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Efficiency of the Core Product List in International Comparisons

Paper for Session 3

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1. BACKGROUND

After the successful completion of the 2005 round of the ICP Asia Pacific, the regional comparison is due to be fully updated in 2011, along with the upcoming global exercise. However, there exists considerable demand for the compilation of PPPs and real GDP aggregates on an annual basis for analytical purposes. Extrapolation to non-benchmark years of the PPP-based indicators is usually done with national growth rates and deflators. Yet, as the history of ICP has shown, such an updating usually results in aggregates that are not consistent with benchmark estimates. The main reason for this inconsistency is national growth rates being estimated using national price structures, and, strictly speaking, being not quite comparable internationally.

The accumulated inconsistencies between ICP benchmarks extrapolated with national growth rates and deflators, from one benchmark to the next, could reach significant levels in several years even for countries in the OECD comparison. Apart from this theoretical incomparability, there exist many other practical sources of differences, including:

> [i] inconsistencies due to *using different indices* (for example, using the Fisher or Laspeyres indices, chained or fixed-base at the aggregate level; at the same time using different indices for elementary aggregation at the individual basic heading (item or class in CPI) level create significant inconsistencies as well). In addition, different countries have different base years for expenditure weights, and different ways of linking their growth series over times.
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> [ii] those due to using SNA 93 vs. SNA 68. Most problems would arise when different countries in the comparison implement differing versions of SNA;
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> [iii] those due to using hedonics in capturing quality changes in electronics, computers and cars and other adjustments in some countries. It is estimated that US CPI when measured at pre-1998 methodology could be 1.4% higher today due to various adjustments [not only hedonics]. An overview of the methodological changes in US CPI and their effects on the index is contained in David S. Johnson, Stephen B. Reed, and Kenneth J. Stewart, *"Price measurement in the United States: a decade after the Boskin Report"*, BLS, 2006 [http://www.bls.gov/opub/mlr/2006/05/art2full.pdf]. It should be noted that the methodologies used in national CPIs can diverge even more among themselves than pre-1998 and today's CPIs in the US.
>
> [iv] those due to the terms of trade effect not captured in GDP growth rates. *Terms of trade effect* would normally be captured in *Real GDI* [*Real Gross Domestic Income*], see SNA 1993 Manual for the definition, http://unstats.un.org/unsd/sna1993/tocLev8.asp?L1=16&L2=11. However, not all countries estimate *Real GDI*, and those who do may not be doing it uniformly.

A good overview of some inconsistencies between ICP benchmarks and extrapolated GDP figures can be found in S. Stapel, *"Challenging the "snapshot theory" of Purchasing Power Parities: Eurostat's revision of the PPP 1995 to 2000"*, Eurostat, 2004 [http://www.ipeer.ca/papers/Stapel, June6, 2004,_final_04_6_04.pdf]. Table 3 on p.9 of this paper shows that in EU countries, the inconsistencies between two adjacent ICP benchmarks, separated by five years, unexplainable by GDP growth rates

ranged from *minus 16.3%* for Norway to *plus 11.7%* for Island. Another paper on this subject is S.Varjonen, *Improving the Quality of PPP Series*, OECD, 2002 [http://www.oecd.org/dataoecd/51/21/1961624.pdf]. Similarly, the author reports inconsistencies between two benchmarks ranging from *minus 13.6*% [Turkey] to *plus 11.7*% [Greece] during the 1990-99 period, see Table 2 on p.6 of the paper. For France, for example, the inconsistency stood at *minus 6.4*%.

Related developments in the Asia Pacific region since the completion of the 2005 round have been directed at examination the feasibility of achieving a closer integration of CPI-ICP activities in the future. A large workshop was held in January, 2008 to discuss the recommendations of a report commissioned by ERDI of the Asian Development Bank. The region is looking towards harmonization of CPI and ICP but any concrete steps towards achieving this goal are still in the future.

Given the gap between the two rounds it is very important that the participating countries in the region, in the interim, are engaged in ICP related activities in order to maintain the institutional capacity acquired through their participation in the 2005 ICP. Otherwise the region could face a risk that the whole set of processes need to be reintroduced in these countries for the 2011 round. Thus, the *ICP Asia Pacific: 2009 Update* is designed to keep the participating countries engaged in at a desirable level of activity. The proposed *2009 Update* is designed to achieve a set of inter-related objectives that will help strengthen the ICP in the region, enhance the capacity of the participating countries to improve compilation of CPI at the national level and to participate in the ICP at the international level.

2. MAJOR OBJECTIVES

The paper targets a *relatively small-scale exercise* [covering around 40% of the original list in Consumption, however individual countries would need to collect only a subset of it] to be carried out *in the capital areas*, that is intended to be much less resource intensive than a regular ICP comparison.

The 2009 Update for the Asia Pacific region will achieve a number of important objectives. Major ones are listed below.

i. To identify a *core list of products* that can be used in compiling quick updates of PPPs for the years in between benchmark years.

ii. To build *scaling factors* that can be used in scaling capital city prices to national average prices using the CPI information from the national sources and/or information from the price data collected as a part of the 2005 ICP.

iii. Recognizing the interest in increased CPI-ICP harmonization, an attempt will be made to *integrate the core ICP list* into the regular price collection to facilitate price collection for the 2009 Update as well as in the upcoming round 2011 round.

iv. Another objective of the Update is to establish a framework for *using the CPI information for estimating sub-national price levels* (PPPs for sub-regions within a country) – for this part of the project, the main focus will be on China, India, Indonesia, Philippines, Vietnam and Thailand.

v. *Enhanced capacity building*: An important consideration for bringing the countries onboard for the 2009 ICP Update and CPI-ICP Harmonization is establishing the foundation for the next 2011 round

in the countries. As the countries will be able to manage and run the sub-national comparisons themselves, they will acquire knowledge and institutional infrastructure necessary for participation, and will be able to grasp the full cycle of the program: from planning and price collection to the aggregation and results.

3. BUILDING A CORE PRODUCT LIST FOR HOUSEHOLD CONSUMPTION – COMBINATORIAL APPROACH

The full product list for Asian comparison consists of 656 items for household goods. In order to achieve the low-cost objective, the list was reduced to 269 household consumption goods and services. The core list should be optimal in the sense of delivering minimum deviations from the full list for the whole set of countries. In practice, it means that each country would need to collect prices for 165-245 products only [only the products priced in 2005 will need to be estimated for 2009 in each country].

To demonstrate the approach for the core list selection, rice which is one of the basic headings with the most number of products in the Asian regional comparison was chosen. Rice had 19 items and the price matrix was very sparse with only four items having 10 or more countries pricing them, see Table 1. We intend to select six items for our core list which represents about 30% of the total number of products for the BH. Table 1 also shows CV of CPD residuals by country and by item which indicate how coherent the prices are across countries and items.

Selection of items can be done based on a similarity measure, for example, CV by item, based on the CPD regression, from Table A[1]. However, selecting individual items in this way does not allow for effects of within-core group correlation, when individual items may contribute more when considered in a group. It is worth mentioning that evaluating all permutations is very intensive computationally. The number of *k*-combinations from a set of size *n* would be given by the following formula:

$$C_k^n = \binom{n}{k} = \frac{n!}{k!(n-k)!}.$$

For a core list of six items out of 19 that would mean 27,132 combinations[2]. The combinatorial approach singled out items S={10, 12, 13, 17, 18, 19}. The standard deviation for S was 8.1%, with 48 quotes only [Table 2 shows items to be priced, country by country][3].

Note that item 2 was not a part of the selection, even though it was priced by 12 countries. The ratio of the selection PPP to the BH PPP, country by country, is shown below:

Table A. Ratio of Core List PPP to Full BH PPP

	BAN	BHU	BRU	PRC	FIJ	HKG	INO	IND	IRN	CAM	LAO	SRI	MAC	MLD	MON	MAL	NEP	PAK	PHI	SIN	THA	TAP	VIE
PPP ratio	1.08	1.06	0.97	1.05	1.14	1.03	0.87	1.12	1.02	1.10	0.93	0.93	0.94	0.94	1.01	1.07	0.88	0.90	1.02	1.14	0.95	1.01	0.92

[1] A very important consideration in the selection process should be providing sufficient overlap for computing CPD-based PPPs. Thus, a low value for the CV for a group of items cannot guarantee meeting this criterion.

[2] Only the combinations that provide PPPs for the same number of countries as in the full set were considered. Note that some possible combinations may generate significant gaps in country coverage.

[3] Note that BH PPPs are normalized [divided] wrt. regional geomean in order to remove the base country effect.

For the 2009 Update, in order to get meaningful comparison with the 2005 results basic heading by basic heading, the coefficients from Table 4 will be used to adjust the core list PPP to the full BH. In this sense, the 2009 exercise will be using the maximum available information from the base 2005 comparison.

Size of the core list

For the current exercise, we target the size of the core list to be around 30% of the original list, or around 200 items. However, the countries will be required to collect prices only for the items that were priced in the 2005 round. Thus, each country would price around 160-190 items.

The 30% ratio was approximately estimated as the point where the returns start to diminish as we increase the number of items in the core list. As an illustration, the figure below shows the standard deviation of the BH PPP estimates [CPD] depending on the number of items in the core list[4]. Please note that selecting one to three items does not produce an outcome with the same number of countries as the original 19 item BH. Thus, those selections cannot be shown in the graph.

Fig. A. Standard deviation of the BH PPP estimates depending on the number of items in the core list

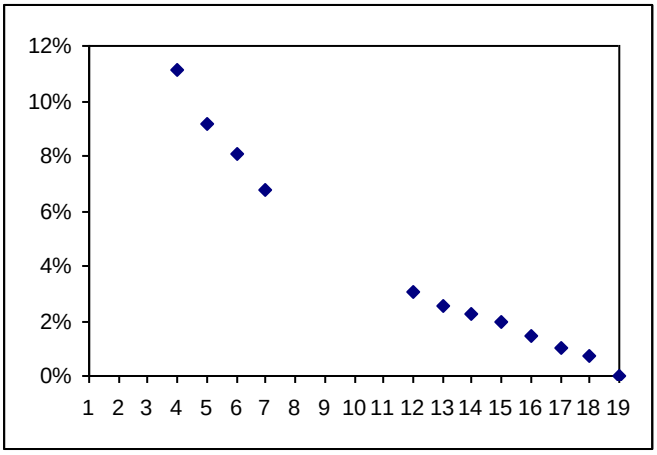

Table 1. Average price in local currency

Item name	CV of CPD residuals by item	N. of countries pricing item	BAN	BHU	BRU	PRC	FIJ	HKG	INO	IND	IRN	CAM	LAO	SRI	MAC	MLD	MON	MAL	NEP	PAK	PHI	SIN	THA	TAP	VIE
1.Coarse #3	0.15	3		109.34						69.562						42.8									
2.White rice #3	0.19	12	316.59	253.58	8.3378				59953	172.68		11200	24465	251.83				18.944			243.35		139.2		48265
3.White rice #4	0.26	4	228.56	129.01					48968					388.85											
4.White rice #5	0.13	6	257.49						38608		79806			293.41					293.6						64856
5.White rice #6	0.06	4	239.87						35989					271.38	57.825										
6.White rice #7	0.11	3	253.7					57.437						350.33											
7.White rice $8	0.16	5	193.27					65.895							83.771			19.636					165.76		
8.White rice #9	0.07	4	239.18				11.057	64.884																336.79	
9.White rice #10	0.14	5	246.62				10.977	70.896												169.37				373.7	
10.Premium rice #1	0.19	10	410.68	215.87		44.437		75.462	31953			14625			76.34		6127.6	23.665					149.99		
11.Premium rice #2	0.20	12	470.24					110		387.64	147262	13114						35.556	480.28	360.23	226.41	16.13	249.57	356.61	
12.Premium rice #3	0.10	4	384.57									12734												433.34	64451
13.Premium rice #4	0.12	13	221.05		5.8937		10.555	55.217	38598	180.27	67678					60		15.895		145.8	133.94	7.8462	111.08		
14.Coarse #2	0.33	3											35584	151.15				10.19							
15.Coarse #6	0.17	5	94.516			13.3				60.571				153.46						106.59					
16.Coarse #5	0.18	3	90.451							68.784				166.81											
17.Brown rice	0.29	5	99.478	128.54										138.16								11.139		183.51	
18.White rice #1	0.15	9	376.32			36.435						13704		325.35			5694.9		252.37		179.14			272.3	43899
19.White rice #2	0.15	7	213.62							153.73		12362	29488	272.64					194.18		220.29				
CV of CPD residuals by country			0.19	0.21	0.04	0.08	0.08	0.06	0.24	0.19	0.07	0.18	0.35	0.19	0.10	0.08	-	0.11	0.14	0.16	0.20	0.32	0.09	0.18	0.15
N. of items priced by country			17	5	2	3	3	7	6	7	3	6	3	11	3	2	2	6	4	4	5	3	5	6	4

[4] The rice BH with 19 items was chosen for this example.

Table 2. Quotes to be collected

Item name	N. of countries pricing	BAN	BHU	BRU	PRC	FIJ	HKG	INO	IND	IRN	CAM	LAO	SRI	MAC	MLD	MON	MAL	NEP	PAK	PHI	SIN	THA	TAP	VIE
1.Coarse #3	3																							
2.White rice #3	12																							
3.White rice #4	4																							
4.White rice #5	6																							
5.White rice #6	4																							
6.White rice #7	3																							
7.White rice $8	5																							
8.White rice #9	4																							
9.White rice #10	5																							
10.Premium rice #1	10	x	x		x		x	x			x			x		x	x					x		
11.Premium rice #2	12																							
12.Premium rice #3	4	x									x												x	x
13.Premium rice #4	13	x		x		x	x	x	x	x					x		x		x	x	x	x		
14.Coarse #2	3																							
15.Coarse #6	5																							
16.Coarse #5	3																							
17.Brown rice	5	x	x										x								x		x	
18.White rice #1	9	x			x						x		x			x		x		x			x	x
19.White rice #2	7	x							x		x	x	x					x		x				
TOTAL QUOTES:	48																							
DEVIATION:	8.1%																							

Table 3. Diagnostic table of CPD residuals

Item name	CV of CPD residuals by item	N. of countries pricing item	BAN	BHU	BRU	PRC	FIJ	HKG	INO	IND	IRN	CAM	LAO	SRI	MAC	MLD	MON	MAL	NEP	PAK	PHI	SIN	THA	TAP	VIE
Coarse #3																									
White rice #3																									
White rice #4																									
White rice #5																									
White rice #6																									
White rice #7																									
White rice $8																									
White rice #9																									
White rice #10																									
Premium rice #1	0.13	10	0.27	-0.10		0.07		-0.02	-0.27			0.06					0.00	0.02					-0.03		
Premium rice #2																									
Premium rice #3	0.13	4	0.06									-0.23												0.08	0.09
Premium rice #4	0.14	13	0.01		0.00			0.02	0.27	0.15								-0.02			-0.12	-0.36	0.03		
Coarse #2																									
Coarse #6																									
Coarse #5																									
Brown rice	0.26	5	-0.42	0.10										-0.12								0.36		0.09	
White rice #1	0.12	9	0.25			-0.07						0.06		0.08			0.00		0.06		-0.12			-0.17	-0.09
White rice #2	0.13	7	-0.17							-0.15		0.10		0.05					-0.06		0.23				
CV of CPD residuals by country			0.24	0.10	-	0.07	-	0.02	0.27	0.15	-	0.13	-	0.09	-	-	-	0.02	0.06	-	0.17	0.36	0.03	0.12	0.09
BH CV	**0.150**																								

TABLE 4 : Asian Core Product List

2009 PPP Updates

Number of Products Priced By Basic Heading and By Country

BH_Code	Pr_Desc	Products Included (2005)	Core Products (2009)	% Proposed	BAN	BHU	BRU	PRC	FJI	HKG	INO	IND	IRN	CAM	LAO	SRI	MAC	MLD	MON	MAL	NEP	PAK	PHI	SIN	THA	TAP	VIE
1101111	Rice	19	6	32	6	2	1	2	1	2	2	2	1	4	1	3	1	1	2	2	2	1	3	2	2	3	2
1101112	Other cereals, flour and other cereal products	13	4	31	3	2	3	3	4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3	2	3
1101113	Bread	6	2	33	2	2	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2
1101114	Other bakery products	10	3	30	3	3	3	2	1	3	2	3	3	3	3	3	3	2	3	3	2	3	3	2	3	3	3
1101115	Pasta products	5	3	60	3	2	3	3	3	3	3	2	2	3	3	3	3	2	3	3	3	3	3	3	3	3	3
1101121	Beef and Veal	7	3	43	3	1	2	2	2	1	3	1	2	2	2	2	1	0	2	2	1	3	2	1	2	1	3
1101122	Pork	6	2	33	0	2	0	2	2	2	2	2	0	2	2	2	2	0	2	2	1	0	2	2	2	2	2
1101123	Lamb, mutton and goat	5	3	60	1	2	0	3	3	2	3	3	1	0	0	1	1	0	3	3	3	3	1	1	0	3	0
1101124	Poultry	9	3	33	2	1	2	3	2	3	3	1	1	2	1	2	2	1	2	2	1	3	3	2	2	2	3
1101125	Other meats and meat preparations	7	4	57	2	3	2	4	2	2	4	2	1	3	2	2	1	1	3	3	0	2	2	2	2	2	3
1101131	Fresh, chilled or frozen fish and seafood	15	6	40	3	1	4	4	2	5	6	6	3	4	2	5	5	2	0	6	1	6	5	2	4	5	5
1101132	Preserved or processed fish and seafood	7	3	43	1	3	3	3	2	2	3	3	2	3	1	3	2	2	2	3	3	3	3	3	3	3	3
1101141	Fresh milk	4	2	50	2	2	1	2	1	1	1	2	2	1	1	2	1	1	2	1	2	2	1	1	1	1	1
1101142	Preserved milk and other milk products	8	3	38	3	2	2	3	2	3	3	3	2	2	2	1	2	2	2	3	3	3	3	3	3	3	3
1101143	Cheese	4	2	50	1	1	2	2	0	2	2	1	1	2	2	1	2	1	2	2	2	2	2	2	2	2	2
1101144	Eggs and egg-based products	4	2	50	1	2	1	2	2	2	2	1	2	1	1	2	2	1	2	2	1	2	2	1	2	2	2
1101151	Butter and Margarine	3	2	67	1	1	2	0	2	2	2	1	2	2	1	2	2	2	2	2	1	2	2	2	2	2	2
1101153	Other edible oils and fats	10	3	30	2	1	3	3	2	2	3	3	3	2	1	2	2	3	3	3	2	3	2	3	3	3	2
1101161	Fresh or chilled fruit	10	3	30	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1101162	Frozen, preserved or processed fruit and fruit-based	3	2	67	1	0	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2
1101171	Fresh or chilled vegetables other than potatoes	11	3	27	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1101172	Fresh or chilled potatoes	3	2	67	2	2	2	1	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
1101173	Frozen, preserved or processed vegetables and vege	6	4	67	3	4	4	4	1	3	4	3	2	2	1	4	3	2	4	4	2	4	4	4	4	4	4
1101181	Sugar	3	2	67	1	1	2	2	0	2	2	1	1	2	2	2	2	2	1	2	1	2	2	2	2	2	2
1101182	Jams, marmalades and honey	3	2	67	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
1101183	Confectionery, chocolate and ice cream	5	3	60	2	2	3	3	3	3	3	2	2	2	1	2	3	3	2	3	2	3	2	2	3	3	3
1101191	Food products n.e.c.	10	3	30	3	3	3	3	3	2	2	3	3	2	2	3	2	3	3	3	3	3	2	3	3	2	3
1101211	Coffee, tea and cocoa	8	2	25	2	1	2	1	2	2	1	1	2	1	1	2	2	2	2	2	1	2	2	2	2	2	2
1101221	Mineral waters, soft drinks, fruit and vegetable juice	7	2	29	2	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
1102111	Spirits	2	2	100	0	2	0	1	2	1	2	1	0	2	2	2	1	0	2	1	2	0	2	1	2	1	2
1102121	Wine	5	3	60	0	1	0	3	1	2	2	1	0	2	1	2	2	0	1	1	1	0	3	1	2	3	3
1102131	Beer	4	2	50	0	2	0	2	2	2	2	1	0	2	2	2	2	0	2	1	0	0	2	2	2	2	2
1102211	Tobacco	6	2	33	2	2	1	2	1	2	2	2	1	2	2	2	1	1	2	2	2	1	2	2	2	2	2
1103111	Clothing materials, other articles of clothing and clot	5	3	60	3	3	2	3	3	3	3	2	2	3	3	3	3	2	3	3	3	3	2	2	3	3	3
1103121	Garments	54	17	31	14	15	10	8	14	17	17	16	15	14	8	15	16	11	17	17	16	17	15	15	15	17	15
1103141	Cleaning, repair and hire of clothing	2	2	100	2	2	2	2	0	2	2	2	2	2	1	2	2	0	1	2	2	2	2	2	2	2	2
1103211	Shoes and other footwear	8	2	25	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
1103221	Repair and hire of footwear	2	2	100	2	2	0	2	2	2	2	2	2	2	1	2	2	0	2	2	2	2	2	2	2	2	2
1104311	Maintenance and repair of the dwelling	6	2	33	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2
1104411	Water supply	1	1	100	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
1104421	Miscellaneous services relating to the dwelling	1	1	100	1	0	1	1	0	0	1	1	0	1	0	1	0	1	1	0	1	1	0	1	1	1	1
1104511	Electricity	1	1	100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1104521	Gas	2	2	100	2	1	1	2	1	2	1	2	2	1	1	1	2	1	1	2	1	2	1	1	1	2	1
1104531	Other fuels	3	3	100	2	2	0	0	2	1	2	3	1	2	1	2	1	1	2	2	1	2	3	2	1	1	0
1105111	Furniture and furnishings	15	5	33	5	3	3	2	2	3	5	4	4	4	4	5	4	3	5	5	5	5	5	5	4	5	4
1105121	Carpets and other floor coverings	3	3	100	1	2	3	0	1	2	2	3	0	2	2	0	0	1	3	3	2	3	2	1	2	2	3
1105211	Household textiles	7	2	29	2	2	1	1	1	2	1	2	1	2	2	1	2	2	1	2	2	2	2	2	2	2	2
1105311	Major household appliances whether electric or not	13	4	31	3	1	3	4	3	3	3	4	4	3	4	4	2	4	3	4	3	4	4	1	4	3	4
1105321	Small electric household appliances	10	3	30	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
1105331	Repair of household appliances	3	3	100	3	1	3	3	3	2	3	3	2	3	3	3	3	2	2	3	3	3	3	3	3	3	3
1105411	Glassware, tableware and household utensils	8	2	25	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1105521	Small tools and miscellaneous accessories	8	2	25	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1105611	Non-durable household goods	13	4	31	4	4	3	4	4	4	4	4	2	3	3	4	4	2	3	4	4	4	4	4	4	4	4
1105621	Domestic services	2	1	50	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1
1106111	Pharmaceutical products	35	11	31	8	4	8	10	11	7	10	9	4	7	4	9	6	7	8	11	11	11	7	8	10	8	11
1106121	Other medical products	8	4	50	4	2	2	4	4	4	4	4	4	4	2	4	4	4	3	4	4	4	4	4	3	4	3
1106131	Therapeutical appliances and equipment	10	3	30	3	0	2	3	0	3	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3
1106211	Medical Services	6	2	33	2	0	2	1	2	2	1	2	1	2	0	2	2	2	1	2	2	2	2	2	2	2	2
1106221	Services of dentists	4	2	50	2	0	1	2	2	2	1	2	2	1	0	2	2	2	1	2	2	2	2	2	2	2	1
1106231	Paramedical services	7	3	43	3	0	2	1	2	3	3	3	3	3	0	3	3	2	3	3	3	3	3	3	3	3	3
1107111	Motor cars	5	3	60	2	1	1	2	0	2	3	3	0	1	2	3	2	0	0	2	3	3	2	2	2	2	2
1107131	Bicycles	1	1	100	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1107221	Fuels and lubricants for personal transport equipme	8	8	100	4	3	5	7	5	4	7	7	6	6	7	7	3	2	5	3	6	6	7	5	4	5	5
1107231	Maintenance and repair of personal transport equip	12	4	33	4	2	4	4	4	4	4	4	3	2	4	4	4	3	3	4	4	3	4	4	4	4	4
1107311	Passenger transport by railway	5	3	60	2	0	0	3	0	1	2	3	1	0	0	1	0	0	3	3	0	2	3	1	2	3	2
1107321	Passenger transport by road	6	2	33	2	1	2	2	1	2	2	1	1	1	1	2	2	0	2	2	1	2	2	1	2	2	2
1107331	Passenger transport by air	4	2	50	2	1	2	2	1	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2
1108111	Postal services	2	2	100	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2
1108211	Telephone and telefax equipment	5	2	40	2	2	1	1	1	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	1	2
1108311	Telephone and telefax services	7	4	57	4	3	2	3	3	1	4	0	2	2	3	2	2	3	3	3	3	3	2	2	3	4	3
1109111	Audio-visual, photographic and information processi	11	3	27	3	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	3	3	3
1109141	Recording media	9	3	33	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3
1109151	Repair of audio-visual, photographic and informatio	2	2	100	2	0	2	0	2	1	2	2	2	2	2	1	1	2	2	2	2	2	2	1	2	1	2
1109211	Major durables for outdoor and indoor recreation	4	2	50	1	0	2	2	2	2	2	2	1	2	2	2	0	2	2	1	2	2	1	2	2	2	2
1109311	Other recreational items and equipment	10	3	30	2	1	3	1	3	3	3	3	3	2	2	2	3	3	2	3	2	3	3	3	3	3	3
1109331	Gardens and pets	5	3	60	1	0	2	3	1	3	0	3	2	2	2	3	3	2	3	3	1	3	3	3	3	3	3
1109351	Veterinary and other services for pets	1	1	100	0	0	1	1	0	1	0	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0
1109411	Recreational and sporting services	3	3	100	1	0	3	2	2	3	3	3	1	3	2	2	3	1	3	3	1	2	3	3	3	3	3
1109421	Cultural services	4	2	50	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2
1109511	Newspapers, books and stationery	8	2	25	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1109611	Package holidays	4	1	25	1	0	1	1	0	1	1	1	1	0	0	1	1	0	0	1	0	1	1	1	1	1	1
1110111	Education	6	6	100	6	2	5	6	2	6	6	6	6	6	2	6	6	4	6	6	6	6	6	5	6	5	6
1111111	Catering services	17	5	29	4	2	3	4	3	4	5	5	4	4	4	5	4	2	5	5	5	5	4	3	4	3	4
1111211	Accommodation services	4	3	75	3	2	2	3	2	2	3	3	3	3	3	2	1	1	3	3	3	3	3	2	1	2	3
1112111	Hairdressing salons and personal grooming establish	6	4	67	4	4	3	4	4	4	4	4	1	4	3	4	4	4	4	4	4	4	4	4	4	4	4
1112121	Appliances, articles and products for personal care	16	5	31	5	5	5	2	5	5	5	5	4	5	5	5	5	4	5	5	5	5	5	5	5	5	5
1112311	Jewellery, clocks and watches	6	2	33	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2
1112321	Other personal effects	4	2	50	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1112621	Other financial services n.e.c.	5	2	40	1	1	2	2	1	2	2	2	2	1	1	2	1	1	2	1	2	2	2	1	1	2	1
1112711	Other services n.e.c.	2	1	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total	647	269	42	215	165	192	215	192	225	245	233	189	214	175	232	212	166	226	245	217	244	239	211	233	235	243
	Total Number of BH to be priced	90																									
	BH where 2005 list = 2009 updates	17	19																								
	BH where 2005 list < 2009 updates	73	81																								

4. CORE PRODUCT LIST FOR THE 2009 ASIAN REGIONAL UPDATE

The combinatorial approach was applied to the Asian regional product list to arrive at the core product list. 269 products were identified as candidates for the core list. In order to achieve better uniformity among basic headings, an additional criterion was used within each basic heading: if the number of items within the basic heading was too low then all items from that basic heading were included in the core list. In addition, if the *deviation of the normalized BH parities based on the core list from the normalized BH parities based on the full list* was greater than 15% then the number of items from that BH in the core list was increased.

The number of core products per country and per basic heading is shown in Table 5. For 17 small BHs [one to three items], all the products would be included in the core list. In addition, all six educational products would be included, as this basic heading, while having a relatively high weight, exhibits a higher degree of variability compared to other basic headings of similar size.

As a result, each country would be required to price from 165 items [Bhutan] to 245 items [Malaysia and Indonesia]. Precision for each BH is presented in the table below, along with precision for the aggregates. Thus, the overall precision for Individual consumption is 1.6% [measured as the CV].

Among individual countries, the highest deviations were in Iran [+3.8%], as well as in Cambodia [-3.3%] and Pakistan [+3.3%], with most countries being within one percent boundaries. Again, those deviations quoted are for unadjusted parities. Once we adjust them for the coefficients from Table 4, they become zero. Those unadjusted deviations are only here to show what the overall results would be like if the only product list we had were the core product list, and we did not have our 2005 comparison to be the benchmark. As we can see, the overall precision would still be well within the ICP target: the precision of the ICP exercise is estimated to be around 5%.

5. CONCLUSION

It turns out to be possible to significantly reduce a product list and still obtain reasonably robust results in international comparisons. Another advantage of using a subset of the 2005 product list in the 2009 Asian Update is the possibility of direct comparison between 2005 and 2009, which can be used to test consistency of CPI data across countries. A similar exercise is currently underway in Africa. If the experience with those updates turns out to be positive, that may lead to a relatively inexpensive annual ICP updates that would strengthen robustness of PPPs between major benchmarks while simultaneously contributing to statistical capacity building in developing countries

ANNEX

CPD [Country-Product Dummy]

CPD index can be presented in two equivalent forms – with the intercept and without. First, the regression equation for the CPD can be written as

$$\ln p_{cp} = y_{cp} = x_{cp}\beta + \varepsilon_{cp} \qquad \textbf{(1)}$$

where p_{cp} - price of product *p* in country *c*;

Dc_j and Dp_i - country and product dummies;

Np and *Nc* – number of products and countries, respectively;

$$x_{cp} = \left[Dc_2 \ldots Dc_{Nc} Dp_1 Dp_2 \ldots Dp_{Np} \right]$$
$$\beta = \left[\alpha_2 \ldots \alpha_{Nc} \gamma_1 \gamma_2 \ldots \gamma_{Np} \right]^T \qquad \textbf{(2)}$$

In matrix notation, by stacking individual observations, this can be written as:

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon} \qquad \textbf{(3)}$$

Note that the first country dummy is dropped from the system because matrix X is of rank *(Np+Nc-1)*[5] [in fact, we can drop any variable from the system, dropping the first country's dummy simply makes it the base country].

The solution is given (under the conditions of independently and identically distributed random disturbances) by

$$\hat{\boldsymbol{\beta}} = \left(\mathbf{X}^T \mathbf{X} \right)^{-1} \mathbf{X}^T \mathbf{y} \qquad \textbf{(4)}$$

In addition, we can drop one product variable (let's say the first product dummy) and introduce the intercept. This is the second form of the CPD. In this case[6],

$$x'_{cp} = \left[Dc_2 \ldots Dc_{Nc}\ 1\ Dp_2 \ldots Dp_{Np} \right]$$
$$\beta' = \left[\alpha'_2 \ldots \alpha'_{Nc}\ c_{\text{intercept}}\ \gamma'_2 \ldots \gamma'_{Np} \right]^T \qquad \textbf{(5)}$$

$$\mathbf{y} = \mathbf{X}'\boldsymbol{\beta}' + \boldsymbol{\varepsilon} \qquad \textbf{(6)}$$

The solutions of systems (4) and (6) we are interested in - the country and product price relatives - are identical up to a scalar in these two cases. In the case with intercept,

$\alpha_j = \alpha'_j$

$\gamma_1 = c_{\text{intercept}}$

$\gamma_i = \gamma'_i + c_{\text{intercept}}$,

for $i = 2 \ldots Np,\ j = 2 \ldots Nc$

γ'_i and α'_j are the product coefficients for product *i* and country *j*, respectively, in the case with intercept.

[5] The sum of country dummies equals the sum of product dummies, so one dummy has to be dropped.

[6] Note that the sign **(′)** does not mean transpose. Sign **(^{T})** is used for that purpose.