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Some comments / considerations on the paper
"*The Gerschenkron Effect in International Comparisons, 2011 and 2017*"
(Y. Dikhanov, World Bank – ICP TAG meeting / VC, May 2021)

The Gerschekron effect is well described on the OECD PPP website:

"*The Gerschenkron effect can arise with aggregation methods that use either a reference price structure or a reference volume structure to compare countries. For methods employing a reference price structure, a country's share of total GDP (that is the total for the group of countries being compared) will rise as the reference price structure becomes less characteristic of its own price structure. For methods employing a reference volume structure, a country's share of total GDP will fall as the reference volume structure becomes less characteristic of its own volume structure. The Gerschenkron effect arises because of the negative correlation between prices and volumes. In other words, expenditure patterns change in response to changes in relative prices because consumers switch their expenditure towards relatively cheap products."*

The paper prepared by Y. Dikhanov examines 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). Y. Dikhanov 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 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 analysis of the Gerschenkron effect in the ICP 2011 / 2017 done by Y.Dikhanov is excellent.

Nevertheless, this analysis can be expanded by the use of additional indicators and the types of multilateral indices based on the average international prices. So, Y. Dikhanov indicated on page 1: "*The Gerschenkron effect (or bias) in spatial comparisons can be defined as an overvaluation of a country's real GDP due to a* ***deviation of the country's price structure from a base price structure****."*

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[1]. These 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 coefficients of

[1] 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 (shares).

similarity of country's price structures with the structures of international average prices are very useful indicators for the evaluation of potential Gerschenkron effect.

Y. Dikhanov carried out a very interesting simulation of the Gerschenkron effect on a limited data set: a group of selected large regional countries - the United States, Brazil, Nigeria, and India - one large country from each of the four larger ICP regions using the ICP 2017 data. He conducted four additional specific GK computations: one country was given a 100-time increase in size, thus, effectively turning that country's prices into international prices, and treating other countries as small economies. Some GK PLIs calculated with the dominance of one country were remarkable different from the original GK for 4 countries[2]:

YD Table 1 Simulation of the Gerschenkron effect, PLI (USA=1)

	USA	BRA	NGA	IND
EKS	1	0.711	0.415	0.322
IDB	1	0.725	0.412	0.322
GK (original)	1	0.671	0.387	0.299
GK (USA dominant)	1	0.624	0.393	0.259
GK (BRA dominant)	1	**0.774**	0.402	0.316
GK (NGA dominant)	1	0.737	**0.438**	0.316
GK (IND dominant)	1	0.697	0.451	**0.375**

Logically, the biggest changes referred to the dominant countries. BRA PLI was increased by 15% by the use BRA as the dominant country, NGA PLI was increased by 13% by the use NGA as the dominant country and the most significant change - IND PLI was increased by 25% by the use IND as the dominant country:

Ratios "GK dominant / GK original"

	USA	BRA	NGA	IND
GK (USA dominant)	1	0.930	1.016	0.866
GK (BRA dominant)	1	**1.154**	1.039	1.057
GK (NGA dominant)	1	1.098	**1.132**	1.057
GK (IND dominant)	1	1.039	1.165	**1.254**

YT Table 1 presents the PLIs relatively USA. All results are the base country invariant and the transitive. Therefore the PLIs relatively other countries have respective significant differences

	NGA/BRA	NGA/IND	BRA/IND
EKS	0.5837	1.289	2.208
IDB	0.5683	1.280	2.252
GK (original)	0.5768	1.294	2.244
GK (USA dominant)	0.6298	**1.517**	2.409
GK (BRA dominant)	**0.5194**	1.272	**2.449**
GK (NGA dominant)	**0.5943**	**1.386**	2.332
GK (IND dominant)	0.6471	**1.203**	**1.859**

[2] The IDB and GEKS results are not affected by this increase in size because they are scale-neutral.

These results are not surprise because BRA and especially NGA and IND have very different price and expenditure structures than USA – see respective Tables below:

Table 1 GDP: Coefficients of similarity of national price structures

	USA	BRA	NGA	IND
USA	**1.0000**	0.7184	0.4145	0.4059
BRA	0.7184	**1.0000**	0.6347	0.5870
NGA	0.4145	0.6347	**1.0000**	0.6242
IND	0.4059	0.5870	0.6242	**1.0000**

Table 2 Coefficients of similarity of national GDP expenditure structures (shares)

	USA	BRA	NGA	IND
USA	**1.0000**	0.7110	0.3464	0.5549
BRA	0.7110	**1.0000**	0.3927	0.5704
NGA	0.3464	0.3927	**1.0000**	0.4416
IND	0.5549	0.5704	0.4416	**1.0000**

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 from the Global ICP 2017[3].

Table 3 contains Average coefficients of similarity of national price structures for GDP and HH(d) by the Regions.

Table 3
Average coefficients of similarity of national price structures for GDP and HH (d)

GDP: Average coefficients of similarity of national price structures					
	EU-OECD	**AFR**	**ASI**	**LA**	**WA**
EU-OECD	**0.7814**	**0.5502**	**0.5831**	**0.6808**	**0.5568**
AFR	**0.5502**	**0.7260**	**0.6695**	**0.6863**	**0.4929**
ASI	**0.5831**	**0.6695**	**0.7101**	**0.6787**	**0.5805**
LA	**0.6808**	**0.6863**	**0.6787**	**0.7897**	**0.6087**
WA	**0.5568**	**0.4929**	**0.5805**	**0.6087**	**0.6756**
HH (d.): Average coefficients of similarity of national price structures					
	EU-OECD	**AFR**	**ASI**	**LA**	**WA**
EU-OECD	**0.8083**	**0.5312**	**0.5707**	**0.6546**	**0.4946**
AFR	**0.5312**	**0.6910**	**0.6284**	**0.6521**	**0.4233**
ASI	**0.5707**	**0.6284**	**0.6793**	**0.6358**	**0.5091**
LA	**0.6546**	**0.6521**	**0.6358**	**0.7613**	**0.5249**
WA	**0.4946**	**0.4233**	**0.5091**	**0.5249**	**0.5823**

As one could expect, intra-regional average coefficients are higher than inter-regional average coefficients due to the regional fixity of BH-PPPs.

Generally, average regional coefficients for GDP are higher than for the HH(d). One can assume that this is because some components of GDP have BH-PPPs which are

[3] Detailed coefficients are contained in the EXCEL file which is available by the WB ICP unit..

relatively close to the XRs ("Machinery and equipment") in all regions and the category "Net export" has the XRs as the reference PPPs.

EU-OECD has relatively high average coefficient with LA and moderate with other regions. WA has lower similarity with other regions as well as within the WA region.

Table 3 and the table with detailed coefficients of inter-country similarity of national price structures (see enclosed EXVEL file) show that lower similarity reflects in some cases actual national peculiarities in prices but in many cases lower similarity reflects 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).

The degree of the Gerschenkron effect on aggregated PPPs depends mostly on similarity of country's price structure but also on similarity of country's expenditure structure (shares). **Table 4** contains Average coefficients of similarity of national expenditure structures for GDP and HH (d) by the Regions:

Table 4
Average coefficients of similarity of national expenditure structures (shares) for GDP and HH (domestic) by the Regions

Average coefficients of similarity of national structures (shares)					
GDP					
	EU-OECD	**AFR**	**ASI**	**LA**	**WA**
EU-OECD	0.6798	0.4969	0.5530	0.5861	0.5206
AFR	0.4969	0.5199	0.5007	0.5160	0.5199
ASI	0.5530	0.5007	0.5446	0.5456	0.5194
LA	0.5861	0.5160	0.5456	0.6115	0.5195
WA	0.5638	0.4922	0.5224	0.5420	0.5207
HH (dom.)					
	EU-OECD	**AFR**	**ASI**	**LA**	**WA**
EU-OECD	0.6968	0.4618	0.5448	0.5995	0.5161
AFR	0.4618	0.4967	0.4699	0.5091	0.5147
ASI	0.5448	0.4699	0.5447	0.5515	0.5138
LA	0.5995	0.5091	0.5515	0.6368	0.5143
WA	0.5894	0.4662	0.5257	0.5603	0.5170

As one could expect, intra-regional average coefficients are generally higher than inter-regional average coefficients due to higher regional economic homogeneity.

EU-OECD has relatively high average coefficient with LA and moderate with other regions. WA has lower similarity with other regions as well as within the WA region.

Y. Dikhanov analysed in his paper two additive methods: GK and IDB. It is desirable to include in the analysis several other methods based on the use of international average prices[4]:

- Gerardi-UCW
- CPD-Rao
- Share GK-Rao
- MPCP
- Standardized structure (SS)

The respective calculations (like by Y. Dikhanov without regional fixity) were done by the author of this notice for the GDP and HH (domestic)[5] on the basis of BH data from the Global 2017 ICP. 143 countries participating in the Global linking were included (recent state of BH input data provided by the WB to the COTT members was used).

To evaluate potential Gerschenkron effect for the countries and the regions, it is desirable to look - How close / far the international price structure reflect regional and country price structure by each additive method included in the analysis? The author of this notice calculated the coefficients of similarity of national price structures with international sets of prices for GDP and HH (domestic). **Table 5** contains maximal and minimal coefficients of similarity of price structures (national with international sets of prices) for GDP and HH (domestic) at the country level as well as average regional coefficients of similarity of price structures obtained by each of seven aggregation methods.

[4] 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

[A shorter version of this paper was published in the book "Purchasing power parities of currencies: Recent advances in methods and applications". Edited by Rao, D. S. Prasada Cheltenham, UK: Edward Elgar, 2009.]

Aggregation methods on the basis of structural international prices described in the paper are additive and are based on price structures which are characteristic for all countries

[5] The aggregate "HH (domestic)" seems to be more straightforward for the purposes of the analysis than the GDP. GDP contains the category "Net exports" which has very significant negative value in many countries. Additive aggregation methods like the GK can be very sensitive to use of negative expenditure values => the distorting effect can be significant. For example, recent version of the PWT10.1 contains several cases where GK GDP-PPPs are negative

Table 5 Coefficients of similarity of price structures (national with international sets of prices) for GDP and HH (domestic) at the country and regional levels

Average coefficients of similarity of price structures (national and international)							
GDP							
	GK	**Ikle**	**Gerardi**	**CPD-Rao**	**ShGK-Rao**	**SS Str**	**MPCP**
Max	0.9226	0.9106	0.9270	0.9152	0.9264	0.9278	0.9017
Min	0.4352	0.3977	0.3490	0.3397	0.3131	0.3120	0.5724
Average	0.7426	0.7804	0.7934	0.7814	0.7743	0.7845	0.7558
EU-OECD	0.8206	0.7720	0.7984	0.7952	0.8025	0.8089	0.7310
AFR	0.6688	0.7878	0.7884	0.7706	0.7478	0.7601	0.7469
ASI	0.7080	0.7779	0.7884	0.7702	0.7607	0.7750	0.7792
LA	0.8057	0.8533	0.8700	0.8592	0.8574	0.8672	0.8308
WA	0.7212	0.6862	0.6957	0.6818	0.6808	0.6900	0.7750
HH (dom.)							
	GK	**Ikle**	**Gerardi**	**CPD-Rao**	**ShGK-Rao**	**SS Str**	**MPCP**
Max	0.9232	0.8944	0.9105	0.9051	0.9059	0.9154	0.8802
Min	0.3471	0.3306	0.2598	0.2682	0.2444	0.2339	0.4626
Average	0.7214	0.7569	0.7744	0.7625	0.7550	0.7660	0.7252
EU-OECD	0.8225	0.7671	0.8002	0.7966	0.8027	0.8105	0.7046
AFR	0.6399	0.7511	0.7610	0.7414	0.7196	0.7355	0.7185
ASI	0.6800	0.7562	0.7713	0.7506	0.7425	0.7583	0.7574
LA	0.7659	0.8165	0.8336	0.8256	0.8237	0.8300	0.7813
WA	0.6601	0.6501	0.6303	0.6312	0.6235	0.6188	0.7142

It is visible that the variation (the spread "Max – Min") of country's similarity coefficients with the set of average international prices is significant by each method. This spread is remarkable lower by the MPCP method because the MPCP method designed for searching for the vector of international prices which produces maximal possible highest coefficient of similarity of price structure (national with international average) for each country[6].

Table 5 shows that in average 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 but rather small countries or the countries with the middle level of economic development: CYP, ESP, EST, GRC, SVN, HKG, PER - see Table 6 below:

[6] The description of the MPCP method can be found in the paper by S. Sergeev - see the footnote 4.

Table 6 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

What is numerical size of the Gerschenkron effect by additive GK and IDB methods (i.e. the methods which can be potentially used in the ICP)? he ratios between the GEKS and GK / IDB PPPs can be used for this purpose. **Table 7** contains average ratios (GM) between the GEKS and GK / IDB for GDP and HH(d) for the regions[7] in two versions:

- with the base “USA = 1”

and

- with the base “World 143 = 1” (unweighted GM scalinng)

The presentation with the base “USA = 1” is more traditional. However in this case the ratios depend heavily on the peculiarities of the USA price structure. The presentation with the base “World = 1” is neutral.

[7] The country’s ratios “GEKS /GK” and “GEKS / IDB” are presented in the Excel file which is available by the WB ICP unit.

Table 7
Average ratios (GM) between the GEKS and GK / IDB for GDP and HH(d) for the Regions

GDP: average ratios (GM) between the GEKS and GK / IDB				
	GM Ratios of PPP (US=1)		GM Ratios of PPP (W143=1)	
	EKS/GK	EKS/IDB	EKS/GK	EKS/IDB
EU-OECD	1.015	0.994	0.965	1.008
AFR	1.091	0.976	1.038	0.990
ASI	1.045	0.992	0.993	1.007
LA	1.041	0.962	0.989	0.976
WA	1.074	1.016	1.021	1.030
HH (d): average ratios (GM) between the GEKS and GK / IDB				
	GM Ratios of PPP (US=1)		GM Ratios of PPP (W143=1)	
	EKS/GK	EKS/IDB	EKS/GK	EKS/IDB
EU-OECD	1.024	1.020	0.955	0.981
AFR	1.115	1.055	1.040	1.015
ASI	1.090	1.055	1.017	1.015
LA	1.063	1.030	0.992	0.991
WA	1.076	1.041	1.003	1.001

Table 7 shows that the 2017 Global (unrestricted) GK PPPs exhibit the Gerschenkron effect in relatively remarkable degree if the country's PPPs are presented with the base "USA = 1" and in relatively small degree if the country's PPPs are presented with the base World = 1.

It is not very likely that the ICP will change the official aggregation method. However the official GEKS method should not be considered as an "ideal" method. Fisher-PPP satisfies the economic approach to index number theory and F-PPPs can be presented as the PPP based on average arithmetic (unweighted) international prices (F-PPPs as 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. What sense has the comparison of USA and CAN via ALB or the comparison of SZE and SVK via LUX?

P. Hill gave the comments about multilateral methods that take the Fisher indices as the starting point (GEKS and the like) in an aphoristic form: „*The construction of a multilateral set of measurements at a later stage has then to be regarded as a process whereby an initial set of perfectly good binary measures has to be distorted, rather in the manner practiced by Procrustes, in the interests of securing transitivity*" (see Kravis, Heston, Summers, 1982, p.77). S. Khamis commented the use of the EKS-method in EUROSTAT-comparison with the following words: „*In the opinion of the author, the adoption of the EKS(F) results by EUROSTAT is a retrogressive step in comparison with their excellent earlier comparisons including those of 1975 based on the Gerardi UCW method*" (see, S. Khamis. „*On some aspects of the measurement of Purchasing Power Parities*". Reports of ISI Session, Florenz, August 1993).

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 depends 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.

Main disadvantage of all additive methods is not the potential Gerschenkron effect but the fact that practically all of them 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". There is one exception - the Gerardi UCW method (this method was used in the Eurostat PPP comparison of Year 1975). 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.

A deeper look in 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) 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)[8]. 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 and 7 different methods based on the use of average international prices vary in a very moderate degree[9].

Flexible non-additivity of the EKS results

The EKS results are non-additive and therefore are less applicable for the structural analysis. Therefore there is the proposal to produce and publish two sets of the results: official EKS results for volume and price level inter-country comparisons and non-official results by an additive method for structural analyse. So, Y. Dikhanov indicated: "*It appears that publishing the two indices (GEKS and IBD) would indeed address multiple users' needs as referred to by Deaton and Heston (2009) and Diewert (2010), and could bring in new users of ICP data working on problems where additive decomposition of real expenditures is required*."

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[8] The weakness of BH-PPPs for several areas means simultaneously that the GEKS results are also not free from the bias relatively the "true" results. It is not an accident that Y. Dikhanov used the quotation marks for the GEKS as "unbiased" index in the sentence "*Normally, in order to determine the Gerschenkron effect of an index, we have to reference this "overvaluation" to some **"unbiased"** index. In this paper we will use the official 2011 and 2017 ICP index – **the GEKS**".*

[9] Country's PPPs by the official and 7 different methods based on the use of average international prices can be found in the EXCEL file which is available by the WB ICP unit.

Obviously, the results by an additive method would be the most appropriate for structural analysis.

However, additive results 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. The OECD long-term experience with the production of two sets of the results (GEKS and GK) shows this clearly. The GK results were practically not used (only some irritations) and the OECD stopped the production of the GK results.

And even more important point:

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

- if one produces the free GK results then these will additive and formally inter-regionally comparable but inconsistent with the regional results due to different approaches used by the EU-OECD and other ICP Regions for many important areas (Housing rents, Education, Health, Construction).

Is it possible to use the official EKS results for the structural analyses? The author of this notice believes that "Yes" (of course, with the reservations).

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 in this case Real values reflect price structure of the base country.

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 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 PPP/PLIs or by the WB by the presentation of the PLLI 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 these experiments are presented in **Table 8**[10]

Table 8
Summary of the experiments for the evaluation of non-additivity of the ADB 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

Conclusions

1) The 2017 Global (unrestricted) GK PPPs exhibit the Gerschenkron effect in relatively remarkable degree if the country's PPPs are presented with the base USA = 1 and in relatively small degree if the PPPs are presented with the base World = 1. However the main actual reason for this effect is not a theoretical drawback of the GK method *per se* but 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). If Quality and Productivity adjustments are done properly

[10] The details are presented in the Excel file which is available by the WB ICP unit.

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.

2) The non-additivity of the EKS results can be significantly reduced if the 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)