	58 330	24 728	3 034	14 732	1 685	293	81	1 473	19 800	1 014	701	45 349	2 480	3 136	3 390	2 741	5 121	744	1 976	2 696	47 368	1 956	7 797	5 250	476	100	404	490	1 422	1 170	7 692	13 053	8 978	68 384	10 378	1 855
		% Difference (RV by scaled EKS-PPP Total =100)																																																			
	1501000	GROSS FIXED CAPITAL FORMATION	15.8	1.0	2.2	-0.3	13.7	0.0	-0.4	-0.2	10.7	9.4	-1.1	0.7	-1.0	2.5	2.0	15.5	5.8	-2.7	-1.0	-4.6	-5.2	-4.0	0.9	3.1	7.0	0.7	7.0	0.2	5.7	-2.2	-2.6	-3.3	-4.2	-3.0	-2.7	6.1	0.3	-1.3	-2.7	-0.7	-1.4	-4.9	-6.2	1.7	5.7	-1.1	7.8	3.9	5.8	-4.2
		Calculation by EKS-PPPs to USD																																																			
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	52 733	742	4 277	6 037	8 997	674	14 234	13 846	26 001	6 113	377	1 002	1 473	119 351	97 496	36 519	4 891	25 816	2 901	523	146	2 615	33 468	1 677	1 117	76 801	3 952	5 338	5 790	4 781	8 963	1 311	3 515	4 739	82 992	3 144	13 258	9 073	834	172	699	860	2 585	1 963	12 415	22 494	14 200	112 147	16 735	3 392
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	116.266	1046.951	335.189	310.217	5.825	337.212	333.042	337.286	908.002	502.564	251.396	67.626	124.861	64.985	6.345	13.436	367.963	2.740	5504.866	28.460	332.632	342.095	50.563	74.666	7.437	3.966	1650.822	333.982	32.572	157.881	20.514	457.873	8.079	335.704	203.732	556.991	6.854	343.796	5219.673	13.180	7.640	9.017	344.142	329.516	1.473	1531.249	2251.068	7.295	5.840	0.642
NV	1501000	GROSS FIXED CAPITAL FORMATION	6 131 055	776 671	1 433 749	1 672 842	52 495	227 403	4 740 538	4 670 123	23 606 622	3 072 365	94 810	67 793	183 662	7 691 099	618 584	490 680	1 799 535	70 724	15 970 073	14 666	49 713	894 475	1 692 251	125 217	8 310	304 571	7 313 769	1 782 682	188 585	754 778	183 662	600 049	28 400	1 590 929	16 908 134	1 751 364	90 669	3 119 399	4 354 266	2 251	5 337	7 757	889 495	646 730	18 283	34 444 296	31 966 101	818 094	94 382	2 121
RV-EKS	1501100	MACHINERY AND EQUIPMENT	4 512	143	617	1 239	766	147	2 737	2 130	2 407	462	69	122	424	19 259	18 400	2 338	502	4 641	601	144	29	583	7 286	333	102	11 421	465	791	783	1 133	2 193	318	973	1 007	20 259	370	3 222	1 433	212	42	163	261	792	352	1 389	4 833	1 602	20 231	2 417	1 041
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	351.190	2382.078	792.703	733.923	16.080	790.854	802.959	740.560	2237.416	1080.279	586.012	144.078	244.294	149.264	16.218	37.244	765.579	6.458	12195.702	70.664	827.691	787.675	127.453	206.293	19.233	9.259	4712.393	799.906	78.640	322.844	47.254	######	18.963	844.964	468.890	1265.785	12.801	813.496	12680.174	29.445	19.467	20.022	772.576	789.856	3.543	3312.040	5230.831	19.131	14.553	1.430
NV	1501100	MACHINERY AND EQUIPMENT	1 584 401	340 104	486 450	909 545	12 323	116 168	2 197 335	1 577 164	5 384 463	498 942	40 531	17 644	103 644	2 874 647	299 405	97 059	384 298	29 975	7 323 825	10 190	24 057	459 925	928 950	68 751	1 969	105 749	2 193 976	632 682	61 578	365 831	103 644	325 947	18 448	850 958	9 489 294	457 653	41 370	1 165 725	2 693 812	1 241	3 168	5 227	588 536	276 389	4 922	16 006 915	8 382 351	387 030	35 172	1 488
RV-EKS	1501200	CONSTRUCTION	98 035	818	5 115	6 077	16 203	697	14 363	13 776	45 957	11 009	357	1 105	959	144 540	116 028	69 299	7 888	21 540	2 693	397	104	1 851	36 548	2 029	1 633	83 668	5 811	5 573	8 383	3 278	7 252	945	2 550	4 073	67 304	4 787	12 877	8 483	716	163	671	488	1 089	2 255	17 807	20 127	23 079	143 256	23 370	2 027
PPP-EKS	1501200	CONSTRUCTION	44.207	481.572	149.145	137.272	2.332	150.963	144.135	161.175	393.537	231.172	112.762	33.082	70.510	29.530	2.613	5.406	175.759	1.217	2625.199	11.704	135.215	157.474	20.747	27.669	3.049	1.783	769.036	145.552	14.229	85.549	9.312	218.663	3.617	135.823	93.504	253.672	3.804	151.347	2224.894	6.211	3.067	4.440	166.392	143.632	0.643	750.076	1008.287	2.913	2.315	0.311
NV	1501200	CONSTRUCTION	4 333 858	393 727	762 937	834 151	37 780	105 285	2 070 236	2 220 374	18 065 847	2 544 924	40 285	35 571	67 529	4 268 239	303 187	374 635	1 382 841	25 217	7 069 885	4 644	14 113	291 485	758 281	56 128	4 980	149 155	4 469 068	811 215	119 272	280 467	67 529	206 574	9 224	553 247	6 293 159	1 214 221	48 979	1 283 875	1 593 803	1 013	2 058	2 168	181 253	323 840	11 443	15 096 708	23 270 392	417 282	34 097	630
RV-EKS	1501300	OTHER PRODUCTS	786	23	304	233	187	10	765	1 515	80	35	31	121	66	4 791	1 367	1 010	55	2 920	167	1	17	238	51	2	91	6 961	178	550	127	435	342	86	49	287	3 119	70	52	1 060	7	0	7	23	202	73	696	1 308	78	928	453	2
PPP-EKS	1501300	OTHER PRODUCTS	270.572	1933.080	597.384	554.175	12.291	603.004	618.352	576.004	1726.066	824.350	456.447	111.955	193.009	114.434	12.434	28.697	589.466	4.977	9414.332	54.363	636.494	605.146	97.932	157.445	14.930	7.135	3646.565	615.828	61.039	249.392	37.138	789.174	14.710	651.276	357.711	987.864	9.949	631.818	9718.507	22.505	15.151	15.561	592.372	606.860	2.758	2553.281	4032.383	14.955	11.298	1.119
NV	1501300	OTHER PRODUCTS	212 796	43 041	181 323	128 147	2 303	5 960	472 967	972 585	138 312	28 499	13 995	13 577	12 688	548 213	16 982	28 966	32 396	14 532	1 576 563	51	10 503	144 063	5 020	338	1 360	49 667	650 685	338 784	7 735	108 480	12 688	67 527	728	186 724	1 115 681	69 289	520	669 799	66 650	7	112	352	119 706	44 501	1 918	3 340 676	313 448	13 782	5 113	3
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	103 333	984	6 036	7 549	17 157	854	17 865	17 421	49 444	11 505	457	1 349	1 448	168 590	135 795	72 046	8 425	29 100	3 461	542	150	2 672	43 888	2 364	1 827	102 050	6 455	6 914	9 292	4 847	9 787	1 349	3 572	5 367	90 662	5 226	16 161	10 976	936	206	841	773	2 053	2 680	19 892	26 268	24 759	164 414	26 239	3 070
		% Difference (RV by EKS-PPP to USD Total =100)																																																		
	1501000	GROSS FIXED CAPITAL FORMATION	96.0	32.6	41.1	25.0	90.7	26.7	25.5	25.8	86.3	88.2	21.2	34.6	-1.7	42.4	39.3	98.9	72.3	12.7	18.3	3.6	2.4	2.2	31.1	41.0	63.5	32.9	63.4	29.5	60.5	1.4	9.2	2.9	1.6	13.3	9.3	66.2	21.9	21.0	12.2	19.8	20.4	-10.2	-20.6	36.6	60.2	16.8	74.4	46.6	56.8	-7.0

Annex 1: Global ICP 2017: Average percentage absolute deviations: GFCF-Total vs Sum of 3 categories (cont.)

	ICP 2017 (Global)	Real values (mio.USD-W)	BGD	BRN	BTN	CHN	FJI	HKG	IDN	IND	KHM	LAO	LKA	MDV	MMR	MNG	MYS	NPL	PAK	PHL	SGP	THA	TWN	VNM	ARG	BOL	BRA	DOM	ECU	HND	HTI	NIC	PAN	PER	PRY	SLV	URY	ARE	BHR	IRQ	JOR	KWT	OMN	PSE	QAT	SAU
Gerardi RV	1501000	GROSS FIXED CAPITAL FORMATION	116 768	5 621	2 016	4 613 818	1 045	54 489	579 198	1 166 648	3 587	7 640	30 811	2 488	37 168	3 813	117 265	11 332	65 338	95 939	77 840	130 420	113 267	83 734	70 391	9 257	280 381	22 839	28 735	6 820	2 878	3 906	23 082	44 287	7 033	4 825	6 460	109 494	12 804	35 410	9 906	41 253	28 550	3 177	89 258	236 148
		% Diff G-RV / scaled EKS-RV	15.6	5.0	14.5	3.1	-8.0	0.2	16.6	1.1	7.1	-2.6	-0.3	6.2	5.5	-1.8	4.8	3.3	-0.8	-1.1	-3.0	-7.9	-2.0	11.6	2.4	3.6	1.1	5.5	2.4	-0.6	9.6	2.4	2.6	2.7	2.6	-0.3	2.0	4.0	6.2	3.9	4.5	1.2	10.1	2.1	5.4	1.8
		Calculation by EKS-PPPs scaled to ICP143 by XRs																																												
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	101 018	5 355	1 762	4 475 911	1 136	54 358	496 750	1 153 863	3 350	7 843	30 902	2 342	35 241	3 883	111 923	10 973	65 858	97 028	80 245	141 571	115 601	75 023	68 740	8 934	277 286	21 640	28 068	6 864	2 626	3 816	22 488	43 134	6 853	4 839	6 332	105 320	12 052	34 066	9 484	40 745	25 925	3 111	84 683	232 023
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	64.631	1.285	47.951	7.858	1.732	10.596	8798.344	40.910	2896.254	5992.434	113.330	13.373	753.112	1769.129	3.052	75.705	75.053	40.747	1.538	24.779	31.006	15868.134	23.299	6.170	3.458	41.699	0.944	18.629	59.452	28.349	1.099	3.287	6137.067	0.802	44.413	2.835	0.315	1073.864	0.602	0.255	0.286	3.761	3.202	2.702
NV	1501000	GROSS FIXED CAPITAL FORMATION	6 528 856	6 878	84 475	35 172 305	1 968	575 991	4 370 574 766	47 204 960	9 703 361	46 996 274	3 502 124	31 317	26 540 160	6 869 350	341 547	830 704	4 942 905	3 953 630	123 380	3 507 913	3 894 368	1 190 474 000	1 601 537	55 124	958 779	902 380	26 496	127 874	156 150	108 172	24 724	141 776	42 054 473	3 880	281 219	299 569	3 797	36 582 246	5 707	10 380	7 425	11 701	271 146	626 931
RV-EKS	1501100	MACHINERY AND EQUIPMENT	19 577	1 438	334	826 442	594	20 634	55 485	272 317	1 083	1 555	12 105	688	10 572	1 033	25 909	1 948	17 682	28 663	22 330	62 564	41 750	13 356	25 602	4 448	95 620	4 455	6 673	3 009	52	1 550	4 428	14 017	2 406	1 794	1 882	32 011	3 031	16 133	1 174	194	2 472	658	27 529	100 511
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	97.715	1.597	74.416	7.848	2.069	7.823	12929.243	52.350	4073.954	8529.022	148.654	16.900	1066.412	2287.215	3.876	90.283	97.239	50.461	1.638	32.553	33.603	20781.834	25.167	6.160	3.569	50.707	0.974	19.556	75.710	26.716	1.030	3.046	6370.553	0.906	34.957	3.076	0.351	1086.328	0.624	0.257	0.356	2.744	3.362	2.911
NV	1501100	MACHINERY AND EQUIPMENT	1 912 923	2 297	24 822	6 485 939	1 229	161 419	717 377 037	14 255 856	4 414 087	13 261 653	1 799 424	11 629	11 274 000	2 362 834	100 428	175 909	1 719 332	1 446 352	36 585	2 036 623	1 402 902	277 553 373	644 341	27 397	341 283	225 916	6 498	58 846	3 957	41 408	4 561	42 699	15 327 251	1 625	65 774	98 455	1 094	17 525 476	732	50	880	1 806	92 551	292 600
RV-EKS	1501200	CONSTRUCTION	95 115	3 825	1 621	3 226 317	387	26 876	491 251	716 061	2 353	4 697	16 821	1 688	22 805	2 078	77 931	7 612	34 944	55 997	29 783	60 521	40 848	65 533	43 084	3 362	143 776	18 266	20 873	3 014	2 813	1 721	18 509	27 034	4 280	2 904	3 963	70 935	9 564	17 879	7 398	19 992	21 773	2 325	50 565	109 087
PPP-EKS	1501200	CONSTRUCTION	48.158	1.078	34.878	7.810	1.558	13.411	6683.831	33.943	2200.025	4430.641	90.821	11.092	565.293	1436.498	2.534	65.196	60.483	34.682	1.611	19.621	31.484	12925.624	21.717	6.160	3.308	36.693	0.898	17.486	54.051	29.095	1.089	3.339	5846.589	0.711	48.841	2.601	0.265	1033.915	0.567	0.247	0.244	4.087	2.996	2.478
NV	1501200	CONSTRUCTION	4 580 581	4 123	56 538	24 553 312	602	360 424	3 283 435 901	24 305 555	5 175 741	20 811 372	1 927 680	18 723	12 891 600	2 985 220	197 440	496 258	2 113 522	1 938 944	47 988	1 167 472	1 286 085	847 051 874	935 630	20 713	475 553	670 242	18 743	52 706	152 033	50 081	20 163	90 257	25 022 475	2 066	193 547	184 505	2 723	18 485 776	4 192	4 932	5 311	9 502	151 481	270 346
RV-EKS	1501300	OTHER PRODUCTS	373	283	42	536 908	68	6 977	28 738	173 166	29	1 547	1 211	57	2 352	678	11 496	1 712	11 552	11 546	25 617	8 912	27 541	3 224	852	1 117	39 318	121	1 280	836	2	624	0	2 848	269	205	613	5 182	27	529	1 278	20 866	3 497	145	8 029	22 219
PPP-EKS	1501300	OTHER PRODUCTS	94.678	1.619	73.538	7.698	2.009	7.761	12866.616	49.915	3938.752	8351.392	144.561	16.842	1009.671	2243.257	3.799	92.581	96.091	49.225	1.515	31.846	32.511	20432.110	25.312	6.280	3.610	51.502	0.981	19.527	72.958	26.749	1.019	3.096	6326.289	0.918	35.705	3.012	0.351	1079.722	0.612	0.259	0.353	2.718	3.377	2.880
NV	1501300	OTHER PRODUCTS	35 382	458	3 115	4 133 055	136	54 148	369 761 827	8 643 549	113 533	12 923 249	175 020	965	2 374 560	1 521 295	43 680	158 537	1 110 051	568 333	38 808	283 818	895 371	65 868 754	21 566	7 014	141 943	6 220	1 255	16 323	150	16 683	0	8 822	1 704 747	188	21 898	15 609	9	570 994	783	5 399	1 235	393	27 115	63 985
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	115 065	5 547	1 997	4 589 667	1 049	54 487	575 473	1 161 543	3 465	7 799	30 136	2 433	35 729	3 789	115 337	11 273	64 178	96 116	77 730	131 997	110 139	82 112	69 538	8 927	278 714	22 842	28 826	6 859	2 867	3 895	22 936	43 899	6 955	4 903	6 458	108 128	12 622	34 541	9 851	41 052	27 742	3 127	86 123	231 817
		% Difference (RV by scaled EKS-PPP Total =100)																																												
	1501000	GROSS FIXED CAPITAL FORMATION	13.9	3.6	13.4	2.5	-7.7	0.2	15.8	0.7	3.4	-0.5	-2.5	3.9	1.4	-2.4	3.1	2.7	-2.6	-0.9	-3.1	-6.8	-4.7	9.4	1.2	-0.1	0.5	5.6	2.7	-0.1	9.2	2.1	2.0	1.8	1.5	1.3	2.0	2.7	4.7	1.4	3.9	0.8	7.0	0.5	1.7	-0.1
		Calculation by EKS-PPPs to USD																																												
RV-EKS	1501000	GROSS FIXED CAPITAL FORMATION	172 255	9 131	3 004	7 632 315	1 937	92 691	847 057	1 967 564	5 713	13 373	52 694	3 993	60 092	6 621	190 851	18 711	112 302	165 452	136 833	241 406	197 123	127 929	117 215	15 235	472 928	36 901	47 862	11 705	4 479	6 507	38 363	73 551	11 685	8 251	10 797	179 591	20 551	58 089	16 172	69 479	44 208	5 305	144 401	395 646
PPP-EKS	1501000	GROSS FIXED CAPITAL FORMATION	37.902	0.753	28.121	4.608	1.016	6.214	5159.720	23.992	1698.485	3514.216	66.462	7.843	441.657	1037.492	1.790	44.396	44.014	23.896	0.902	14.531	18.183	9306.743	13.663	3.618	2.028	24.454	0.554	10.925	34.865	16.625	0.644	1.928	3599.035	0.470	26.046	1.662	0.185	629.759	0.353	0.149	0.168	2.206	1.878	1.585
NV	1501000	GROSS FIXED CAPITAL FORMATION	6 528 856	6 878	84 475	35 172 305	1 968	575 991	4 370 574 766	47 204 960	9 703 361	46 996 274	3 502 124	31 317	26 540 160	6 869 350	341 547	830 704	4 942 905	3 953 630	123 380	3 507 913	3 894 368	1 190 474 000	1 601 537	55 124	958 779	902 380	26 496	127 874	156 150	108 172	24 724	141 776	42 054 473	3 880	281 219	299 569	3 797	36 582 246	5 707	10 380	7 425	11 701	271 146	626 931
RV-EKS	1501100	MACHINERY AND EQUIPMENT	16 464	1 210	281	695 053	500	17 354	46 664	229 023	911	1 308	10 180	579	8 891	869	21 790	1 639	14 870	24 106	18 780	52 617	35 112	11 232	21 532	3 741	80 419	3 747	5 612	2 531	44	1 304	3 724	11 788	2 023	1 509	1 582	26 922	2 549	13 568	987	163	2 079	553	23 152	84 531
PPP-EKS	1501100	MACHINERY AND EQUIPMENT	116.187	1.899	88.484	9.332	2.460	9.302	15373.318	62.246	4844.072	10141.302	176.755	20.095	1268.000	2719.577	4.609	107.350	115.621	59.999	1.948	38.706	39.955	24710.319	29.925	7.324	4.244	60.292	1.158	23.252	90.022	31.766	1.225	3.622	7574.807	1.077	41.566	3.657	0.417	1291.681	0.741	0.306	0.423	3.263	3.998	3.461
NV	1501100	MACHINERY AND EQUIPMENT	1 912 923	2 297	24 822	6 485 939	1 229	161 419	717 377 037	14 255 856	4 414 087	13 261 653	1 799 424	11 629	11 274 000	2 362 834	100 428	175 909	1 719 332	1 446 352	36 585	2 036 623	1 402 902	277 553 373	644 341	27 397	341 283	225 916	6 498	58 846	3 957	41 408	4 561	42 699	15 327 251	1 625	65 774	98 455	1 094	17 525 476	732	50	880	1 806	92 551	292 600
RV-EKS	1501200	CONSTRUCTION	313 543	12 610	5 344	10 635 456	1 275	88 595	1 619 392	2 360 473	7 755	15 484	55 449	5 564	75 176	6 850	256 899	25 092	115 192	184 296	98 100	199 505	134 655	216 027	142 024	11 084	473 953	60 214	68 806	9 936	9 272	5 674	61 013	89 117	14 108	9 572	13 063	233 836	31 528	58 939	24 388	65 904	71 774	7 663	166 687	359 604
PPP-EKS	1501200	CONSTRUCTION	14.609	0.327	10.580	2.309	0.473	4.068	2027.573	10.297	667.388	1344.056	27.551	3.365	171.485	435.769	0.769	19.777	18.348	10.521	0.489	5.952	9.551	3921.051	6.588	1.869	1.003	11.131	0.272	5.305	16.397	8.826	0.330	1.013	1773.591	0.216	14.816	0.789	0.086	313.643	0.172	0.075	0.074	1.240	0.909	0.752
NV	1501200	CONSTRUCTION	4 580 581	4 123	56 538	24 553 312	602	360 424	3 283 435 901	24 305 555	5 175 741	20 811 372	1 927 680	18 723	12 891 600	2 985 220	197 440	496 258	2 113 522	1 938 944	47 988	1 167 472	1 286 085	847 051 874	935 630	20 713	475 553	670 242	18 743	52 706	152 033	50 081	20 163	90 257	25 022 475	2 066	193 547	184 505	2 723	18 485 776	4 192	4 932	5 311	9 502	151 481	270 346
RV-EKS	1501300	OTHER PRODUCTS	407	308	46	585 063	74	7 603	31 316	188 697	31	1 686	1 319	62	2 563	739	12 528	1 866	12 588	12 581	27 914	9 712	30 011	3 513	928	1 217	42 944	132	1 395	911	2	680	0	3 103	294	224	668	5 647	29	576	1 393	22 738	3 810	157	8 750	24 212
PPP-EKS	1501300	OTHER PRODUCTS	86.885	1.485	67.485	7.064	1.844	7.122	11807.585	45.807	3614.563	7664.008	132.663	15.456	926.567	2058.620	3.467	84.961	88.182	45.173	1.390	29.225	29.835	18750.392	23.228	5.763	3.313	47.263	0.900	17.920	66.953	24.548	0.935	2.843	5805.587	0.842	32.767	2.764	0.322	990.832	0.562	0.237	0.324	2.495	3.099	2.643
NV	1501300	OTHER PRODUCTS	35 382	458	3 115	4 133 055	136	54 148	369 761 827	8 643 549	113 533	12 923 249	175 020	965	2 374 560	1 521 295	43 680	158 537	1 110 051	568 333	38 808	283 818	895 371	65 868 754	21 566	7 014	141 943	6 220	1 255	16 323	150	16 683	0	8 822	1 704 747	188	21 898	15 609	9	570 994	783	5 399	1 235	393	27 115	63 985
RV as Sum	1501000	GROSS FIXED CAPITAL FORMATION	330 414	14 128	5 670	11 915 571	1 848	113 552	1 697 372	2 778 194	8 698	18 478	66 949	6 205	86 630	8 458	291 216	28 597	142 650	220 983	144 874	261 834	199 778	230 772	164 484	16 041	597 216	64 093	75 813	13 377	9 319	7 657	64 737	104 008	16 425	11 365	15 314	266 404	34 106	73 083	26 769	88 804	77 664	8 374	198 588	468 347
		% Difference (RV by EKS-PPP to USD Total =100)																																												
	1501000	GROSS FIXED CAPITAL FORMATION	91.8	54.7	88.8	56.1	-4.6	22.5	100.4	41.2	52.2	38.2	27.1	55.4	44.2	27.7	52.6	52.8	27.0	33.6	5.9	8.5	1.3	80.4	40.3	5.3	26.3	73.7	58.4	14.3	108.1	17.7	68.7	41.4	40.6	37.0	41.8	48.3	66.0	25.8	65.5	27.8	75.7	57.9	37.5	18.4