Statistics

in focus

ECONOMY AND FINANCE

THEME 2 – 10/2002

NATIONAL ACCOUNTS

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QUARTERLY ACCOUNTS

GDP: Expenditure and Output approach - non seasonal adjusted figures now available

Roberto BARCELLAN



Eurostat is facing an ever increasing demand for quarterly statistics about the economic situation of the **euro-zone** (¹) and the **European Union**.

Given that expectations are high with respect to the timely availability, coverage, comparability and reliability of data, Eurostat is working to expand the services offered and, as a recent addition to its programme, has started compiling *non seasonal adjusted* quarterly national accounts for the **euro-zone** and the **European Union**. This publication explains the features of these new data and their compilation and discusses the differences to the seasonally adjusted data published so far. The latest raw quarterly GDP growth rates and levels are given, along with the raw figures for the main components of GDP both from the expenditure and output side.

For the third quarter 2001, **Eurostat** estimates (²) show the raw GDP of the **euro-zone** and the **EU15** to have grown by 1.4 % and 1.5 %, respectively with respect to the third quarter 2000. During the second quarter 2001, the figures had been 1.6 % and 1.7 %, respectively. It may be noted that the corresponding growth rates calculated from seasonally adjusted figures and published in Eurostat's latest press release (³) are 1.4 % for both zones for the third quarter 2001 and 1.6 % and 1.7 %, respectively, for the second quarter.

- (¹) The euro-zone consists of Belgium, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland. Euro-zone data cover eleven Member States till end 2000; with Greece's entry into the euro-zone from the beginning of 2001 onwards, they cover twelve Member States.
- (¹) Data for euro-zone and EU15 are calculated within a coherent and consistent statistical framework using as indicators the available raw data from the Member States. Member States have different policies for releasing their quarterly accounts and not all the data for all the countries are available at the same time. All the information available at a certain date in time is used for estimating, euro-zone and EU15 figures.
- (³) Eurostat Press Release No 20/2002 of 07.02.2002.

Specific features of raw data

Due to the sub-annual periodicity at which quarterly data are recorded, series usually show periodic fluctuations, commonly called seasonality, caused by the weather, calendar, timing decisions, expectations, etc, which tend to recur with about the same intensity each year. Classical time series analysis regards subannual values as being a combination of several components, of which the seasonal component is one, the principal other ones being the trend component, the cyclical component, the calendar component and the irregular component (see Box on next page).

Raw series include all the components mentioned above; this means that these values are neither seasonally adjusted nor corrected for calendar and working day effects. Seasonally adjusted series, on the other hand, are adjusted in order to eliminate the seasonal component, and this seasonal adjustment often incorporates a correction for the calendar effect as well. Those effects are, however, not genuinely observable. Raw figures thus give an economic picture that is closer to observable economic reality but may be more difficult to interpret since more components are involved.

Raw figures meet a demand from various, often experienced users which want to use them for econometric modelling or prefer to apply their own seasonal adjustment. Since they may contain more information than the adjusted figures, they are particularly useful for modelling by business banks, central banks and economic research institutes. They also may be used for comparison purposes since National Statistical Institutes often publish growth rates calculated from raw data. All in all, the availability

of raw values enhances the possibilities for economic analysis, monitoring and forecasting.

In the case of Eurostat quarterly National Accounts, an additional factor to take into account when judging the usefulness of raw data is that up to now, seasonal adjustment is carried out on the basic data by National Statistical Institutes according to their specific methods, including a working-day correction in some cases only. This means that the resulting European aggregates are seasonally adjusted according to a mix of methods and are partially working-day corrected.

Concerning the presentation of quarterly growth rates, only those relative to the same quarter of the previous year (T/T-4) are commonly calculated from raw data given the presence of seasonality. Since the seasonal pattern is supposed to be basically repeated every year, comparing the same guarter of different years should give a growth rate broadly unaffected by the seasonal effects. The impact of the calendar/working day effect can, however, be different. This partly explains possible differences between the T/T-4 growth rates derived from raw and seasonally adjusted data. Growth rates in comparison to the preceding quarter (T/T-1), which are widely used with adjusted data, are not meaningful in the raw data context. To illustrate the point, the following table compares some growth rates for the euro-zone and the EU15.

As can be seen, the T/T-1 growth rates from raw data fluctuate heavily and show a repetitive pattern, whereas the T/T-4 growth rates calculated from raw and seasonally adjusted data are roughly the same with the exception of the first quarter 2000.

		Growth rates of GDP at constant prices (1995)														
	compa	ared to the pre	evious quar	ter (T/T-1)	compared to the same quarter of the previous year (T/T-4)											
		raw	seasona	Ily adjusted	1	raw	seasona	lly adjusted								
	EU15	euro-zone	EU15	euro-zone	EU15	euro-zone	EU15	euro-zone								
1999 Q4	4.2	3.7	1.0	1.0	3.5	3.6	3.5	3.6								
2000 Q1	-2.9	-2.7	0.8	0.9	4.4	4.5	3.6	3.6								
2000 Q2	2.0	2.5	0.9	0.9	3.7	3.9	3.8	3.9								
2000 Q3	-0.3	-0.5	0.5	0.4	2.9	2.9	3.2	3.2								
2000 Q4	3.8	3.1	0.6	0.6	2.4	2.3	2.8	2.8								
2001 Q1	-3.0	-2.6	0.5	0.6	2.3	2.3	2.5	2.4								
2001 Q2	1.4	1.7	0.1	0.1	1.7	1.6	1.7	1.6								
2001 Q3	-0.6	-0.7	0.2	0.1	1.5	1.4	1.4	1.4								



Classical time series decomposition

Classical time series analysis considers a time series to be, in fact, a combination of several components. By applying appropriate techniques, the time series may be decomposed to single out the components. The classical additive decomposition model has the form

$$X_t = T_t + C_t + S_t + K_t + U_t,$$

where:

- T_t is the trend component;

C_t is the cyclical component; *S_t* is the seasonal component;

- S_t is the seasonal component; - K_t is the calendar component;

- $U_{\rm t}$ is the irregular component.

These components are usually defined like this:

- *Trend* is a slow change in the level of the variable over a short-term period, generally associated with the structural causes of the phenomenon being considered.
- *Cycle* is a short term fluctuation characterised by alternate periods of growth and contraction, in most cases related to the fluctuations of economic activity. The trend and cycle components are often considered together as one combined cycle-trend component due to problems in separating them.
- Seasonal variations represent the effect of climatic and institutional events, which repeat themselves more or less regularly each year.
- *Calendar* component captures the differences determined by the calendar structure, e.g. the different number of working days per month or special effects like the Easter effect.
- *Irregular* fluctuations represent unexpected movements related to events other than those previously considered. They are often supposed to be identically and independently distributed with zero mean and constant variance.

Of course, the components may also be assumed to be connected in a way other than additive. Multiplicative models, in which the time series value is derived as the product of all components, may be transformed to the additive model via a logarithmic transformation.

Estimating European aggregates

As is the case for the seasonally adjusted data, raw National Accounts aggregates are balanced so that the figures from the expenditure and output (and possibly also the income) approaches to GDP will give the same single value for GDP.

The estimation procedure uses regression and time series modelling to combine historical low (annual) frequency information with high (quarterly) frequency indicators based on the available raw data from the Member States. Given that certain Member States are not publishing quarterly accounts regularly yet, eurozone and EU15 data must be estimated.

To estimate GDP and its components, Eurostat adopts procedures based on temporal disaggregation of the annual accounts data in accordance with statistical methods using related indicators that give the quarterly movements.

In a first step, all the available quarterly data from Member States are summed up to give related indicators to be used for the estimation of the euro-zone and EU15 aggregates. Some data at least for the large Member States are usually necessary in order to give a reliable indicator. These indicators are then used to produce a preliminary guarterly estimate by disaggregating the annual values according to the quarterly indicator following the optimal statistical univariate method of Chow and Lin. This method ensures temporal consistency (i.e. the sum of the quarterly values is equivalent to the corresponding annual data). The quarterly movement of the estimated aggregates is led by the quarterly indicators and reflects the movement and weights of the available Member States.

In a second step, the preliminary estimates are balanced via a multivariate adjustment to ensure that the accounting consistency (i.e. the sum of the components gives GDP) is satisfied.



T1 GDP AND EXPENDITURE COMPONENTS EURO-ZONE, EU-15, EU MEMBER STATES AND MAIN PARTNERS

t/t-4 Percentage change over the same quarter of the previous year – non seasonally adjusted – at constant prices (1995)

	GDP Final consumption expenditure					Government final consumption expenditure				Gross Fixed Capital Formation				Domestic Demand					Ехро	orts		Imports						
	2000		2001		2000	-	2001		2000		2001		2000		2001		2000		2001		2000		2001		2000		2001	
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
euro-zone	2.3	2.3	1.6	1.4	1.4	1.9	1.8	1.6	1.5	2.0	1.9	2.2	2.5	1.6	-0.4	-1.7	1.8	1.6	1.0	0.7	11.7	8.6	4.9	0.9	10.7	6.8	3.4	-0.9
EU-15	2.4	2.3	1.7	1.5	1.8	2.1	2.0	1.9	1.4	2.0	1.9	1.9	3.4	1.9	0.3	-1.4	6.6	4.7	2.2	0.0	11.5	8.5	4.4	0.1	10.6	7.2	3.3	-1.1
EU MEMBER	STATE	S																										
В	2.9	1.8	1.4	0.7	2.9	2.1	1.7	1.3	2.4	3.1	2.6	2.1	3.9	1.3	-0.7	-0.4	2.1	0.5	1.6	-0.5	8.0	4.5	0.5	-3.4	7.2	3.0	0.6	-5.2
DK	2.7	2.0	0.9	1.2	-1.5	0.8	1.0	0.8	0.2	0.6	1.2	1.7	7.9	-3.8	-1.4	-4.6	1.8	-0.2	0.6	1.3	12.7	12.8	4.7	-0.9	11.7	7.5	4.2	-0.9
D	1.5	1.4	0.6	0.3	-0.2	1.2	1.2	1.0	0.8	1.6	1.6	1.4	-0.1	-2.9	-3.7	-4.8	1.2	0.7	-0.3	-1.2	12.2	8.2	7.2	4.8	11.7	6.4	4.9	0.0
EL	5.0	6.1	4.9	4.5	:	:	:	:	:	:	:	:	:	:	:	:	4.0	6.0	4.8	4.3	22.0	10.9	8.7	7.7	13.1	9.4	7.3	6.3
E	2.8	3.7	2.2	2.6	2.8	2.9	2.6	2.3	3.5	2.3	2.7	5.0	3.7	4.0	2.6	2.0	2.1	2.7	3.1	2.1	11.9	10.9	3.7	1.6	8.7	7.2	6.5	0.0
F	2.9	2.7	2.2	2.0	1.7	3.2	2.6	2.6	2.1	2.2	2.0	2.4	6.4	4.9	4.0	1.6	3.0	2.3	2.2	1.6	14.5	9.4	2.6	0.1	15.8	8.2	2.5	-1.3
IRL	12.1	12.7	9.2	:	:	:	:	:	7.5	6.1	4.5	:	3.5	12.6	-0.1	:	10.1	10.5	-1.3	:	18.9	22.2	12.5	:	18.3	21.5	2.6	:
I	2.2	2.5	2.1	2.1	2.5	0.9	1.6	0.9	1.1	1.1	0.9	0.6	2.0	4.5	0.6	-2.3	1.0	1.0	-0.1	2.3	10.4	13.2	8.8	-3.6	6.2	7.8	1.7	-3.4
L	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
NL	2.2	1.4	1.4	0.8	3.4	1.1	1.7	1.0	1.8	3.1	3.0	3.0	1.1	-1.0	-2.2	-1.2	1.5	1.6	0.8	1.4	9.3	5.2	4.0	0.4	8.8	6.0	3.1	1.4
А	2.0	2.7	1.0	0.7	2.1	2.9	0.7	0.8	-0.6	-1.5	-1.3	0.2	6.0	6.4	-3.0	-1.2	0.6	1.4	0.8	0.2	10.6	8.2	2.8	2.5	7.5	5.9	2.3	1.5
Р	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
FIN	54	36	04	0 0	07	0.5	10	26	-0.2	22	22	22	52	72	-0 1	1 8	54	57	0 9	40	13.5	29	-35	-10 3	16.8	82	-36	-4.3
e .	24	22	0.⊣ 1 1 1	0.0	1.6	0.0	-0.2	_0.5	-0.6	0.1	<u>2.2</u>	_1 0	4.3	6.1	2.5	-1 0	0.4	2.1	_0 1	-1.5	10.0	4.3	-0.4	_3 7	0.0	12	_3.0	_8.2
3	2.4	2.0	2.0	0.4	2.0	0.0 2 F	-0.2	-0.5	-0.0	2.4	0.0	-1.5	7.0	4.0	2.5	-1.9	0.9 2 F	2.1	-0.1	-1.5	0.0	4.3 0 /	-0.4	-0.1	3.1 10 F	+.2	-5.2	-0.3
UK	2.7	2.2	3.0	2.3	3.9	3.5	3.4	3.8	1.1	3.4	2.2	1.3	7.9	4.0	4.0	1.2	3.5	3.1	3.4	2.9	9.1	ŏ.4	3.1	-3.3	10.5	10.1	4.1	-0.8

: Data not available.

4

eurostat



Т2

Т

GDP AND EXPENDITURE COMPONENTS

EURO-ZONE, EU-15, EU MEMBER STATES AND MAIN PARTNERS

levels Third quarter 2001 - in millions of euro - non seasonally adjusted - at current prices

									_
	GDP	Household and NPISH final consumption expenditure	Government final consumption expenditure	Gross Fixed Capital Formation	Change in Inventories	Domestic Demand	Exports	Imports	External Balance
euro-zone	1 684 554.6	977 762.6	326 495.4	346 425.8	7 723.1	1 658 406.8	615 741.7	589 593.9	26 147.7
EU-15	2 185 563.8	1 293 737.2	429 549.9	432 401.1	8 990.8	2 164 678.9	765 721.8	744 836.9	20 884.9
EU MEMBER	STATES								
В	61 777.0	34 609.0	13 297.0	12 524.0	- 1 357.0	59 073.0	51 081.0	48 377.0	2 704.0
DK	44 951.3	20 883.1	11 670.4	9 026.2	- 148.3	41 431.4	20 427.4	16 907.6	3 519.9
D	517 989.8	303 922.1	95 243.5	108 347.9	6 611.0	514 124.4	175 889.5	172 024.2	3 865.4
EL	32 984.3	:	:	:	:	35 973.6	7 284.8	10 274.1	- 2 989.3
E	162 178.0	95 963.2	28 137.2	39 843.9	- 1 106.8	162 837.5	47 905.7	48 565.2	- 659.5
F	357 691.0	196 766.8	83 792.0	69 811.5	- 561.1	349 809.2	99 334.5	91 452.6	7 881.9
IRL	:	:	:	:	:	:	:	:	:
I	301 669.6	189 432.5	49 661.9	53 486.9	2 767.3	295 348.6	85 600.3	79 279.2	6 321.0
L	:	:	:	:	:	:	:	:	:
NL	102 379.0	51 807.0	23 880.0	20 973.0	834.0	97 494.0	67 074.0	62 189.0	4 885.0
А	53 522.4	30 354.2	10 134.0	12 375.2	1 486.9	54 350.4	26 888.4	27 716.3	- 828.0
Р	:	:	:	:	:	:	:	:	:
FIN	32 899.7	17 185.1	7 550.0	6 916.2	- 1 421.2	30 230.1	12 779.9	10 110.3	2 669.7
S	55 034.7	28 196.9	14 635.5	9 468.7	- 501.8	51 799.3	25 391.9	22 156.4	3 235.5
UK	401 124.9	267 607.7	76 126.5	67 313.2	1 813.0	411 047.4	104 733.1	116 468.6	- 11 735.5

: Data not available.

Т3 GDP AND GROSS VALUE ADDED BY INDUSTRY

EURO-ZONE, EU-15 AND EU MEMBER STATES

t/t-4 Percentage change over the same quarter of the previous year - non seasonally adjusted - at constant prices (1995)

		GD	P		Agric	Agriculture, hunting and fishing			Industry, incl. Energy Construction				Trade, transport and communication services			Business activities and financial services				Other services				Total Gross Value Added								
	2000		2001		2000	2000 2001 2		2000		2001		2000		2001		2000	000 2001		2000 2001			2000 2001			2000		2001					
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
euro-zone	2.3	2.3	1.6	1.4	-1.2	0.6	-0.2	0.0	3.5	3.3	1.4	0.7	0.1	-1.6	-1.3	-1.1	3.4	3.7	2.8	2.6	3.6	3.2	3.0	2.8	1.3	1.3	1.3	1.5	2.7	2.6	1.9	1.7
EU-15	2.4	2.3	1.7	1.5	-1.2	0.1	0.5	0.2	3.2	2.9	1.2	0.5	0.3	-1.6	-1.2	-1.1	3.5	3.7	2.9	2.7	3.9	3.7	3.7	3.5	1.4	1.3	1.4	1.6	2.8	2.7	2.1	1.9
EU MEMBE	R STA	TES															•															
в	2.9	1.8	1.4	0.7	-2.5	0.0	0.1	-1.1	2.4	2.3	-0.1	-0.6	5.9	1.8	1.6	-2.1	3.2	-0.6	0.2	0.6	5.0	5.8	5.8	3.6	1.7	0.8	1.2	-0.2	3.2	2.3	1.9	0.8
DK	2.7	2.0	0.9	1.2	-5.3	4.7	6.4	4.6	5.6	3.5	-0.4	0.6	-2.9	-5.1	-8.6	-1.5	2.5	-1.1	-1.0	0.3	8.8	8.9	5.6	3.0	0.7	1.4	1.5	2.8	3.6	2.8	1.2	1.7
D	1.5	1.4	0.6	0.3	-0.2	0.0	0.3	0.7	3.8	3.4	1.0	-1.2	-6.0	-9.9	-7.0	-5.3	3.2	3.4	2.4	2.4	3.5	2.9	2.6	2.7	0.8	0.4	0.1	0.4	2.4	1.9	1.1	0.8
EL	5.0	6.1	4.9	4.5	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Е	2.8	3.7	2.2	2.6	2.3	3.7	-1.5	-0.7	2.5	2.0	1.3	1.8	6.0	5.8	5.7	5.2	3.9	5.6	3.0	2.6	4.1	4.7	4.5	4.0	2.5	2.0	2.8	4.1	3.5	3.8	2.8	3.1
F	2.9	2.7	2.2	2.0	-1.3	-1.8	-1.6	-1.5	2.9	2.6	2.3	2.2	2.5	2.4	0.1	1.3	3.4	4.1	2.8	2.0	2.9	2.8	2.7	2.7	2.2	2.1	1.5	1.8	2.7	2.7	2.1	2.1
IRL	12.1	12.7	9.2	:	:	:	:	:	:	:	:	:	:	:	:	:	i :	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
I	2.2	2.5	2.1	2.1	-5.5	3.4	-1.1	-1.2	2.9	3.8	2.1	3.8	1.7	2.7	2.6	1.8	3.3	3.2	4.1	4.0	4.5	3.7	3.2	2.9	0.1	0.5	0.9	0.7	2.5	3.0	2.6	2.8
L	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
NL	2.2	1.4	1.4	0.8	1.5	-6.4	-3.1	-0.7	1.8	0.8	1.0	-1.2	-0.1	-1.1	-0.9	2.5	3.2	2.8	1.7	1.0	3.0	1.9	1.9	1.0	1.4	2.8	2.8	2.6	2.3	1.7	1.6	0.9
Α	2.0	2.7	1.0	0.7	0.7	0.3	0.6	2.0	5.4	5.1	1.5	0.9	-0.5	0.3	-1.8	-3.9	2.8	2.8	1.5	0.8	3.2	0.3	0.9	0.6	1.8	0.9	0.5	0.9	3.0	2.3	0.9	0.4
Р	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
FIN	5.4	3.6	0.4	0.0	0.1	2.8	-3.7	-7.4	12.8	7.7	-2.5	-3.0	0.5	1.2	-0.3	-2.0	4.3	2.9	1.9	1.9	5.2	2.9	4.2	3.4	1.9	1.5	1.7	1.8	6.2	4.1	0.7	0.0
s	2.4	2.3	1.1	0.4	-0.5	-1.9	-0.5	0.9	3.8	3.7	-0.9	-1.1	2.2	6.3	4.8	2.4	2.2	1.8	0.2	1.3	3.9	3.5	2.0	0.5	1.3	1.3	1.9	1.0	2.7	2.6	1.0	0.5
UK	2.7	2.2	3.0	2.3	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:

: Data not available.

Differences between GDP and GVA growth rates are attributable to the other two components of GDP: Taxes less subsidies on production and FISIM.



6



T4

Т

GDP AND GROSS VALUE ADDED BY INDUSTRY

EURO-ZONE, EU-15 AND EU MEMBER STATES

levels Third quarter 2001 - in millions of euro - non seasonally adjusted - at current prices

	GDP	Agriculture, hunting and fishing	Industry, incl. Energy		Trade, transport and communication services	Business activities and financial services	Other services	Total Gross Value Added	Taxes less subsidies on products	FISIM
euro-zone	1 684 554.6	41 709.7	339 658.7	87 906.5	341 185.2	425 518.9	327 345.5	1 563 324.5	175 926.4	54 696.3
EU-15	2 185 563.8	47 994.1	437 728.8	109 751.6	453 672.6	547 600.7	427 839.6	2 024 587.5	233 357.7	72 381.4
EU MEMBER	STATES				•	•	•			
В	61 777.0	879.0	11 960.0	2 768.0	11 569.0	16 782.0	13 499.0	57 457.0	6 545.0	2 225.0
DK	44 951.3	981.4	8 402.5	1 892.1	9 264.7	9 164.4	10 595.6	40 300.5	6 040.4	1 389.5
D	517 989.8	5 839.0	119 269.1	24 818.1	88 203.0	144 358.2	101 225.6	483 712.8	51 681.4	17 404.4
EL	32 984.3	:	:	:	:	:	:	:	:	:
E	162 178.0	4 210.6	29 820.3	13 619.7	45 170.0	29 843.3	30 786.3	15345:6	14 807.8	6 079.9
F	357 691.0	9 562.2	66 183.5	15 400.7	60 628.3	100 196.3	76 089.2	328 060.1	38 439.0	8 808.2
IRL	:	:	:	:	:	:	:	:	:	:
I	301 669.6	11 261.7	59 545.7	13 816.3	73 256.4	74 716.6	49 273.4	28187:3	30 600.3	10 800.7
L	:	:	:	:	:	:	:	:	:	:
NL	102 379.0	3 319.0	17 598.0	5 112.0	21 409.0	25 021.0	21 804.0	94 263.0	11 345.0	3 229.0
A	53 522.4	1 196.4	11 690.4	4 303.0	11 837.6	11 061.7	10 126.8	50 215.9	5 750.1	2 443.6
Р	:	:	:	:	:	:	:	:	:	:
FIN	32 899.7	949.6	7 363.6	1 727.0	6 391.3	6 363.9	6 500.5	29 295.8	4 420.2	816.2
S	55 034.7	862.7	10 623.1	2 166.3	10 523.9	12 454.8	13 820.2	50 451.0	5 894.2	1 342.3
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