Tutorial:Rounding of numbers

Statistics Explained

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Authors of statistical publications must balance accuracy with readability. Reporting overly precise numbers can obscure important information and create a misleading sense of accuracy. Therefore, rounding large numbers and long decimals enhances readability and prevents false precision.

Although Eurostat's common editorial guidelines address number rounding, more detailed guidance is needed due to growing inquiries from authors and contractors. The best rounding policy varies by publication context and statistical domain, making universal rules challenging. However, this document aims to harmonise practices and offer straightforward recommendations for publications aimed at non-specialists.

General recommendations

The general recommendations apply to all communication elements of statistical publications (texts, tables, graphs and maps):

1. Use only the number of digits which are necessary and make sense for the purpose of a clear communication.
2. Rounding of numbers should take place at the latest phase of data processing and analysis.
3. For target indicators always use the full precision of the indicator to assess whether the target has been met. The rounding should not change the situation of the countries towards the target (to achieve or exceed the target).
4. Big numbers are difficult to grasp. It may be reasonable to round them and use the words millions, billions, etc.
5. In case of doubt on the number of digits to be used, authors should consult the Dissemination unit.
6. A disclaimer should be added, when applicable, at the beginning or end of the publication describing the rounding policy and the reasons for possible inconsistencies. For instance:

Due to rounding, some totals may not correspond with the sum of the separate figures.

Specific recommendations

The specific recommendations are based on 3 increasing levels of approximation: while detailed figures from data sources (e.g. Eurobase) should not be changed when preparing graphs and maps (level 0), they should be partially rounded for compiling tables (level 1) and rounded even further when writing texts (level 2).

Summary

- **Level 0** :*Graphs and maps* should be built using unrounded figures from the original dataset(s).

Examples: 12.34% and 56.789%, 1 234 and 56 789 persons

- **Level 1** : For*tables with percentages* , the general rule is to round to one decimal. For*tables with absolute numbers* , identify the smallest number, decide how many digits to keep for this number, and then round all other entries to those digits.

Examples: 12.3% and 56.8%, 1 200 and 56 800 persons

- **Level 2** : In*text* 2 significant (non-zero) digits are in general sufficient.

Examples: 12% and 57%, 1 200 and 57 000 persons

Details

The assessment whether a **target** has been met should be done on the basis of unrounded figures (and properly reflecting the accuracy of the data).

- **Level 1** : Numbers and percentages in tables should undergo initial rounding, but this applies to text tables, not detailed annex tables. For percentages and proportions, round to one decimal place. If values often exceed 70%, use no decimals; however, for indicators like monthly changes, more decimals may be necessary. Rounding should not misrepresent a country's position regarding targets or thresholds.

For tables with absolute numbers, identify the shortest number in terms of digits and round others to match its significant digits, generally 2, to ensure consistency in totals, except for minor rounding discrepancies. Display decimals for exchange rates.

When displaying multiple indicators in one table, keep the number of significant digits consistent: one side for absolute figures and the other for relative quantities.

- **Level 2** : Numbers and percentages in text should be more rounded than those in tables. Detailed figures are generally unnecessary in text analyses; consider adding a table if needed for clarity.

When precision is not crucial, group countries or units and use terms like "at least," "about," or "less than." Use unrounded numbers for grouping, then round them, adjusting the text if needed due to rounding overlaps.

For target indicators or thresholds, use maximum precision to accurately rank positions. Inconsistencies in digit precision for countries of different sizes are acceptable in text, as the focus is on communicating concepts.

Tables

Consider the following population data extracted from Eurobase:

GEO/TIME	1970
Belgium	9660154
Germany (until 1990 former territory of the FRG)	61194591
France	:
Italy	53685300
Luxembourg	338500
Netherlands	12957621

Luxembourg shows the smallest figure; keeping two significant digits implies rounding to the “ten-thousands” position, i.e. to 340 000. By rounding all other numbers to this position we obtain the table:

Member State	Population in 1970
BE	9 660 000
DE	61 190 000
FR	:
IT	53 690 000
LU	340 000
NL	12 960 000

The unrounded total is 137 836 166 which, according to the rounding scheme applied in the table, rounds to 137 840 000. This is exactly the sum of the rounded figures in the table!

Even though the proposed rounding scheme reduces the possibility of inconsistencies between the sum of rounded numbers and the rounded sum, small differences could still occur. In this case, it is important to report the disclaimer described above (general recommendations number 6).

Texts

Consider the same population dataset as above. By keeping two significant digits, population in Germany rounds to 61 000 000, in Belgium to 9 700 000 and in Luxembourg to 340 000. The significant positions clearly differ in these three numbers; however this is generally not a problem in texts.

Text describing a table: good example

The following is a good example of how to present analysis of numbers reported in a table. In the accompanying text, countries are regrouped and rounded figures are used.

In 2024, total road freight transport decreased in 10 EU countries compared with 2023, with the most significant declines recorded in Bulgaria (-18.6%), Portugal (-14.0%) and Luxembourg (-8.6%). In contrast, 15 EU countries recorded increases, the highest ones in Slovakia (+15.9%), Latvia (+12.9%) and Czechia (+8.5%). In Croatia, total road freight transport remained stable during these 2 years (see Figure 1). Looking back to 2023, compared with 2022, total road freight transport had fallen in 20 EU countries, from -16.4% in Portugal to -1.3% in Spain. In the remaining 6 EU countries, total road freight transport had increased, from +17.3% in Lithuania to +1.4% in Romania.

Road freight transport by type of operation, 2022-2024
(million tonne-kilometres)

	2022					2023					2024				
	National	International	Cross-trade	Cabotage	Total	National	International	Cross-trade	Cabotage	Total	National	International	Cross-trade	Cabotage	Total
EU	1 176 987	487 302	204 227	50 051	1 918 566	1 137 891	466 068	203 392	49 657	1 857 006	1 146 542	459 133	210 571	52 051	1 868 697
Belgium	22 662	9 106	1 063	1 260	33 480	21 525	8 601	964	1 144	32 234	20 515	8 873	1 334	1 368	32 090
Bulgaria	8 817	13 489	11 636	1 192	35 134	9 902	12 409	9 995	819	33 125	10 456	9 101	6 803	608	26 969
Czechia	39 762	28 343	5 592	1 098	65 794	28 633	27 558	7 321	1 295	64 806	29 028	31 870	8 039	1 410	70 346
Denmark	12 755	2 159	119	129	15 162	13 921	2 278	105	103	16 406	14 388	2 020	96	162	16 666
Germany	268 557	30 883	2 998	1 510	303 948	253 596	28 376	3 000	1 436	286 408	248 248	28 285	2 972	1 335	280 840
Estonia	1 797	1 721	826	196	4 540	1 537	1 760	718	180	4 194	1 933	1 360	866	204	4 363
Ireland	10 182	1 455	389	337	12 364	10 448	1 319	475	349	12 591	11 133	1 343	589	462	13 528
Greece	16 182	4 822	129	47	21 182	14 815	5 129	67	1	20 011	15 044	5 254	273	4	20 574
Spain	178 005	81 610	4 454	2 655	266 724	178 213	77 965	4 627	2 577	263 382	182 954	81 033	4 898	2 703	271 588
France	160 535	11 908	309	601	173 353	157 313	11 143	311	473	169 240	160 705	12 430	304	576	174 015
Croatia	4 854	5 758	2 711	335	13 659	5 169	5 945	2 937	279	14 329	5 109	6 132	2 809	274	14 325
Italy	132 267	17 236	770	826	151 100	128 805	14 920	641	808	145 173	136 137	14 956	767	818	152 678
Cyprus	923	26			949	986	38			1 023	1 019	78			1 096
Latvia	3 989	6 330	3 487	775	14 581	4 058	5 211	3 289	646	13 203	4 135	5 475	4 599	698	14 906
Lithuania	3 182	10 256	34 661	5 674	53 773	4 178	10 878	41 238	6 807	63 101	4 648	10 266	43 672	7 660	66 245
Luxembourg	588	2 012	3 159	1 594	7 353	493	1 836	3 198	1 437	6 964	467	1 715	2 799	1 383	6 364
Hungary	13 926	16 014	6 517	987	37 444	14 050	14 427	4 110	767	33 353	12 364	14 501	6 343	1 023	34 231
Malta (')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	35 433	25 018	3 276	1 738	65 466	33 127	24 603	3 081	1 788	62 600	33 622	24 353	3 089	1 820	62 883
Austria	17 565	6 976	1 604	685	26 830	16 567	6 884	1 392	578	25 422	16 626	6 798	1 362	529	25 315
Poland	140 032	145 588	77 718	21 751	385 089	134 808	143 326	78 049	21 690	377 873	131 995	133 302	80 257	22 761	368 314
Portugal	9 055	14 896	6 782	1 306	32 039	7 645	12 566	5 613	958	26 782	7 656	10 507	4 164	716	23 043
Romania	21 994	22 713	16 772	2 874	64 353	22 313	23 238	16 803	2 894	65 249	24 029	23 084	17 524	2 719	67 357
Slovenia	2 567	10 921	9 521	1 300	24 308	3 098	9 749	8 338	1 335	22 520	2 679	9 277	8 711	1 190	21 857
Slovakia	6 203	14 824	9 507	952	31 488	5 939	12 685	6 817	938	26 380	7 172	14 044	8 102	1 243	30 562
Finland	29 005	1 260	167	168	30 590	26 472	1 358	171	263	28 265	25 845	1 356	111	291	27 603
Sweden	45 759	1 977	60	68	47 865	40 280	1 869	133	102	42 383	39 038	1 719	88	93	40 938
Norway	22 325	2 071	19	13	24 428	22 606	1 720	37	45	24 408	22 389	1 635	21	4	24 047
Switzerland	10 868	1 667	251	202	12 988	10 308	1 245	119	217	11 888	10 261	1 689	232	86	12 268

(-) Not applicable.
(:) Not available.
(') Malta excluded (see chapter 'data sources').
Source: Eurostat (online data code: road_go_ta_tott)

eurostat

Example of numbers in text with too many digits

Consider the following example of text:

The total number of available hospitals beds in the EU was 2.70 million in 2010, equivalent to one bed for every 185.8 persons or 538.2 hospitals beds per 100 000 inhabitants.

The figures in this text are too much detailed (up to four significant digits) and it is difficult for the reader to retain the main messages. Original numbers should be rounded to two digits only.

Solution

The total number of available hospital beds in the EU was 2.7 million in 2010, equivalent to **around** *one bed for every* **190** *persons, or* **540** *hospitals beds per 100 000 inhabitants.*

Note that the rounding above must be done on the most detailed available figures for increased consistency.

Rounding of numbers in tables: bad example

Reconsider the population dataset introduced in the first table. If instead of applying the above mentioned recommendation for tables, we had kept the same number of significant digits in all figures in the table, we would not have achieved the same level of coherence. For instance, with two significance digits we have

Member State	Population in 1970
BE	9 700 000
DE	61 000 000
FR	:
IT	54 000 000
LU	340 000
NL	13 000 000

The rounded total is 140 000 000 and this is different from the sum of the rounded figures (138 040 000).

Solution

We have already seen that the correct scheme consists in rounding all figures to the “ten of thousand” position. Apart from the second table, the following two alternative tables correctly represent the data:

Member State	Population in 1970 (in thousand)
BE	9 660
DE	61 190
FR	:
IT	53 690
LU	340
NL	12 960

Member State	Population in 1970 (in million)
BE	9.66
DE	61.19
FR	:
IT	53.69
LU	0.34
NL	12.96

See also

- Tutorials - overview of all tutorials