Chapter **17**

Validation of Government Employee Compensation Data

As explained in chapter 10 on the approach and data requirements for government, three sets of data are required for the survey on compensation of government employees: (1) remuneration data for government employees; (2) government expenditure data—a necessary source to obtain weights; and (3) pay and employment structure indicators, which provide useful information for validation purposes (see table 17.1). Purchasing power parities (PPPs) for compensation of government employees are calculated using these data sets.

OCCUPATION TYPES

Thirty-seven occupations are listed in the 2011 International Comparison Program (ICP) government compensation survey. For each occupation, the survey records remuneration for four levels of experience: 0 years (starting salary), 5 years, 10 years, and 20 years. Therefore,

Table 17.1 Data Collected, Compensation of Government Employees, ICP 2011

	Compensation of government employees	Government expenditure	Pay and employment structure indicators
From	Official government pay scales	Final government accounts	Relevant official statistics
For	37 typical occupations (4 levels of experience each)	3 categories of government (general = central + subnational)	General indicators
Data	Data collection form: • Basic pay • Cash allowances • Income in kind • Employer's social security contributions • Information on hours worked	Questionnaire: • Wages and salaries in cash • Employer's contribution to social security fund • Benefits in kind • Information related to fixed capital formation	Aggregated indicators: • General indicators such as gross domestic product (GDP) and population • Government recurrent expenditure indicators • Wage bill indicators • Employment indicators
Note	Covers three basic headings: health, education, and collective services.	Reports separately for health, education, and collective services.	Additional ratios are computed automatically (ICP Kit).

Source: ICP, http://icp.worldbank.org/.

the total number of items on the list for this survey is 148 (37 × 4).

Some of the 37 occupations, such as building caretaker and office cleaner, are used to calculate PPPs for three basic headings (BHs): health, education, and collective services. Others, such as hospital doctor, university teacher, or database administrator, are used only for one of the three basic headings. In summary, 23 occupations are used to calculate the BH PPPs for government collective services, 10 are used for government health services, and 9 are used for government education services.

AVERAGE REMUNERATION

In most economies, governments have official national pay scales. For these economies, the number of observations per occupation is one. If an economy does not have a unified national pay scale and subnational governments have different pay scales, multiple observations are collected. In this case, the average remuneration for each occupation is the weighted average of the subnational pay scales (weighted by the number of employees at the subnational level).

Validation Process

Like the validation of household consumption survey data, the validation of data from the survey on compensation of government employees has three stages: intra-economy validation, intereconomy validation, and global validation.

After the compilation of annual data in an economy, intra-economy validation is implemented by the national coordinating agency (NCA). This stage involves initial data validation and the finalization of data. Unlike data validation for the household consumption survey, there are no statistical tests at this stage because, as noted earlier, the number of observations is relatively small.

The NCAs submit their data to their regional coordinating agency (RCA) after data validation at the national level. At the regional level, intereconomy validation is conducted by the RCA and NCAs. At this stage, initial data validation, validation table analysis, temporal analysis, and finalization of data are implemented.

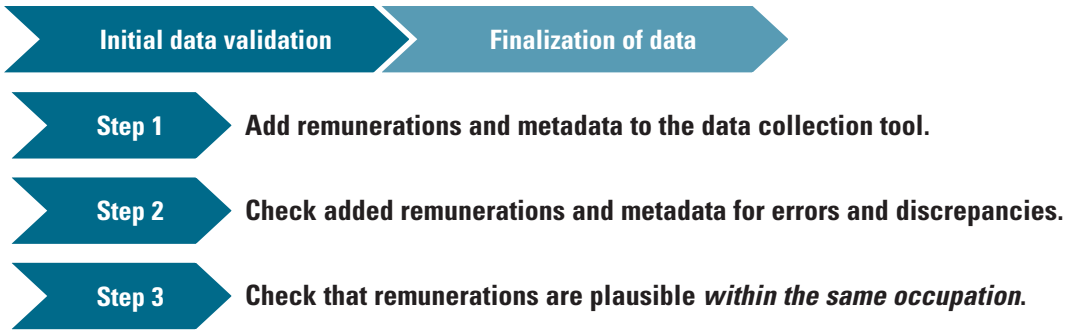
After the data have been transmitted from the RCAs to the Global Office, the Global Office conducts the global-level validation in cooperation with the NCAs and RCAs.

The following sections explain the validation steps unique to this survey. Steps that are similar to those for household consumption validation are shown with just an arrow. For a detailed explanation of that validation, see chapter 15 on household consumption.

Intra-economy Validation

After data collection ends, economy-level data validation is conducted by the NCAs. As noted, because of the lower number of observations for each item, this level of validation for the compensation of government employees survey does not involve statistical tests. However, some validation steps are unique to this survey, and they are explained in this section.

Initial Data Validation



Within the Same Level of Experience

It is recommended that the process described earlier, averaging remuneration, be followed to obtain remuneration data. In most cases, only one observation will be recorded after the process. However, when each subnational government has different salary scales, remunerations of the same occupation with the same level of experience should be compared before obtaining the weighted average for each occupation. Even if subnational governments have different pay scales, remuneration for the same occupation within the same level of experience cannot differ so much (see box 17.1).

When multiple observations appear under an item, they should be averaged after all the observations are verified. In doing so, those doing the validation should obtain data for the number of employees from which the remuneration data are quoted and take a weighted average, as mentioned earlier. All these processes and the data used in the processes should be noted and reported to the RCA when the data are submitted to that agency.

Between Different Levels of Experience

In a normal economic environment, one's remuneration increases as one gains work experience in the same field—or at least it does not decrease. By comparing remunerations within the same occupation and between different levels of experience, those conducting validation can check the plausibility of this economic aspect of the observations (see box 17.2).

BOX **17.1**

Example of Validation within Same Occupation and within Same Level of Experience

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal A	Database administrator	5 years	35,256
Observation 2	Municipal B	Database administrator	5 years	74,662

In this case, the remuneration in municipal location B is more than double that in municipal location A for the same occupation with the same level of experience. Thus the data show an extreme difference and should be flagged for further investigation because of the possibility of a price error or a product error. If there is an acceptable economic reason for the differential, the price should not be removed or edited.

BOX **17.2**

Example of Validation within Same Government Employee Occupation and between Different Levels of Experience

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	0 years	50,653
Observation 2	Municipal C	Hospital doctor	5 years	45,367

In a private hospital, it is possible that a doctor earns more than a colleague with more experience because in some economies the salary they receive is based solely on the competence or popularity of each doctor. However, most governments have a pay scale, and so it would be unusual for a doctor with five years of experience to earn less than a doctor who just recently began work. Thus observations like those shown here would have to be flagged for further investigation.

BOX **17.3**

Example of Validation between Related Government Employee Occupations

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	5 years	62,556
Observation 2	Municipal C	Hospital nurse	5 years	75,698

As noted, generally a hospital doctor earns more than a hospital nurse. The observations shown here from government pay scales could be subject to either a price error or a product error. Therefore, these observations should be flagged and rechecked.

Step 4

Check that remunerations are plausible *between related occupations*.

Of the 37 occupations, several occupations are related in terms of skill, knowledge, proficiency, or position that would result in a difference in their remunerations (see box 17.3). Usually, to become a hospital doctor one needs an advanced degree and greater proficiency than that required to be a hospital nurse. Therefore, in most cases a hospital doctor earns a larger salary than a nurse. Also, some occupations are better- or worse-paid than other occupations, even if there is no direct relationship between the occupations. An example is a judge whose remuneration is expected to be higher than that of a personnel professional or a payroll clerk.

This analysis of related occupations must be *limited to the same level of experience*. Level of skill, knowledge, or proficiency strongly affects remuneration. However, level of experience also determines remuneration (see box 17.4). These two factors are totally independent and should not be mixed in this step of validation.

BOX **17.4**

Example of Erroneous Validation between Related Government Employee Occupations

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	0 years	62,556
Observation 2	Municipal C	Hospital nurse	20 years	75,698

Even though doctors have more education and proficiency than nurses, level of experience has an independent influence on remuneration. Thus comparing the salary of a very experienced nurse with that of a new doctor would be very misleading. Mixing independent factors in an analysis should be avoided.

Table 17.2 Example of Comparable Government Employee Occupations between ICP 2011 and ICP 2005 Lists

ICP 2011		ICP 2005	
Code	Occupation	Code	Occupation
31	Firefighter	215	Firefighter
32	Policeman/policewoman	213	Policeman/policewoman
33	Prison guard	214	Prison guard
34	Driver (general-duty)	221	Chauffeur
35	Office cleaner	212	Cleaner

Source: ICP, http://icp.worldbank.org/.

Step 5

Check that remunerations are temporally plausible by comparing them with data from a previous ICP round.

The occupation list for the survey on the compensation of government employees was updated from the list used in the ICP 2005 round (see annex). The 2005 list had 44 occupations, and level of experience was not necessarily specified for all the occupations. In ICP 2011, there were 37 occupations. Even though some items were updated from the 2005 list, most of the occupations in the 2005 list continued to be in the 2011 list. In some cases, however, the name of the item was changed (see table 17.2).

If price deflator data between 2005 and 2011 for the three basic headings are available, it is recommended that the 2005 remuneration data be adjusted to the 2011 value, making it easier to conduct the temporal analysis. However, even if the relevant price deflator data needed to adjust the 2005 values to 2011 values are not available, the pattern of government pay scales can be checked. In this case, the general economic situation of the economy regarding the change in price level should be taken into consideration. If the economy is experiencing inflation, remunerations would also increase to reflect the inflation to some degree, and vice versa.

Step 6

Compare remuneration data and expenditure data by using structure indicators—that is, compare the relationship between (remuneration × number of employees) and (expenditure).

Information on pay and employment structure indicators provides important clues for verifying the plausibility of remuneration data.

One of the ways to use the data is to check the relevancy in the relationship among remuneration, employment, and expenditure. Theoretically, for an occupation the government expenditure should match the amount of the remuneration multiplied by the number of employees with the occupation. Because of the infeasibility of implementation, the NCAs are not asked to determine the population of each occupation for each level. However, the questionnaire for indicators asks key questions such as number of government employees in education, health, and other collective services, and their aggregates. Starting from an aggregated level such as expenditure, average remuneration, and number of employees in the total public sector, the NCAs can verify to some degree whether the relationship between remuneration and expenditure makes sense. If the expenditure is too large or too small compared with the remuneration multiplied by the number of employees in each field, something could be wrong with the data. If so, the NCA should check the breakdown figures to determine the source of the problem. However, those data would not yield any exact matches in numerical value. Because of the differences in the systems of data collection used on the expenditure side and on the remuneration side, and also because of infeasibility issues, the systems produce only rough sketches of the relationship.

Government expenditure data should be validated in line with the validation of national accounts data. This step also plays a role in validation of the expenditure data and pay and employment structure indicators data. If the NCAs find problems in the process, not only remuneration but also the expenditure and general indicators should be further investigated for verification.

Step 7 **Analyze price data and metadata for flagged cases.**

Finalization of Data

Initial data validation → **Finalization of data**

Step 1 **Confirm that remuneration data, expenditure data, indicators, and metadata have been intra-economy validated.**

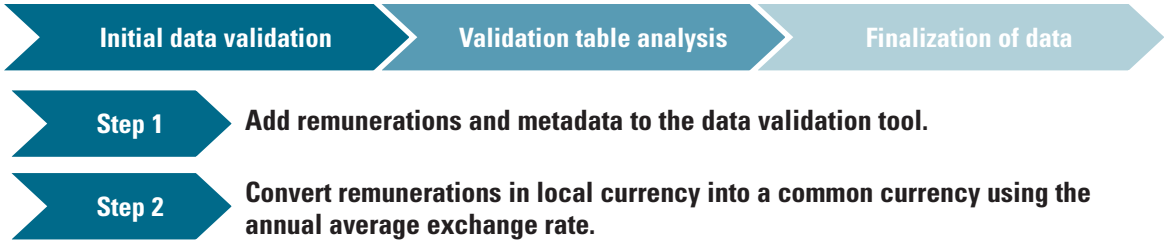
Step 2 **Submit remuneration data, expenditure data, indicators, and metadata to the RCA.**

Intereconomy Validation

Intra-economy validation → **Intereconomy validation** → **Global validation**

After receiving all data and metadata from the NCAs, the RCA conducts the regional-level validation. Like the validation for the household consumption survey, this level of validation is a collective process involving the RCA and a group of economies. Remuneration data collected in economies in the region should be checked for their accuracy and comparability between economies. Even though the RCA leads the process, the active involvement of the NCAs is essential because their cooperation is required to investigate the data when the RCA finds any potential problems.

Initial Data Validation



Intereconomy validation helps to check whether there are extreme values among the average remunerations as well as discrepancies in the reported metadata for each item within a basic heading. Therefore, the average remunerations must be converted to the same base to make them comparable. First, then, the remunerations expressed in a local currency unit should be converted and expressed in a common currency unit using the annual average exchange rate.

Step 3 **Rebase data from all economies to the reference number of hours worked.**

Next, convert the remunerations into those based on the same number of hours worked across economies in the region. If they are based on different reference numbers of hours worked, they are not comparable (see box 17.5).

In many economies, it is accepted practice that government employees work fewer than the regular (official) number of hours per week. Therefore, economies are asked to report the best estimate of the number of hours actually worked per week by employees for each occupation. For the conversion, in ICP 2011 the Global Office recommended converting remunerations into ones based on the actual number of hours worked, if the information was available.

After being converted by reference hours and exchange rate, the average prices provided by each NCA are checked against the average prices provided by the other NCAs in the region.

BOX **17.5**

Example of Rebasing to Reference Number of Hours Worked

Economy	Remuneration (in a common curency)	Regular hours worked per week	Actual hours worked per week
Neverland	60,000	32	25
Timberland	70,000	40	60

Economy	Remuneration (in a common currency)	Rebased on regular hours (40 hours)	Rebased on actual hours (40 hours)
Neverland	60,000 (a)	[(a)/32] × 40 = 75,000	[(a)/25] × 40 = 96,000
Timberland	70,000 (b)	[(b)/40] × 40 = 70,000	[(b)/60] × 40 = 46,667

Before being rebased, data from the two economies shown were not comparable. If one looks just at the remunerations, Timberland has the higher amount. However, it is obvious that the salary in Timberland is not so high if the number of hours worked per week is taken into consideration. The remunerations must then be rebased so they represent the same number of hours worked per week.

After the conversion, it becomes clear that Neverland has the higher salary for the reference number of hours.

Remunerations from economies should be incorporated in a data validation tool that will allow the RCA to easily compare prices across economies.

Step 4 **Check that remunerations are plausible within an economy.**

First, validate the plausibility of the remuneration data vertically (as in table 17.3; here *vertically* means within each economy).

Although what should be done in this step is almost the same as the validation carried out at the economy level (see steps 3 and 4 in the intra-economy validation section of this chapter), it is important and beneficial that this step be carried out by the RCA, which is knowledgeable about the entire region.

Step 5 **Check that remunerations are plausible across economies.**

Next, validate the plausibility of remunerations data horizontally (as in table 17.3; here *horizontally* means across economies).

Now that the data are based on the reference quantity and expressed in a common currency, the remunerations can be compared across the economies. The RCAs must employ their knowledge of the economic structure and situation of each economy in their region (see boxes 17.6 and 17.7).

Step 6 **Check that remunerations are temporally plausible by comparing them with those from the previous ICP round.**

Step 7 **Analyze price data and metadata for flagged cases.**

Table 17.3 Example of Table for Validation at Regional Level of Remuneration of Government Employees, ICP 2011
common currency units

Code	Occupation	Economy A	Economy B	Economy C	Economy D	Economy E
9	University teacher	9,086	16,182	17,109	28,697	35,387
11	Primary school teacher	1,214	4,652	5,108	9,920	25,562
12	Secondary school teacher	1,959	5,259	4,221	14,313	26,960
15	Database administrator	1,400	17,396	3,799	4,744	23,362
29	Building caretaker	965	5,947	1,931	2,542	8,605
31	Firefighter	560	7,569	18,199	4,660	13,719
32	Policeman/policewoman	1,380	8,235	3,257	5,422	12,501
33	Prison guard	836	2,457	3,820	5,422	13,918
34	Driver (general-duty)	999	4,308	2,531	3,558	8,024
35	Office cleaner	965	3,499	1,858	3,558	8,595

Source: ICP, http://icp.worldbank.org/.

BOX **17.6**

Example of Table for Validation at Regional Level of Remuneration of Government Employees, ICP 2011

common currency units

		Economy A	Economy B	Economy C	Economy D	Economy E
9	University teacher	9,086	16,182	17,109	28,697	35,387
11	Primary school teacher	1,214	4,652	5,108	9,920	25,562
12	Secondary school teacher	1,959	5,259	4,221	14,313	26,960
15	Database administrator	1,400	17,396	3,799	4,744	23,362
29	Building caretaker	965	5,947	1,931	2,542	8,605
31	Firefighter	**560**	7,569	**18,199**	4,660	13,719
32	Policeman/policewoman	1,380	8,235	3,257	5,422	12,501
33	Prison guard	836	2,457	3,820	5,422	13,918
34	Driver (general-duty)	999	4,308	2,531	3,558	8,024
35	Office cleaner	965	3,499	1,858	3,558	8,595

This table reveals a big discrepancy in the remuneration of firefighters in economies A and C (see shading). This discrepancy could be a problem, or not a problem at all. Because the payment structures and price levels of economies differ, the knowledge of the RCA would be important in identifying potential problems. In this case, even though the remunerations for other occupations in economy A are much lower than those of economy C, the gap for firefighter is still too large. These values would thus be flagged for further investigation. Although the validation table analyses in step 7 will provide more objective criteria for finding potential errors, it is useful for the RCAs to uncover any potential problems at this initial stage.

Validation Table Analysis

As in the household consumption survey validation process, analyses using tables such as the Quaranta and Dikhanov make it possible to conduct detailed comparisons. Analytical tables provide indexes for more objective validation such as the coefficient of variation and PPP-ratio. One should follow the validation steps in the household consumption survey for the actual steps to be taken. Also, temporal analyses with ICP 2005 data using indexes such as price level indexes and PPPs make the series of analyses more robust.

BOX **17.7**

Application of Information from Pay and Employment Structure Indicators

The following indicators are automatically calculated in the pay and employment structure indicators if the relevant information is entered. These indicators give insights into the employment, payment, and economic structure of each economy and reinforce the knowledge of the RCAs, which is needed when comparing data across economies.

1 Wage bill indicators
Government wage bill per gross domestic product (GDP)
for general/central/subnational government
2 Compression ratios (ratio of average total remuneration)
For health, education, and collective services, respectively:
Managerial-professional ratio
Managerial-clerical ratio
3 Public sector remuneration per GDP per capita
For health, education, and collective services, respectively:
Managerial
Professional
Clerical
4 Employment indicators
Employment per capita
Employment per labor force

Finalization of Data

After confirmation that the remuneration data, expenditure data, indicators, and metadata have been intereconomy validated, the RCA should submit the data to the Global Office for the global-level validation process across regions.

Global Validation

The Global Office conducts the global-level validation across regions. Similar to the process for the validation of household consumption survey data, the active involvement of the NCAs and RCAs is crucial to this final validation stage. The objective is to ensure that the remunerations collected across the regions are comparable and that the linked global PPPs are plausible in wider terms.

Annex

Comparison of ICP 2011 Items with ICP 2005 Items

ICP 2011				ICP 2005	
	Occupation	ISCO 08	ISCO 88	Code	Occupation
1	Senior government official	1112	1120		(Not in 2005 list)
2	Hospital manager	1120	1210	110	Hospital chief executive
3	Data processing manager	1330	1226		(Not in 2005 list)
4	Secondary school principal	1345	1229	305	Head teacher
5	Government statistician	2120	2121/2122		(Not in 2005 list)
6	Hospital doctor	2211	2221/1229	101	Doctor, head of department*
			2221/1229	102	Doctor (20 years of seniority)*
			2221/1229	103	Doctor (10 years of seniority)*
7	Specialist doctor	2212	2212		(Not in 2005 list)
8	Hospital nurse	2221	2230/3231/3232	104	Nurse, head of department*
			2230/3231/3232	105	Nurse, operating theater*
			2230/3231/3232	106	Nurse
9	University teacher	2310	2310	304	University lecturer
10	Vocational education teacher	2320	2310/2320		(Not in 2005 list)
11	Primary school teacher	2341	2331/3310	302	Primary teacher
12	Secondary school teacher	2330	2320	303	Secondary teacher
13	Government accountant	2411	2411		(Not in 2005 list)
14	Human resources professional	2423	2412		(Not in 2005 list)
15	Database administrator	2521	2131	224	Database administrator
16	Judge	2612	2422		(Not in 2005 list)
17	Government economist	2631	2441		(Not in 2005 list)
18	Laboratory assistant	3212	3211	109	Laboratory assistant
19	Auxiliary nurse	3221	2230	107	Nursing auxiliary
20	Medical records clerk	3252	4143		(Not in 2005 list)
21	Office supervisor	3341	3431/3439/3442/3443/ 3449	202	Executive official (skill level III)*
			3431/3439/ 3442/3443/3449	203	Executive official (skill level IV)*
22	Medical secretary (hospital)	3344	4115/4111/4112	111	Secretary (hospital)
23	Customs inspector	3351	3441		(Not in 2005 list)
24	Computer operator	3511	3122	204	Computer operator
25	Secretary (not medical)	4120	4115/4111/4112	207	Secretary (not hospital)
26	Accounting and bookkeeping clerks	4311	4121	205	Bookkeeping clerk
27	Payroll clerk	4313	4121		(Not in 2005 list)
28	Cook	5120	5122	112	Cook (not head cook)
29	Building caretaker	5153	9141	211	Building caretaker
30	Teacher's aide	5312	5131		(Not in 2005 list)
31	Firefighter	5411	5161	215	Firefighter
32	Policeman/policewoman	5412	5162	213	Policeman/policewoman
33	Prison guard	5413	5163	214	Prison guard
34	Driver (general-duty)	8322	8322	221	Chauffeur

table continues next page

Annex *(Continued)*

ICP 2011				ICP 2005	
	Occupation	ISCO 08	ISCO 88	Code	Occupation
35	Office cleaner	9112	9132	212	Cleaner
36	Kitchen helper	9412	9132		(Not in 2005 list)
37	Messenger	9621	9151	209	Messenger

Source: ICP, http://icp.worldbank.org/.
Note: ISCO = International Standard Classification of Occupations. An asterisk (*) indicates that level of experience should be considered when comparing the 2005 item with a 2011 item.