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A PRELIMINARY ASSESSESSMENT OF THE EFFECT OF THE CHANGE IN CONSTRUCTION METHODOLOGY BETWEEN THE 2005 AND 2011 ROUNDS

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A PRELIMINARY ASSESSEMENT OF THE EFFECT OF THE CHANGE IN CONSTRUCTION METHODOLOGY BETWEEN THE 2005 AND 2011 ROUNDS¹

Background

The purpose of this working note is to test the effect that the change in Construction methodology between the 2005 and 2011 Rounds would have on the resulting PPPs for Construction.

Construction is considered a “comparison resistant” area in the ICP, because it is difficult to identify a range of comparable and representative construction products or projects across all countries. As a result, most methods adopted for the calculation of PPPs are largely based on theoretical projects and require adjustments to bring them to a common basis. Designing the data collection forms, collecting the price data and processing it requires thus specialist skills and knowledge.

The Construction and Civil Engineering Category under Gross Fixed Capital Formation in the ICP Classification is broken down into three Groups, Classes and Basic Headings:

- Residential Buildings
- Non-Residential Buildings
- Civil Engineering Works

The objective of the Construction and Civil Engineering survey is to estimate PPPs for these three Basic Headings (BHs) and to further aggregate these up to the Construction Category.

In this note, we focus on one region, Western Asia, where we had access to the data needed to conduct this analysis. Western Asia countries supplied very detailed information on the costs of construction during the 2005 Round. This allowed for extracting all the data and metadata needed to test the effect that the change in Construction methodology between the 2005 and 2011 Rounds would have on the resulting PPPs for Construction in Western Asia.

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2005 Approach – Basket of Construction Components Method

In September 2004, the then ICP Technical Advisory Group (TAG) recommended the use of the Basket of Construction Components (BOCC) approach for construction sector comparisons. This recommendation was based on a detailed study that was conducted under the aegis of the World Bank and the African Development Bank, the results of which were circulated in three reports entitled “International Comparison of Cost for the Construction Sector.” The methodological study determined that the level of estimation should occur at a level that lies between the construction project level and the input level. Thus, the comparison did not occur at the construction project level typical of the standard project method; nor did it follow suit of a comparison of prices at the input level typical for most temporal construction cost indices.

The BOCC approach used in the 2005 ICP round involved a combination of simple components and complex components. The simple components were inputs, including labor and materials (steel, cement, plywood, etc). The total price of each complex component was the sum of the costs (unit cost x quantity) of underlying inputs required to build this component, namely material, labor and equipment. Annex I shows an example of a data collection form for a complex component under the BOCC method. The components are grouped under systems that play the role of sub-headings as shown in Table 1.

Table 1: Basic Heading Structure under the BOCC Method

Basic Heading	Systems (Sub-headings)
Residential buildings	Site-work (10 components)
	Substructure (11 components)
	Superstructure (9 components)
	Exterior Shell/Building Envelope (5 components)
	Interior Partitions (6 components)
	Interior and Exterior Finishes (10 components)
	Mechanical and Plumbing (2 components)
	Electrical (3 components)
Non-residential buildings	Site-work (10 components)
	Substructure (11 components)
	Superstructure (9 components)
	Exterior Shell/Building Envelope (5 components)
	Interior Partitions (6 components)

Basic Heading	Systems (Sub-headings)
	Interior and Exterior Finishes (10 components)
	Mechanical and Plumbing (2 components)
	Electrical (3 components)
Civil engineering works	Site-work (10 components)
	Substructure (11 components)
	Superstructure (9 components)
	Mechanical Equipment (5 components)
	Electrical Equipment (3 components)
	Underground Utility (9 components)

Under this method, an unweighted CPD is used to calculate PPPs for these Systems (Sub-Headings). Aggregation of the Systems PPPs to the BH level PPPs requires System Expenditure data. These System Expenditure data are estimated by breaking-down the BH total expenditures over each system using System Weights, referred to as W2 weights (provided by countries in percentage).

The BOCC method was criticized because there were difficulties with the establishment of W2 weights and confusion over the mixture of simple and complex components.

2011 Approach – Input Method

The 2011 ICP Operational Guide chapter “Construction: Approach and Data requirements” describes in detail the 2011 approach for Construction PPPs. The 2011 ICP Construction and Civil Engineering survey is based on an input approach, where countries price 50 basic and common resources for construction work that are selected to correspond with the main inputs to national construction output. In addition, respondents to a national survey provide information on importance, resource mixes, typical mark-ups and professional fees, and approximate project prices. These data are used to calculate and validate the Construction and Civil Engineering PPPs.

The 50 basic and common construction resources are grouped into Materials, Equipment, and Labor. The 38 material resources are allocated to the three BHs (Residential buildings, Non-residential buildings, and Civil engineering works) so that items such as concrete and steel reinforcement appear in all three BHs, while other items, such as sheet roofing and sanitary ware, appear only in Residential and Non-residential buildings BHs. National experts are required to indicate if a material is commonly used or, in

other words, whether the material in question is relevant, for each type of construction. This is done by deeming materials either important or not-important for each BH. Each BH has thus three Sub-Heading PPPs: Materials, Equipment and Labor, as shown in Table 2.

Table 2: Basic Heading Structure under the Input Method

Basic Heading	Sub-Headings
Residential buildings	Materials: 34 material inputs
	Equipment: 5 types of equipment (hire rates)
	Labor: 7 categories of construction labor
Non-residential buildings	Materials: 36 material inputs
	Equipment: 5 types of equipment (hire rates)
	Labor: 7 categories of construction labor
Civil engineering works	Materials: 19 material inputs
	Equipment: 5 types of equipment (hire rates)
	Labor: 7 categories of construction labor

An unweighted CPD is used to calculate PPPs for these Sub-Headings. Aggregation of the sub-heading PPPs to the BH level PPPs requires Sub-Heading Expenditure data. These are calculated by breaking-down the BH total expenditures over each Sub-Heading using Resource Mixes as weights. Resource Mixes are cost of materials, equipment and labor expressed as percentage shares of the total expenditure value of a BH. The shares usually depend on the labor skills and technology available in countries as well as other factors. These shares can vary from country to country and across BHs.

After the Sub-Headings weights are established, the Sub-Heading PPPs can be aggregated to BH, Class, Group and finally up to the level of Construction Category, using the selected aggregation method. A final step in the calculation process that is still being discussed by TAG relates to whether adjustment of the Category level PPPs for productivity differentials would be needed.

Prices provided should be those paid by construction contractors to their suppliers. Countries are requested to provide national annual average prices in national currency. The main advantages of the approach are that it is relatively simple to collect the necessary price and supporting data and it is relatively inexpensive to implement.

Overlap between Methods

In both the 2005 and 2011 ICP rounds, a basket of items is identified for the construction sector to serve as the basis for pricing. Both methods have the Residential, Non-Residential and Civil Engineering BHs. The criteria for selection of items in the baskets differed in each round. While the 2005 BOCC method identified components to price, the 2011 Input method identified inputs to price. However, approximately nine construction inputs in the Input method are similar to simple components in the BOCC method. This allows for some overlap in the methods that enable a comparison between the two rounds. To improve this overlap, an analysis was made of the unit costs of inputs -material, labor and equipment- reported under the complex components in the BOCC method. This resulted in a stronger overlap between the two methods, as shown in Table 3 below.

Table 3: Overlap of Inputs between the BOCC and Input Methods

Materials	Labor	Equipment
Aggregate for concrete	General (unskilled) laborers	Wheeled loader and excavator
Sand for concrete and mortar	Bricklayer	Tracked tractor
Exterior plywood	Plumber	Skid steer loader
Emulsion paint	Carpenter	Tandem vibrating roller
Ordinary Portland cement	Structural steel worker	Compact track loader
Ready mix concrete	Electrician	
High yield steel reinforcement	Machine (equipment) operator	
Mild steel reinforcement		
Structural steel sections		

Data Analysis

2005 Results Using the BOCC Method

In 2005, the components costs were used to compute System (Sub-Heading) PPPs using the CPD method. System (Sub-Heading) PPPs were then aggregated to Residential, Non-Residential, and Civil Engineering PPPs, and then to Construction PPPs using the EKS method. Annex II shows the full set of results for Construction. Table 4 below shows the resulting Price Level Indices.

Table 4: 2005 Construction Price Level Indices using the BOCC Method

Code	Aggregate	PLIs (Base=Region)										
		Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen
1502	Construction	1.14	0.65	1.13	1.09	1.19	1.02	1.19	1.35	1.20	0.79	0.60
15021	Residential Buildings	1.15	0.57	1.08	1.20	1.21	1.22	1.16	1.23	1.37	0.70	0.59
15022	Non-Residential Buildings	1.17	0.63	1.06	1.08	1.08	1.04	1.22	1.23	1.26	0.83	0.68
15023	Civil Engineering Works	1.14	0.74	1.24	1.01	1.25	0.86	1.21	1.77	0.88	0.87	0.54

2005 Results Using the Input Method

On the price side, two scenarios were examined. The first scenario consisted in computing the PPPs for Materials, Labor, and Equipment using the unit costs of overlapping inputs between the BOCC and Input methods. The second scenario considered the unit costs of all inputs -Materials, Labor, and Equipment- identified from the BOCC data sets submitted by countries.

On the expenditure side, resource mix shares were identified to help estimate the national accounts expenditure at the sub-heading level.

Estimating Sub-Heading Expenditure Data - Resource Mixes

To estimate the Sub-Heading expenditure data needed to implement the input method, data on resource mixes for each country is needed. We relied on the initial estimated Resource Mixes from the ICP Operational Guide Chapter “Validation of the Construction and Civil Engineering Survey”. The chapter indicates that two criteria are needed to estimate the resources mixes of countries: Income Level and Labor Costs. The World Bank provides a classification of countries by income level on an annual basis (see Table 5 below).

Table 5: World Bank Income Classification of Countries, 2012

Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen
H	M	M	M	H	M	H	H	H	M	M

H = High; M = Medium; and L = Low.

To determine the level of labor cost in Western Asia countries, we analyzed the rate per hour data provided by the countries for the simple components “Skilled Labor” and “Unskilled Labor.” Table 6 shows the cost of labor and how it helped determine the level of labor cost (High, Medium, and Low).

Table 6: Estimated Cost of Labor for Western Asia Countries from the 2005 Round

In USD/hour	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S . Arabia	Syria	Yemen
Skilled Labor	19.0	14.0	32.0		57.0	79.0	21.0	25.0	49.0	9.0	13.0
Unskilled Labor	12.0	4.0	10.0	12.0	41.0	10.0	14.0	14.0	24.0	9.0	6.0
Average	15.5	9.0	21.0	12.0	49.0	44.5	17.5	19.5	36.5	9.0	9.5
Cost of Labor	M	L	M	M	H	H	M	M	H	L	L

H = High; M = Medium; and L = Low.

Using these two indicators - income level and labor cost- resource mix shares were estimated for countries, as seen in Table 7.

Table 7: Estimated Resource Mix Shares for Western Asia Countries

Resource Mix Shares											
	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen
Income Classification	H	M	M	M	H	M	H	H	H	M	M
Relative Cost of labor	M	L	M	M	H	H	M	M	H	L	L
CONSTRUCTION											
Residential buildings											
Labor	25%	20%	25%	25%	30%	25%	25%	25%	30%	20%	20%
Equipment	5%	5%	5%	5%	8%	5%	5%	5%	8%	5%	5%
Materials	70%	75%	70%	70%	63%	70%	70%	70%	63%	75%	75%
Non-residential buildings											
Labor	25%	20%	25%	25%	30%	25%	25%	25%	30%	20%	20%
Equipment	8%	8%	8%	8%	10%	8%	8%	8%	10%	8%	8%
Materials	68%	73%	68%	68%	60%	68%	68%	68%	60%	73%	73%
Civil engineering works											
Labor	23%	20%	23%	23%	20%	23%	23%	23%	20%	20%	20%
Equipment	28%	30%	28%	28%	30%	28%	28%	28%	30%	30%	30%
Materials	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%

H = High; M = Medium; and L = Low.

Scenario A: Using the Overlap Inputs between the BOCC and Input Methods

The unit costs of the overlapping inputs shown in Table 3 were used to compute the Sub-Heading PPPs for Materials, Labor, and Equipment under each BH using the CPD method. Sub-Heading BHs were then aggregated to Residential, Non-Residential, and Civil Engineering PPPs, and then to Construction PPPs using the EKS method and the expenditure data deduced from the resource mixes. Annex III.A shows the full set of results for Construction. Table 8 below shows the resulting Price Level Indices.

Table 8: 2005 Construction Price Level Indices using the Input Method (Scenario A)

Code	Aggregate	PLIs (Base=Region)										
		Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen
1502	Construction	1.13	0.62	1.15	0.92	1.78	0.93	0.85	1.15	1.18	0.73	0.97
15021	Residential Buildings	1.15	0.63	1.24	0.88	1.59	1.00	0.85	1.10	1.20	0.71	1.02
15022	Non-Residential Buildings	1.14	0.63	1.22	0.89	1.64	0.98	0.86	1.11	1.19	0.71	0.99
15023	Civil Engineering Works	1.09	0.63	1.04	1.01	2.08	0.86	0.86	1.28	1.14	0.76	0.81

Scenario B: Using all the Inputs from the BOCC Method

The unit costs of all inputs -Materials, Labor, and Equipment- identified in the country submissions for the BOCC method were used to compute the Sub-Heading PPPs for Materials, Labor, and Equipment under each BH using the CPD method. Sub-Heading BHs were then aggregated to Residential, Non-Residential, and Civil Engineering PPPs, and then to Construction PPPs using the EKS method and the expenditure data deduced from the resource mixes. Annex III.B shows the full set of results for Construction. Table 9 below shows the resulting Price Level Indices.

Table 9: 2005 Construction Price Level Indices using the Input Method (Scenario B)

Code	Aggregate	PLIs (Base=Region)										
		Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen
1502	Construction	1.04	0.64	1.08	1.04	1.50	0.86	1.03	1.17	1.32	0.74	0.88
15021	Residential Buildings	1.05	0.61	1.07	1.04	1.52	0.89	1.04	1.19	1.28	0.72	0.91
15022	Non-Residential Buildings	1.05	0.61	1.07	1.04	1.54	0.85	1.04	1.18	1.32	0.73	0.90
15023	Civil Engineering Works	1.00	0.70	1.11	1.06	1.49	0.86	1.00	1.13	1.39	0.79	0.76

Comparison of Results

The comparison of the results from these three scenarios is shown in Table 10 below. It shows that the difference in methods may have a high impact on country results. For example, the Construction PPPs from the Input Method for Kuwait and Yemen change substantially from those from the BOCC Method. However, on average, the change in Construction PPPs between the Input Method and the BOCC Method is around 14-18%.

Table 10: Comparison of Resulting Construction PLIs

Aggregate	Methods	PLIs (Base=Region)											Average of absolute % change
		Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S. Arabia	Syria	Yemen	
Construction	BOCC Method	1.14	0.65	1.13	1.09	1.19	1.02	1.19	1.35	1.20	0.79	0.60	
	Input Method - Scenario A	1.13	0.62	1.15	0.92	1.78	0.93	0.85	1.15	1.18	0.73	0.97	
	% change	-1%	-4%	2%	-16%	50%	-9%	-28%	-15%	-1%	-9%	61%	18%
	Input Method - Scenario B	1.04	0.64	1.08	1.04	1.50	0.86	1.03	1.17	1.32	0.74	0.88	
	% change	-9%	-1%	-4%	-5%	26%	-15%	-14%	-13%	10%	-7%	47%	14%

Conclusion and Questions

There is much left to be learned regarding the effect that the change in construction methodology would have on the resulting Regional and Global PPPs. This working note is a first attempt at analyzing this effect. Some caveats are noted and few open questions are for TAG consideration.

This analysis did not take into consideration any markups and professional fees in the Input Method, as this information was not collected in 2005. Are markups and professional fees needed?

The analysis did not include any productivity adjustment on the cost of labor under the Input Method. Does the data imply the need to adjust for labor productivity?

The resource mixes used in this note are very rough preliminary estimates. As more reliable data become available on resource mixes, this analysis can be repeated taking this data into consideration. Also, the data from the BOCC method may have resource mixes embedded in it. The cost of materials, labor, and equipment as percentages from the total cost of each complex component can be used to deduce average resource mixes for each country. This shall be the next phase of this analysis if the TAG deems it useful.

Finally, to further study the impact of the change in Construction methodology between the 2005 and 2011 Rounds on the resulting PPPs for Construction, the 2005 Construction PPPs need to be compared to the 2011 preliminary Construction PPPs, once these are available.

Annex I: Data Collection Form for a Complex Component under the BOCC

15.02.00.0.01 Aggregate Base

Source Information:

- Date of price collection (dd/mm/yyyy):
- Country:
- Describe source of price:
 - ☐ Architect
 - ☐ Engineer
 - ☐ Average, Price Index data collection
 - ☐ General Contractor
 - ☐ Specialty Contractor
 - ☐ Other ()
- Price is for year:
 - ☐ 2005
 - ☐ 2006

Quantity and Details:

The price for this component shall consist of furnishing, placing and compacting one or more courses of aggregate base. The price includes furnishing and incorporating of aggregate and all water required for proper compaction. The prepared surface on which the aggregate is to be placed is assumed to be available and its price is not included in this component. The aggregate used shall be of the following size and shall meet the requirements outlined below:

Nominal Aperture or Sieve Size	Percentage of Mass Passing Through Sieve
50 mm	100%
25 mm	70-100
20 mm	50-90
5 mm	30-60
425 µm	7-30
75 µm	0-13

Aggregate acceptance is determined prior to incorporation into the work based on samples taken from stockpiles. This sampling and associated testing should not be included in the price. The aggregate material shall have reasonably uniform gradation and moisture, and at a moisture content not to exceed less than minus 4 percent of optimum moisture prior to the spreading operation. The aggregate material shall be spread upon the prepared surface. The compacted thickness of a single layer shall not exceed 150 mm when vibratory equipment is used in conjunction with other methods of compaction. The maximum compacted thickness of one layer shall not 75 mm when vibratory compaction equipment is not used. The lift must be compacted to a density of not less than 95% of the maximum density of the standard Proctor compaction test (ASTM D698 or equivalent). Assume that compaction control testing will be conducted, but this testing should not be included in the price. For purposes of this pricing, a total of 1000 sq. m. of aggregate must be placed to a thickness of 600 mm. The price should be reported by the square meter.

Pricing Information:**Material Costs** *(in national currency)*

Type	Quantity (Column 1)	Unit of Measure	Unit Cost (Column 2)	Extended Material Costs (Column 1 X Column 2)
Aggregate Base	1000	Square meters		
TOTAL COST FOR MATERIALS <i>(in national currency):</i>				(a)

Labor Costs *(in national currency)*

Type:	Number of Hours Required (Column 1)	Rate per hour (Column 2)	Extended Labor Costs (Column 1 X Column 2)
Unskilled Labor			
Skilled Labor (list by type):			
TOTAL COST FOR LABOR <i>(in national currency):</i>			(b)

Equipment Costs *(in national currency)*

Type:	Number of Hours Required (Column 1)	Rate per hour (Column 2)	Extended Equipment Costs (Column 1 X Column 2)
TOTAL COST FOR EQUIPMENT <i>(in national currency):</i>			(c)

Total Price for Aggregate Base
(in national currency – sum of a, b, and c):

Annex II: 2005 PLIs using the BOCC Method

Code	Level Name	Level type	PLIs (Base=Region)										
			Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S Arabia	Syria	Yemen
1502	CONSTRUCTION	Category	1.14	0.65	1.13	1.09	1.19	1.02	1.19	1.35	1.20	0.79	0.60
15021	RESIDENTIAL BUILDINGS	Group	1.15	0.57	1.08	1.20	1.21	1.22	1.16	1.23	1.37	0.70	0.59
150211	<u>Residential buildings</u>	Class	1.15	0.57	1.08	1.20	1.21	1.22	1.16	1.23	1.37	0.70	0.59
1502111	Residential buildings	BH	1.15	0.57	1.08	1.20	1.21	1.22	1.16	1.23	1.37	0.70	0.59
15021111	Site-work	Sub-BH	1.66	0.55	0.86	1.40	1.19	0.41	1.18	2.03	1.54	1.07	0.47
15021112	Substructure	Sub-BH	0.96	0.55	1.38	1.65	1.44	1.92	0.95	1.19	1.89	0.39	0.36
15021113	Superstructure	Sub-BH	1.24	0.52	1.58	1.28	0.82	0.89	1.18	1.38	1.27	0.56	0.90
15021114	Exterior Shell/Building Envelope	Sub-BH	1.52	0.45	0.42	0.93	1.10	1.62	1.44	1.15	1.48	1.03	0.83
15021115	Interior Partitions	Sub-BH	1.10	0.59	0.76	1.14	1.08	1.60	1.14	1.10	1.33	1.13	0.55
15021116	Interior and Exterior Finishes	Sub-BH	1.57	0.59	1.28	0.79	0.73	0.71	1.26	0.99	1.66	1.10	0.92
15021117	Mechanical and Plumbing	Sub-BH	0.90	0.45	1.02	1.06	2.78	1.60	0.94	1.05	1.93	0.53	0.51
15021118	Electrical	Sub-BH	0.80	1.04	1.16	1.38	1.48	1.54	1.38	1.49	0.53	0.93	0.32
15022	NON-RESIDENTIAL BUILDINGS	Group	1.17	0.63	1.06	1.08	1.08	1.04	1.22	1.23	1.26	0.83	0.68
150221	<u>Non-residential buildings</u>	Class	1.17	0.63	1.06	1.08	1.08	1.04	1.22	1.23	1.26	0.83	0.68
1502211	Non-residential buildings	BH	1.17	0.63	1.06	1.08	1.08	1.04	1.22	1.23	1.26	0.83	0.68
15022111	Site-work	Sub-BH	1.62	0.75	0.93	1.25	0.91	0.40	1.16	1.60	1.52	1.00	0.68
15022112	Substructure	Sub-BH	0.96	0.55	1.38	1.65	1.44	1.92	0.95	1.19	1.89	0.39	0.36
15022113	Superstructure	Sub-BH	1.24	0.52	1.58	1.28	0.82	0.89	1.18	1.38	1.27	0.56	0.90
15022114	Exterior Shell/Building Envelope	Sub-BH	1.52	0.45	0.42	0.93	1.10	1.62	1.44	1.15	1.48	1.03	0.83

15022115	Interior Partitions	Sub-BH	1.10	0.59	0.76	1.08	1.08	1.60	1.14	1.10	1.35	1.13	0.57
15022116	Interior and Exterior Finishes	Sub-BH	1.57	0.59	1.28	0.79	0.73	0.71	1.26	0.99	1.66	1.10	0.92
15022117	Mechanical and Plumbing	Sub-BH	0.89	0.70	0.91	0.90	1.80	1.41	1.00	1.00	2.31	0.67	0.50
15022118	Electrical	Sub-BH	0.81	1.05	1.16	1.32	1.50	1.55	1.39	1.43	0.54	0.95	0.32
15023	CIVIL ENGINEERING WORKS	Group	1.14	0.74	1.24	1.01	1.25	0.86	1.21	1.77	0.88	0.87	0.54
150231	<u>Civil engineering works</u>	Class	1.14	0.74	1.24	1.01	1.25	0.86	1.21	1.77	0.88	0.87	0.54
1502311	Civil engineering works	BH	1.14	0.74	1.24	1.01	1.25	0.86	1.21	1.77	0.88	0.87	0.54
15023111	Site-work	Sub-BH	2.01	0.65	0.92	1.01	1.20	0.34	1.49	2.26	1.10	0.97	0.57
15023112	Substructure	Sub-BH	1.02	0.67	1.33	0.95	1.23	0.90	0.97	1.57	1.16	0.73	0.82
15023113	Superstructure	Sub-BH	0.76	0.99	1.36	1.15	1.41	1.46	1.31	2.05	0.50	0.98	0.31
15023114	Mechanical Equipment	Sub-BH	1.13	0.63	1.32	0.78	1.25	0.75	0.98	1.36	0.91	1.05	1.14
15023115	Electrical Equipment	Sub-BH	1.09	0.54	1.70	0.93	0.88	0.46	1.42	1.12	1.83	0.73	1.25
15023116	Underground Utility	Sub-BH	1.17	0.68	1.13	1.11	1.52	1.17	0.90	1.06	1.21	0.73	0.66

Annex III: 2005 PLIs using the Input Method

A. Using the Overlap Inputs between the BOCC and Input Methods

Code	Level Name	Level type	PLIs (Base=Region)										
			Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S Arabia	Syria	Yemen
1502	CONSTRUCTION	Category	1.13	0.62	1.15	0.92	1.78	0.93	0.85	1.15	1.18	0.73	0.97
15021	RESIDENTIAL BUILDINGS	Group	1.15	0.63	1.24	0.88	1.59	1.00	0.85	1.10	1.20	0.71	1.02
150211	Residential buildings	Class	1.15	0.63	1.24	0.88	1.59	1.00	0.85	1.10	1.20	0.71	1.02
1502111	Residential buildings	BH	1.15	0.63	1.24	0.88	1.59	1.00	0.85	1.10	1.20	0.71	1.02
15021111	Materials	Sub-BH	1.33	0.67	1.31	0.80	1.21	0.98	0.83	1.10	0.96	0.76	1.36
15021112	Equipment	Sub-BH	0.99	0.61	0.70	1.52	3.69	0.53	0.99	1.47	0.97	1.20	0.47
15021113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54
15022	NON-RESIDENTIAL BUILDINGS	Group	1.14	0.63	1.22	0.89	1.64	0.98	0.86	1.11	1.19	0.71	0.99
150221	<u>Non-residential buildings</u>	Class	1.14	0.63	1.22	0.89	1.64	0.98	0.86	1.11	1.19	0.71	0.99
1502211	Non-residential buildings	BH	1.14	0.63	1.22	0.89	1.64	0.98	0.86	1.11	1.19	0.71	0.99
15022111	Materials	Sub-BH	1.33	0.67	1.31	0.80	1.21	0.98	0.83	1.10	0.96	0.76	1.36
15022112	Equipment	Sub-BH	0.99	0.61	0.70	1.52	3.69	0.53	0.99	1.47	0.97	1.20	0.47
15022113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54
15023	CIVIL ENGINEERING WORKS	Group	1.09	0.63	1.04	1.01	2.08	0.86	0.86	1.28	1.14	0.76	0.81
150231	<u>Civil engineering works</u>	Class	1.09	0.63	1.04	1.01	2.08	0.86	0.86	1.28	1.14	0.76	0.81
1502311	Civil engineering works	BH	1.09	0.63	1.04	1.01	2.08	0.86	0.86	1.28	1.14	0.76	0.81
15023111	Materials	Sub-BH	1.31	0.68	1.22	0.79	1.36	0.97	0.77	1.30	0.95	0.69	1.34
15023112	Equipment	Sub-BH	0.99	0.61	0.70	1.52	3.69	0.53	0.99	1.47	0.97	1.20	0.47
15023113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54

B. Using all the Inputs from the BOCC Method

Code	Level Name	Level type	PLIs (Base=Region)										
			Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	S Arabia	Syria	Yemen
1502	CONSTRUCTION	Category	1.04	0.64	1.08	1.04	1.50	0.86	1.03	1.17	1.32	0.74	0.88
15021	RESIDENTIAL BUILDINGS	Group	1.05	0.61	1.07	1.04	1.52	0.89	1.04	1.19	1.28	0.72	0.91
150211	<u>Residential buildings</u>	Class	1.05	0.61	1.07	1.04	1.52	0.89	1.04	1.19	1.28	0.72	0.91
1502111	Residential buildings	BH	1.05	0.61	1.07	1.04	1.52	0.89	1.04	1.19	1.28	0.72	0.91
15021111	Materials	Sub-BH	1.14	0.65	1.03	1.04	1.19	0.80	1.09	1.27	1.05	0.77	1.18
15021112	Equipment	Sub-BH	1.17	0.50	0.93	1.32	2.40	0.92	1.10	1.03	1.11	1.41	0.36
15021113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54
15022	NON-RESIDENTIAL BUILDINGS	Group	1.05	0.61	1.07	1.04	1.54	0.85	1.04	1.18	1.32	0.73	0.90
150221	<u>Non-residential buildings</u>	Class	1.05	0.61	1.07	1.04	1.54	0.85	1.04	1.18	1.32	0.73	0.90
1502211	Non-residential buildings	BH	1.05	0.61	1.07	1.04	1.54	0.85	1.04	1.18	1.32	0.73	0.90
15022111	Materials	Sub-BH	1.15	0.64	1.04	1.05	1.20	0.73	1.10	1.28	1.06	0.78	1.19
15022112	Equipment	Sub-BH	1.05	0.57	0.86	1.14	2.18	1.01	1.08	0.98	1.37	1.32	0.41
15022113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54
15023	CIVIL ENGINEERING WORKS	Group	1.00	0.70	1.11	1.06	1.49	0.86	1.00	1.13	1.39	0.79	0.76
150231	<u>Civil engineering works</u>	Class	1.00	0.70	1.11	1.06	1.49	0.86	1.00	1.13	1.39	0.79	0.76
1502311	Civil engineering works	BH	1.00	0.70	1.11	1.06	1.49	0.86	1.00	1.13	1.39	0.79	0.76
15023111	Materials	Sub-BH	1.22	0.75	1.18	0.99	0.94	0.71	1.08	1.30	1.11	0.70	1.29
15023112	Equipment	Sub-BH	0.82	0.74	0.92	1.24	2.27	0.92	0.94	0.94	1.46	1.32	0.41
15023113	Labor	Sub-BH	0.83	0.55	1.25	1.01	2.48	1.24	0.92	1.05	2.16	0.50	0.54

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