ASSESMENT OF BREAK IN LABOUR FORCE SURVEYS' TIMESERIES DUE TO THE IESS

Labour Statistics Section, Hellenic Statistical Authority

The adoption of the new Framework Regulation of Social Statistics (EU 2019/1700, IESS) and the Implementing Regulation (EE) 2019/2240 for the Labour Force Survey, introduce important changes in the survey methodology from 1st January 2021.

The main changes concern:

- Data collection (general use of computer-aided interviews)
- The formulation of questions related to the employment status of respondents during the reference week (due to the adoption of a model questionnaire prepared by Eurostat)
- The computation of the weighting factors
- The definition of employment status due to the implementation of the 19th ICLS resolution and, in particular, the treatment of person reporting having a job during but not working even for one hour.

All these changes are likely to have an effect on survey estimates – an effect that will not reflect changes in the labor market but changes in the way data is collected and estimates are generated. As a result, it is expected that there can be a break in the Labor Force Survey's estimates in the 1st quarter 2021.

Pursuant to Article 10 of Commission Implementing Regulation (EU) 2019/2240 of 16 December 2019, Member States were required to transmit to Eurostat by 31 December 2021 backwards calculated break-free time series covering the period from the first quarter of 2009 to the fourth quarter of 2020 and the employment and unemployment levels (in thousands) by sex and age groups 15-24, 25-64, 65+ years and, for employment only, the age group 20-64 years. In addition, for the analysis of the impact of the changes of the new Regulation and mainly of the change of the definition of the employment status, a pilot survey was carried out for the reference year 2020 with funding from Eurostat (Grant Agreement-878526-2019-EL-LFS).

In the following chapters we present the evaluation by ELSTAT of the effect of the new regulation in the LFS results and the back-calculated break-free time series. In particular, we present:

- A review of the main changes in Greek Labour Force Survey due to the adoption of the IESS
- The results of the Pilot Survey and comparison with Labour Force Survey estimations
- A methodology for assessing the effect of the new regulation in the LFS results
- The resulting break-free series for the number of employed and unemployed by sex and age-group for the period 2009 – 2020

1. Review of the main changes in Greek Labour Force Survey due to the adoption of the IESS

The adoption of IESS introduced changes, concerning the data collection method, the survey questionnaire, the method of generating estimates and the definitions used (see Table 1).

Table 1. Changes I Greek Labour Force Survey since 2021

	Up to 2020	**2021 onwards**
Data collection	Paper questionnaires	By electronic means (CAPI)
Questionnaire	The number of the surveyed characteristics and the relevant questions remained the same for every quarter of the year.	The number of the surveyed characteristics and the relevant questions changes every quarter. For specific characteristics, only annual estimates are produced.
Definition of employed	Population: Persons aged 15 years and over. Persons who reported that they did not work in the reference week but had a job from which they were temporarily absent are classified as employed, except in the following cases: • Employees who are non-active, are absent for more than 3 months and receive less than 50 % of their salary. • Employees who are absent from work due to seasonality. Self-employed persons are employed in all cases (including family workers).	Population: Persons aged 15-89 years. Persons who reported that they did not work in the reference week but had a job from which they were temporarily absent are considered to be employed only if the duration of their absence is less than 3 months or if they continue to receive income from their work. • Sick leave, maternity/paternity leave, and educational leave are excluded, and in these cases, persons are classified as employed. Seasonal workers, regardless of professional status, who reported that they did not work in the reference week but had a job from which they were temporarily absent due to seasonality are considered to be employed only if they perform tasks related to their work (e.g. renovation, business trip) excluding legal or administrative obligations.
Weighting	Population adjustment according to sex, age and NUTS-2 Region.	Sample weights are applied for all members of the same household and in addition the results of the survey are now reduced to the estimated number of households in the country.

It should be noted that the above changes differ in terms of their expected impact on survey results, but also in the extent to which it is possible to estimate this impact.

For example, the effect of change in the way weights are calculated can be accurately calculated since we can apply both weighting methods estimate the exact differences that arise. It is also possible to apply the new weighting retrospectively to the data of previous years and to have revised break-free timeseries (in terms of this change).

Other changes, however, do not offer this possibility. For example, it is not possible to estimate the effect of the change in the frequency of data collection for certain variables, or the transition from PAPI to CAPI.

Finally, there are changes - and in particular those relating to changes in questions about having a job during the reference week - that we can **partially** assess their impact, as the survey questions up to 2020 allow us to classify a large percentage of people as employed or unemployed according to **the new definitions**.

2. Results of the Pilot Survey and comparison with Labour Force Survey estimations

During the 1st and 4th quarters of 2020, the Labor Department carried out a pilot survey, using the new questionnaire, with expected sample size similar to the sample size of a wave of the normal survey (that is, 1/6 of the quarterly sample). The pilot survey's sample was allocated in the same final strata and the same reference weeks as the normal survey.

The aim of the pilot was to test the new questionnaire and to identify any errors in its design, as well as in the data entry programs. It also aimed to generate estimates based on the new methodology and compare them

with the estimates of the respective quarterly estimates of the 1st and 4th quarter of 2020, in order to assess the overall impact of the changes on the survey estimates.

The pilot was implemented with quite significant problems due to the COVID pandemic. In particular, the survey in the first quarter of 2020 coincided with the onset of the pandemic which reduced the response to only 39% of the planned sample (from an initial sample of 4610 households, only 1799 households responded to the pilot survey). In addition, the response rate varied significantly by region and as a result the final sample could not be considered representative of the population. Therefore, the results of the first quarter of 2020 pilot cannot be used to produce reliable estimates.

The pilot in the 4th quarter had better results: the response rate increased to 56% (2579 households responded from a planned sample of 4610 households) while the distribution of the final sample by region was more satisfactory. The sample is equal to half a 1st wave (based on the actual sample sizes of 2017 and 2018) and satisfies the Eurostat requirement for a pilot sample equal at least to half a wave of the quarterly survey.

In the next table we present the results of the pilot survey, the actual results of the LFS for the 4th quarter of 2020 and the results that would be produced for the 4th quarter of 2020 if we would use only the first wave sample of the normal survey ("first wave" results). We should note that these “first wave” results are in principle more comparable to the pilot results because they are produced by a sample of similar size and similar survey condition (first contact interviews),

In the first column of Table 2 we have the estimated characteristic (the 14 characteristics for which break-free time series are needed). In the second column we have the estimate that is produced bases on the first wave sample, in the third column the quarterly estimate and in the third column the pilot estimate. The two final columns present the difference between the “first wave” and the pilot estimate from the quarterly estimate.

Table 2. Comparison of the pilot, 1st wave and quarterly estimate for the 4th quarter 2020

	Estimate based on 1st wave of LFS (2020 4th quarter)	Full sample estimate (2020 4th quarter)	PILOT ESTIMATE	Difference in the estimate	
				1st wave/quarter	Pilot/quarter
Employed females 15-24 years old	52.2	58.8	43.3	-11.2%	-26.3%
Employed females 20-64 years old	1,661.8	1,612.2	1,628.4	3.1%	1.0%
Employed females 25-64 years old	1,612.5	1,555.4	1,588.3	3.7%	2.1%
Employed females 65 years old or more	21.0	30.9	28.1	-32.0%	-9.2%
Employed males 15-24 years old	71.5	78.6	77.5	-9.1%	-1.4%
Employed males 20-64 years old	2,143.2	2,157.4	2,129.7	-0.7%	-1.3%
Employed males 25-64 years old	2,076.0	2,088.9	2,065.1	-0.6%	-1.1%
Employed males 65 years old or more	50.5	65.8	53.2	-23.2%	-19.2%
Uneployed females 15-24 years old	40.3	36.7	42.6	9.7%	16.0%
Uneployed females 25-64 years old	316.9	369.1	312.5	-14.1%	-15.3%
Unemployed females 65 years old or more	0.0	2.8	3.5	-100.0%	25.6%
Uneployed males 15-24 years old	56.8	38.4	30.1	47.9%	-21.8%
Uneployed males 25-64 years old	252.2	296.1	256.1	-14.8%	-13.5%
Unemployed males 65 years old or more	5.0	7.1	9.6	-28.9%	36.1%

The absolute percentage difference between pilot and quarterly estimates varies from 1.0% – 36.1%. As expected, the absolute difference is directly related to the magnitude of the estimated characteristic. Pilot estimates are lower the quarterly estimates for 9 of the 14 characteristics.

It should be noted that similar differences occur between the quarterly estimates and the estimates resulting from the "first wave" estimates. In other words, we find that the estimates that come from a survey with the exact same methodology, but smaller sample size have a similar (or even larger) deviation from the quarterly estimates, as the pilot.

If we repeat the same procedure for the results of the previous quarters - that is, if we compare the first wave with quarterly estimated for the time period 2017-2019 – we have the results of the following table:

Table 3. Comparison of 1st wave and quarterly estimates fo2017 – 2019

Employed	2017a	2017b	2017c	2017d	2018a	2018b	2018c	2018d	2019a	2019b	2019c	2019d	2020d	PILOT
Female 15-24	-4.1%	36.8%	-4.5%	7.7%	13.9%	38.7%	-5.7%	43.6%	35.3%	34.0%	29.0%	3.9%	-11.2%	-26.3%
Female 20-64	0.5%	3.2%	-1.8%	-0.4%	1.6%	2.9%	-0.8%	0.1%	4.9%	3.4%	0.9%	0.9%	3.1%	1.0%
Female 25-64	1.1%	1.8%	-1.8%	-0.7%	1.2%	1.5%	-0.5%	-1.3%	3.4%	2.1%	-0.3%	0.7%	3.7%	2.1%
Female 65+	8.8%	-19.9%	-32.3%	-29.3%	16.8%	-27.0%	6.7%	-30.6%	8.5%	-37.5%	-3.2%	-11.3%	-32.0%	-9.2%
Male 15-24	20.9%	1.0%	16.7%	4.2%	23.9%	14.1%	13.0%	9.1%	19.6%	34.0%	7.9%	12.7%	-9.1%	-1.4%
Male 20-64	-1.9%	0.6%	3.0%	-0.1%	2.4%	1.2%	2.1%	-4.5%	0.6%	2.3%	-1.0%	-2.1%	-0.7%	-1.3%
Male 25-64	-2.4%	0.5%	2.7%	-0.2%	1.7%	0.6%	1.9%	-4.8%	0.3%	1.2%	-1.0%	-2.3%	-0.6%	-1.1%
Male 65+	-25.1%	-20.4%	-13.5%	9.6%	-23.2%	-3.5%	10.0%	-10.4%	-3.6%	-15.3%	4.0%	-8.5%	-23.2%	-19.2%
Unemployed	**2017a**	**2017b**	**2017c**	**2017d**	**2018a**	**2018b**	**2018c**	**2018d**	**2019a**	**2019b**	**2019c**	**2019d**	**2020d**	**PILOT**
Female 15-24	50.1%	-20.2%	-30.7%	32.7%	7.1%	-1.7%	25.8%	-32.5%	8.4%	5.5%	-5.3%	12.2%	9.7%	16.0%
Female 25-64	-9.3%	-4.2%	-7.3%	-1.7%	0.3%	-2.9%	2.4%	-5.2%	-7.5%	-13.1%	-2.1%	-6.2%	-14.1%	-15.3%
Female 65+	-64.7%	31.8%	-100.0%	-31.2%	71.9%	-15.9%	-48.2%	-66.3%	16.3%	-35.6%	-100.0%	87.3%	-100.0%	25.6%
Male 15-24	0.7%	3.0%	6.2%	24.4%	32.3%	-18.4%	0.0%	32.2%	-2.1%	21.8%	23.6%	11.0%	47.9%	-21.8%
Male 25-64	6.6%	-10.6%	-12.7%	-6.7%	-8.6%	-3.2%	-8.7%	13.4%	1.1%	1.3%	-3.6%	22.9%	-14.8%	-13.5%
Male 65+	-31.9%	27.5%	5.6%	-18.1%	-11.9%	68.2%	2.3%	3.3%	-27.6%	-41.8%	-67.3%	12.1%	-28.9%	36.1%

We observe that the difference between pilot and quarterly estimates are of similar magnitude, and in many cases smaller, than the difference between "first wave" and quarterly estimates. We also observe that the deviations of the "1st wave" estimates from the quarterly estimates are often large with no evident pattern other than the fact that are larger for the estimates of unemployed. Taking into account the above results, it becomes clear that is not safe to use the results of the pilot to assess the impact of the changes introduced by the new regulation.

3. Assessment of the impact of the changes in Labour Force Survey methodology on the quarterly results 2009 – 2020.

3.1 Impact of the change in the weighting procedure

As already mentioned, the impact of the change in the weighting method (from post-stratification to calibration) can be accurately computed for all quarters in the time period 2009-2020 since all the necessary data are available.

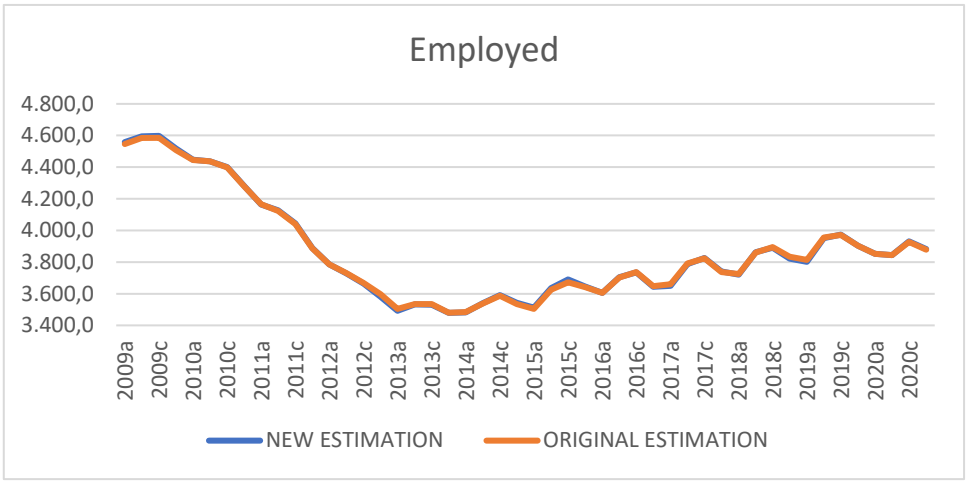
The results of the new weighting method for the 14 characteristics defined in the implementing regulation are presented in Table 4.

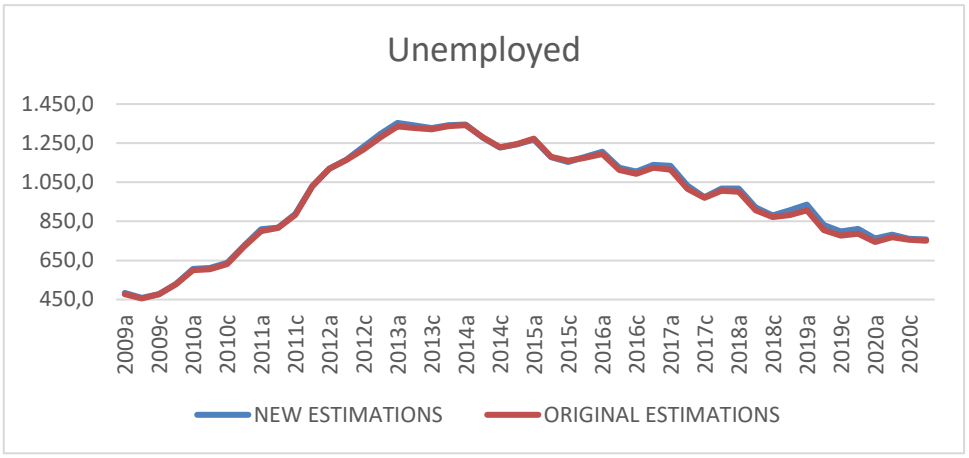
Table 4. Quarterly estimates of employment and unemployment with new and previous weighting procedure

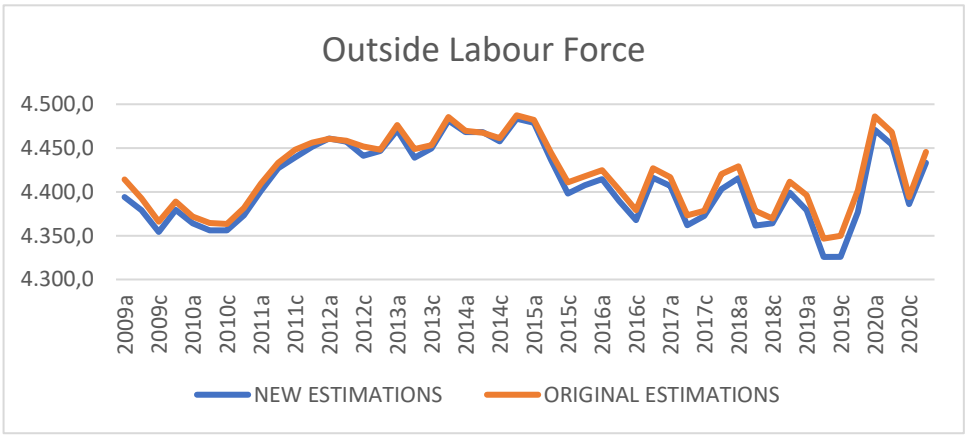
	NEW ESTIMATES (calibration)			INITIAL ESTIMATES (post-statification)			% DIFFERENCE (NEW/INITIAL)		
QUARTER	EMPLOYED	UNEMPLOYED	OUTSIDE LABOUR FORCE	EMPLOYED	UNEMPLOYED	OUTSIDE LABOUR FORCE	EMPLOYED	UNEMPLOYED	OUTSIDE LABOUR FORCE
2009a	4557.9	484.5	4394.0	4545.6	476.7	4414.1	0.3	1.6	-0.5
2009b	4595.3	458.6	4378.9	4584.6	455.6	4392.5	0.2	0.7	-0.3
2009c	4597.9	477.1	4354.3	4585.2	477.9	4366.1	0.3	-0.2	-0.3
2009d	4517.0	529.8	4379.3	4508.6	528.6	4388.9	0.2	0.2	-0.2
2010a	4448.0	606.1	4364.0	4446.0	600.2	4371.8	0.0	1.0	-0.2
2010b	4437.1	612.4	4355.9	4436.5	604.6	4364.3	0.0	1.3	-0.2
2010c	4399.9	637.2	4356.0	4398.0	631.9	4363.2	0.0	0.8	-0.2
2010d	4281.4	726.3	4373.3	4278.5	720.8	4381.8	0.1	0.8	-0.2
2011a	4164.2	809.3	4400.9	4165.5	799.6	4409.3	0.0	1.2	-0.2
2011b	4128.0	818.2	4426.9	4124.2	815.6	4433.3	0.1	0.3	-0.1
2011c	4045.0	887.7	4439.5	4040.8	883.5	4448.0	0.1	0.5	-0.2
2011d	3888.5	1031.5	4451.6	3886.9	1028.6	4456.2	0.0	0.3	-0.1
2012a	3784.5	1119.2	4460.9	3785.0	1119.1	4460.6	0.0	0.0	0.0
2012b	3728.0	1166.0	4457.2	3729.9	1163.0	4458.2	-0.1	0.3	0.0
2012c	3664.7	1232.0	4441.3	3668.0	1218.4	4451.7	-0.1	1.1	-0.2
2012d	3580.5	1298.2	4446.6	3597.0	1279.9	4448.3	-0.5	1.4	0.0
2013a	3492.8	1353.5	4470.3	3504.2	1336.0	4476.3	-0.3	1.3	-0.1
2013b	3533.0	1339.8	4438.9	3535.0	1327.9	4448.8	-0.1	0.9	-0.2
2013c	3530.7	1326.9	4449.5	3533.7	1320.3	4453.1	-0.1	0.5	-0.1
2013d	3479.0	1342.3	4481.4	3479.9	1337.2	4485.6	0.0	0.4	-0.1
2014a	3482.2	1345.4	4468.3	3483.7	1342.3	4469.8	0.0	0.2	0.0
2014b	3540.1	1278.3	4468.2	3539.1	1280.1	4467.4	0.0	-0.1	0.0
2014c	3591.8	1228.2	4457.5	3586.9	1229.4	4461.2	0.1	-0.1	-0.1
2014d	3541.8	1243.3	4483.5	3535.3	1245.9	4487.4	0.2	-0.2	-0.1
2015a	3511.8	1268.6	4478.7	3504.4	1272.5	4482.2	0.2	-0.3	-0.1
2015b	3635.8	1177.8	4437.0	3625.5	1180.1	4445.0	0.3	-0.2	-0.2
2015c	3690.9	1153.3	4398.1	3671.1	1160.5	4410.7	0.5	-0.6	-0.3
2015d	3646.4	1180.1	4407.5	3641.7	1174.7	4417.8	0.1	0.5	-0.2
2016a	3604.8	1206.8	4414.7	3606.3	1195.1	4424.9	0.0	1.0	-0.2
2016b	3703.7	1123.7	4389.8	3702.6	1112.1	4402.5	0.0	1.0	-0.3
2016c	3735.4	1105.0	4367.9	3736.7	1092.6	4379.0	0.0	1.1	-0.3
2016d	3644.7	1138.8	4415.9	3648.6	1124.0	4426.9	-0.1	1.3	-0.2
2017a	3649.8	1134.1	4406.7	3659.3	1114.7	4416.7	-0.3	1.7	-0.2
2017b	3786.5	1033.1	4361.8	3791.4	1016.6	4373.4	-0.1	1.6	-0.3
2017c	3826.6	973.2	4372.5	3823.7	970.1	4378.5	0.1	0.3	-0.1
2017d	3741.9	1018.2	4403.2	3736.3	1006.8	4420.2	0.1	1.1	-0.4
2018a	3720.5	1017.9	4415.6	3723.8	1001.2	4429.1	-0.1	1.7	-0.3
2018b	3861.3	921.9	4361.5	3860.4	906.0	4378.3	0.0	1.8	-0.4
2018c	3891.6	879.7	4364.2	3894.2	871.8	4369.5	-0.1	0.9	-0.1
2018d	3821.3	906.0	4399.1	3833.7	881.1	4411.6	-0.3	2.8	-0.3
2019a	3802.3	936.1	4378.9	3814.0	907.1	4396.2	-0.3	3.2	-0.4
2019b	3950.8	831.3	4325.9	3956.4	805.0	4346.6	-0.1	3.3	-0.5
2019c	3974.2	798.9	4325.8	3971.9	777.0	4350.0	0.1	2.8	-0.6
2019d	3902.3	810.8	4376.9	3901.8	786.4	4401.7	0.0	3.1	-0.6
2020a	3851.3	761.8	4470.8	3852.6	745.1	4486.1	0.0	2.2	-0.3
2020b	3844.8	781.6	4454.1	3844.0	768.3	4468.2	0.0	1.7	-0.3
2020c	3931.0	760.4	4385.9	3926.8	756.4	4394.1	0.1	0.5	-0.2
2020d	3883.4	757.6	4433.3	3878.5	750.1	4445.6	0.1	1.0	-0.3

In the case of employed the observed differences are small. More important are the differences in the estimation of unemployed where we see cases that the number of unemployed is higher more than 2% (and up to 3.3%. The number of persons outside labour force decreases in almost all cases – but no more than 1%.

Graph 3. Estimated number of employed, unemployed and persons outside labour force, bases on the previous and new weighting method







3.2 Effect of the changes in the questionnaire and the definition of employment

3.2.1 Classification in professional status

After computing new weighting factors for the time period 2009-2020 we have to estimate the quarterly results (for the characteristics defined in the implementing regulation) using the new definition of IESS.

As already mentioned, the main differences in the new regulation are:

- The treatment of persons reporting that did not work even one hour during reference week but they a job from which they were absent
- The inclusion of a new question about having a casual job during reference week

In the new Greek LFS, respondents are classified as employed or not according to their answers in a series of questions (Table 3.2.1.1):

Table 3.2.1.1 Questions defining employment during reference week (according to IESS)

Question	Answer	Classification/Flow
Q_B1. Did you work even for one hour as employee or self-employed during the reference week-that is from Monday [date] to Sunday[date]?	Yes	Employed
	No	Q_B2
Q_B2. from Monday the [date] to Sunday the [date], have you done any unpaid work for a business owned by a family member?	Yes	Employed
	No	Q_B3
Q_B3. You told us that you did not work even one hour during the reference week. Did you have a job as employee of self-employed from which you were absent?	Yes	Q_B5
	No	Q_B4
Q_B4. Did you work from Monday [date] to Sunday[date] in some casual of small job like, for example, babysitting, through an Internet platform, in a temporary agricultural work, etc?	Yes	Employed
	No/No answer	Not Employed
Q_B5. What was the reason you did not work at all from Monday [date] to Sunday[date]?	See Table 6	
Q_B6. Are you entitled in any work-related income (salary, benefit, etc.) during your absence from your job?		
Q_B7. Do you continue to perform some tasks or duties for the job or business during the off-season?		
Q_B8.In total, how long do you expect to be absent from work?		

Persons that report to have a job, but did not worked even for one hour during the reference week, are asked the reason that they were absent (Q_B5). Depending on the reason, they may be asked in questions about the duration of the absence or whether they still have an income from this job. Table 3.2.1.2 presents the classification of these persons as employed or not, depending on their answer to the relevant questions.

Table 3.2.1.2 Classification in employment of persons reporting absence from their job during the reference week (according to IESS)

REASON OF ABSENCE (Q_B5)	WORK-RELATED INCOME (Q_B6)	TOTAL EXPECTED DURATION OF ABSENCE LESS THAN 3 MONTHS (Q_B8)	PERFORMING WORK-RELATED DUTIES (Q_B7)	CLASSIFICATION
Holidays	-	-		Employed
Working time arrangements or compensation of overtime	-	-		Employed
Sick leave	-	-		Employed
Maternity or paternity leave	-	-		Employed
Job related training	-	-		Employed
Parental leave	YES			Employed
	NO	YES		Employed
		NO		Not employed
Off season	-	-	YES	Employed
	-	-	NO	Not employed
Lay-off	-	YES		Employed
	-	NO		Not employed
Other reason	-	YES		Employed
	-	NO		Not employed
Do not know/do not answer	-	YES		Employed
	-	NO		Not employed
Has a job but did not start working	-	-		Not employed

We should not that the new survey differs in several points from the old one (LFS up to 2020)

1. Up to 2020, self-employed and members of the family business were considered employed **regardless the reason of absence**.
2. Up to 2020, employees that did not work during the reference week due to seasonality were considered as not employed.
3. The question about the reason for not working in the reference week included different answer categories which do not correspond to the answer categories of the similar questions in the new survey.

Due to these differences, it is not possible to classify as employed (or not) all the persons that answered to the LFS questionnaire up to 2020, using the current definition of employment. Depending on the answers provided in questions E1 to E13 (of the previous survey) we have the situation described in Table 3.2.1.3:

Table 3.2.1.3 Classification of persons responding in LFS up to 2020 as employed or not according to the new definition of employment

RESPOND TO SURVEY QUESTIONS UP TO 2020			CLASSIFICATION UP TO 2020		CLASSIFICATION FROM 2021 ONWARDS
Worked during reference week (E1 = 1 ή E2 = 1)			Employed		Employed
	Reason of absence (Answer to E4 or E6)	**(Code in E4 or E6)**			
Self employed/ family workers that did not work during reference week but report a job (E3 = 1 ή E5 = 1)	Weather conditions	0	Employed		Not possible
	Business or profession are seasonal	1	Employed		Not possible
	Technical or economic reasons	2	Employed		Not possible
	Labour dispute (strike, lock-out, etc.)	3	Employed		Not possible
	Education (General or professional)	4	Employed		Not possible
	Due to sickness, injury, temporary inability	5	Employed		Employed
	No customers	6	Employed		Not possible
	Holidays	7	Employed		Employed
	Other reason (e.g. family responsibilities)	8	Employed		Not possible
Employees that did not work during reference week but report a job (E7 = 1)	Off season	E8 = 1	Not Employed		Not possible
	Due to sickness, injury, temporary inability	E9 = 0	Employed		Employed
	Pregnancy leave	E9 = 1	Employed		Employed
	Lay-off	E9 = 2	Employed (Av E10 = 1 ή E11 = 1)	E10 = 2, 3	Not Employed
			Not Employed (E10 <> 1 & E11 <> 1)	E10 = 1	Not possible
	Technical or economic reasons	E9 = 3	Employed	E10 = 2, 3	Not Employed
				E10 = 1	Not possible
	Labour dispute (strike, lock-out, etc.)	E9 = 4	Employed	E10 = 2, 3	Not Employed
				E10 = 1	Not possible
	Education (General or professional)	E9 = 5	Employed	E10 = 2, 3	Not Employed
				E10 = 1	Not possible
	Leave, absence, holidays	E9 = 6	Employed		Employed
	Compensation leave	E9 = 7	Employed		Employed
	Parental leave	E9 = 8	Employed	E11 = 1, 2	Employed
				E11 = 3, 4	Not Employed
				E11 = Blank	Not possible
	Other reasons, e.g. family responsibilities	E9 = 9	Employed	E10 = 2, 3	Not Employed
				E10 = 1	Not possible

E10: How long are you absent from work?;
1:Up to 3 months 2: More than 3 months 3: Did not answer
E11: Are you still receiving your salary/wage, despite your absent from work?
1: Still receives 50% or more of salary 2: Still receives less than 50% of salary 3: Do not receive any salary/wage 4: No answer

3.2.1 Estimation of persons that are not employed though they reported absence from a job during the reference week

In order to deal with the issue of persons that cannot be classified as employed or not according to their answers in questions E1 – E11 (in the previous quarters) we apply the following steps:

Using the results of the 1st quarter 2021 we can estimate the percentage of persons that **are not** classified as employed though they report having a job.

This percentage is expressed as $\sigma = \frac{persons\ reporting\ absence\ from\ and\ not\ employed}{all\ persons\ reporting\ absence\ from\ job}$.

We compute the corresponding percentages $\sigma_1, \sigma_2, \ldots, \sigma_n$, for every combination of professional status, sex, age group and reason for being absent from work. The detailed categories for the above characteristics are:

professional Status (3 categories)	*Self-employed, employees, family workers*
Sex (2 categories)	*Male, Female*
Age group (13 categories)	*15-19,20-24,25-29,30-34,35-39,40-44,45-49,50-54,55-59,60-64,65-69,70-74,75-89*
Reason of absence (8 categories)[1]	*Holidays, Compensation leave, Working time arrangements, Sick leave, Maternity/Paternity leave, Parental leave, Seasonal work, Lay-Off, Other reason*

There are 624 possible combinations in total. If there are no observations of a certain combination, the categories are collapsed in order to have a coefficient for all persons.

Then, for all previous quarters, we compute the following quantities:

E1 = Number of persons that report they worked even for 1 hour during the reference week

E2 = Number of persons that report not having work during the reference week but had a job, and we can classify them as employed according the IESS definitions using the information collected in the previous survey

E3 = Number of persons that report not having work during the reference week but had a job, and we cannot classify them as employed according the IESS definitions using the information collected in the previous survey

Next, we break down E3 in *E3_1, …E3_n* subsets, by professional status, sex, age group and reason for being absent from work and apply to each subset the corresponding coefficient $\sigma_1, \sigma_2, \ldots, \sigma_n$ than resulted from 1st quarter 2021 survey results .

Finally, the number of employed is computed as:

$$E1 + E2 + E3 - (E3\_1*\sigma_1 + E3\_2*\sigma_2 + \ldots + E3\_n*\sigma_n) \quad \textbf{(1)}$$

3.2.2 Estimation of persons working in casual jobs

In the new survey, there are respondents who are classified as employed after answering that they had a casual/small job (Question Q_B4 in the Greek questionnaire). Respondents are asked this question if they have previously reported that did not work during the refence week and did not have a job from which they were absent. There was no such question in the previous survey.

We estimate the percentage *s* of these persons from the results of 1st quarter 2021 as:

$$s = \frac{persons\ reporting\ a\ casual\ job}{persons\ not\ having\ work\ and\ not\ being\ absent\ from\ a\ job}$$

Next, we compute the corresponding percentages by age group and sex $s_1, s_2, \ldots, s_n$.

[1] The categories are 8 (and not 10 as defined in IESS) because only these can be reconstructed from the information collected in the survey up to 2020

For each previous quarter, we compute for every combination of age group and sex the number of persons that do not report a work and do not report absence from work $A_1, A_2, \ldots A_n$.

We estimate the number of persons that would report a casual job (if were asked) as

$$A_1 * s_1 + A_2 * s_2 + A_n * s_n \qquad \textbf{(2)}$$

Finally, taking in to account a) the estimated number of persons that are not considered employed though they report being absent from a job and b) the estimated number of persons that have a casual job, we compute the revised number of employed by summing the results from (1) and (2).

3.2.3 Estimation of the number of unemployed

In the new survey there are persons that are classified as unemployed even though they have stated that they had a job from which they were absent (and according to the previous definitions were considered employed – for example, self-employed).

We estimate the percentage of these persons using the results of 1st quarter 2021 as:

$$u = \frac{person\ reportin\ have\ a\ job\ form\ which\ they\ were\ absent\ and\ are\ unemployed}{person\ reportin\ have\ a\ job\ form\ which\ they\ were\ absent}$$

Then, we compute the corresponding percentages for all combination of age group and sex $u_1, u_2, \ldots, u_n$.

For each previous quarter, we use the estimated number of persons that report absence from work but are not classified as employed (that is the numbers τα $E3\_1*\sigma_1$, $E3\_2*\sigma_2$, …, $E3\_n*\sigma_n$ in relation (1) above) and for every combination of age group and sex, we estimate the additional unemployed as

$$U\_add = E3\_1*\sigma_1*u_1 + E3\_2*\sigma_2*u_2 + \ldots + E3\_n*\sigma_n*u_n$$

4. Revision results

4.1 Analysis of resutls

During 2009-2019, the revision changes the initial results for employed from -1.2% to 0.4%. The average rate of change is -0,4%. We can see that the effect shows seasonality (average change -0.9% for the 1st quarter, -0.2% for the second, -0.1% for the third and -0.5% for the forth).

In the 4 quarters of 2020, the revisions are larger – an expected result due to the COVID pandemic and the increased number of persons reporting not having worked during the reference week but having a job. The decrease in the number of employed by quarter is:

- 1st quarter: -3.1%
- 2nd quarter: -9.2%
- 3rd quarter: -0.4%
- 4th quarter: -4.7%

The effect of the revision in the number of unemployed is bigger: For the time period 2009 – 2019 the number of unemployed changes for -0.5% to 3.8%.

We should note that throughout this period the change is negative only in one quarter and that the larger part of the revision is due to the implementation of the new weighting scheme.

As in the case of employed, we notice a similar seasonality in the effect of the revision – smaller in the 3rd quarter and larger in the 1st quarter.

The change is again quite larger in the four quarters of 2020 and especially in the 2nd. The increase rate of unemployed in 2020 by quarter is:

- 1st quarter 4.7%
- 2nd quarter 8.4%
- 3rd quarter 1.0%
- 4th quarter 4.7%

Table 4.1.1 presents the revision results for the total number of employed by quarter for the time period 2009 – 2020.

The second column presents the initial estimation of employed, the third column gives the result of the new weighting, the fourth column gives the estimated number of persons that reported absence from a job, they were considered employed and – according to the new regulation – are not employed. The fifth column gives the estimated number of employed persons with casual work. The final column gives the estimated number of employed according to the new definitions.

Table 4.1.2 presents the results of the revision to the total number of unemployed for 2009 – 2020. The second column presents the initial estimation of unemployed, the third column gives the result of the new weighting, the fourth column gives the estimated number of persons that (though reported absence from a job) they would be considered unemployed. The fifth column gives the estimated number of unemployed according to the new definitions.

Table 4.1.1 Results of revision to the total number of employed for the time period 2009 - 2020

QUARTER	INITIAL NUMBER OF EMPLOYED	CHANGE DUE TO NEW WEIGHTING		ABSENT AND NOT EMPLOYED	PERSONS WITH CASUAL JOBS	FINAL ESTIMATION OF EMPLOYED	%DIFFERENCE FINAL-INITIAL
		Number	%				
2009a	4545,6	12.3	0.3	39.9	5.2	4523,2	-0.5
2009b	4584,6	10.7	0.2	14.9	5.0	4585,4	0.0
2009c	4585,2	12.7	0.3	11.3	5.0	4591,6	0.1
2009d	4508,6	8.4	0.2	29.2	5.2	4492,9	-0.3
2010a	4446,0	2.0	0.0	38.4	5.4	4414,9	-0.7
2010b	4436,5	0.6	0.0	15.2	5.4	4427,3	-0.2
2010c	4398,0	1.9	0.0	14.1	5.4	4391,2	-0.2
2010d	4278,5	2.9	0.1	23.8	5.7	4263,3	-0.4
2011a	4165,5	-1.3	0.0	34.4	5.9	4135,8	-0.7
2011b	4124,2	3.8	0.1	13.3	6.0	4120,7	-0.1
2011c	4040,8	4.2	0.1	11.9	6.2	4039,2	0.0
2011d	3886,9	1.6	0.0	29.6	6.6	3865,5	-0.6
2012a	3785,0	-0.5	0.0	42.1	6.9	3749,3	-0.9
2012b	3729,9	-1.9	-0.1	22.9	7.0	3712,1	-0.5
2012c	3668,0	-3.3	-0.1	18.0	7.1	3653,9	-0.4
2012d	3597,0	-16.5	-0.5	25.5	7.3	3562,3	-1.0
2013a	3504,2	-11.4	-0.3	35.1	7.5	3465,1	-1.1
2013b	3535,0	-2.0	-0.1	16.0	7.4	3524,4	-0.3
2013c	3533,7	-3.0	-0.1	14.7	7.4	3523,4	-0.3
2013d	3479,9	-0.9	0.0	25.9	7.5	3460,6	-0.6
2014a	3483,7	-1.5	0.0	36.5	7.6	3453,3	-0.9
2014b	3539,1	1.0	0.0	16.6	7.4	3530,9	-0.2
2014c	3586,9	4.9	0.1	12.2	7.3	3586,9	0.0
2014d	3535,3	6.5	0.2	23.0	7.4	3526,2	-0.3
2015a	3504,4	7.4	0.2	32.8	7.5	3486,6	-0.5
2015b	3625,5	10.3	0.3	14.9	7.1	3628,0	0.1
2015c	3671,1	19.8	0.5	11.0	6.9	3686,8	0.4
2015d	3641,7	4.7	0.1	21.8	7.0	3631,7	-0.3
2016a	3606,3	-1.5	0.0	29.7	7.0	3582,0	-0.7
2016b	3702,6	1.1	0.0	14.3	6.6	3696,0	-0.2
2016c	3736,7	-1.3	0.0	11.6	6.6	3730,4	-0.2
2016d	3648,6	-3.9	-0.1	27.1	6.9	3624,6	-0.7
2017a	3659,3	-9.5	-0.3	32.8	6.8	3623,9	-1.0
2017b	3791,4	-4.9	-0.1	11.5	6.4	3781,4	-0.3
2017c	3823,7	2.9	0.1	9.2	6.3	3823,8	0.0
2017d	3736,3	5.6	0.1	27.7	6.5	3720,7	-0.4
2018a	3723,8	-3.3	-0.1	45.3	6.5	3681,8	-1.1
2018b	3860,4	0.9	0.0	12.6	6.1	3854,9	-0.1
2018c	3894,2	-2.6	-0.1	9.9	6.0	3887,7	-0.2
2018d	3833,7	-12.4	-0.3	23.0	6.2	3804,5	-0.8
2019a	3814,0	-11.7	-0.3	41.9	6.1	3766,6	-1.2
2019b	3956,4	-5.6	-0.1	10.7	5.7	3945,8	-0.3
2019c	3971,9	2.3	0.1	8.7	5.6	3971,2	0.0
2019d	3901,8	0.5	0.0	14.9	5.6	3893,0	-0.2
2020a	3852,6	-1.3	0.0	125.6	5.7	3731,4	-3.1
2020b	3844,0	0.8	0.0	359.6	5.7	3490,9	-9.2
2020c	3926,8	4.2	0.1	26.3	5.4	3910,1	-0.4
2020d	3878,5	4.9	0.1	191.2	5.5	3697,7	-4.7

Table 4.1.2 Results of revision to the total number of unemployed for the time period 2009 - 2020

QUARTER	INITIAL NUMBER OF EMPLOYED	CHANGE DUE TO NEW WEIGHTING		ABSENT AND UNEMPLOYED	FINAL ESTIMATION OF UNEMPLOYED	%DIFFERENCE FINAL-INITIAL
		NUMBER	%			
2009a	476.7	7.8	1.6	5.4	489.9	2.8
2009b	455.6	3.0	0.7	2.1	460.7	1.1
2009c	477.9	-0.8	-0.2	1.7	478.8	0.2
2009d	528.6	1.2	0.2	4.0	533.9	1.0
2010a	600.2	5.9	1.0	5.4	611.4	1.9
2010b	604.6	7.8	1.3	2.2	614.6	1.7
2010c	631.9	5.3	0.8	2.0	639.2	1.2
2010d	720.8	5.5	0.8	3.3	729.6	1.2
2011a	799.6	9.7	1.2	5.0	814.2	1.8
2011b	815.6	2.6	0.3	1.9	820.2	0.6
2011c	883.5	4.2	0.5	1.8	889.5	0.7
2011d	1,028.6	2.9	0.3	3.9	1,035.5	0.7
2012a	1,119.1	0.1	0.0	5.6	1,124.8	0.5
2012b	1,163.0	,	0.3	3.0	1,169.0	0.5
2012c	1,218.4	13.6	1.1	2.6	1,234.5	1.3
2012d	1,279.9	18.3	1.4	3.8	1,302.0	1.7
2013a	1,336.0	17.5	1.3	5.0	1,358.5	1.7
2013b	1,327.9	11.9	0.9	2.3	1,342.1	1.1
2013c	1,320.3	6.6	0.5	2.3	1,329.2	0.7
2013d	1,337.2	5.1	0.4	3.8	1,346.1	0.7
2014a	1,342.3	3.1	0.2	5.1	1,350.5	0.6
2014b	1,280.1	-1.8	-0.1	2.4	1,280.7	0.0
2014c	1,229.4	-1.2	-0.1	1.8	1,230.0	0.0
2014d	1,245.9	-2.6	-0.2	3.4	1,246.7	0.1
2015a	1,272.5	-3.9	-0.3	4.8	1,273.5	0.1
2015b	1,180.1	-2.3	-0.2	2.3	1,180.1	0.0
2015c	1,160.5	-7.2	-0.6	1.5	1,154.8	-0.5
2015d	1,174.7	5.4	0.5	3.0	1,183.1	0.7
2016a	1,195.1	11.7	1.0	4.3	1,211.1	1.3
2016b	1,112.1	11.6	1.0	2.0	1,125.7	1.2
2016c	1,092.6	12.4	1.1	1.6	1,106.6	1.3
2016d	1,124.0	14.8	1.3	3.7	1,142.5	1.6
2017a	1,114.7	19.4	1.7	4.7	1,138.8	2.2
2017b	1,016.6	16.5	1.6	1.6	1,034.7	1.8
2017c	970.1	3.1	0.3	1.3	974.5	0.5
2017d	1,006.8	11.4	1.1	4.3	1,022.5	1.6
2018a	1,001.2	16.7	1.7	6.7	1,024.6	2.3
2018b	906.0	15.9	1.8	1.7	923.6	1.9
2018c	871.8	7.9	0.9	1.4	881.1	1.1
2018d	881.1	24.9	2.8	3.1	909.1	3.2
2019a	907.1	29.0	3.2	5.8	941.9	3.8
2019b	805.0	26.3	3.3	1.3	832.7	3.4
2019c	777.0	21.9	2.8	1.1	800.0	3.0
2019d	786.4	24.4	3.1	2.1	812.9	3.4
2020a	745.1	16.7	2.2	18.5	780.3	4.7
2020b	768.3	13.3	1.7	51.1	832.7	8.4
2020c	756.4	4.0	0.5	3.7	764.2	1.0
2020d	750.1	7.5	1.0	27.4	785.0	4.7

4.2 Break-free series for the number of employed and unemployed by sex and age-group, 2009 – 2020

Graph 4.2.1 Change by year and quarter – Employed males 15-24 years old

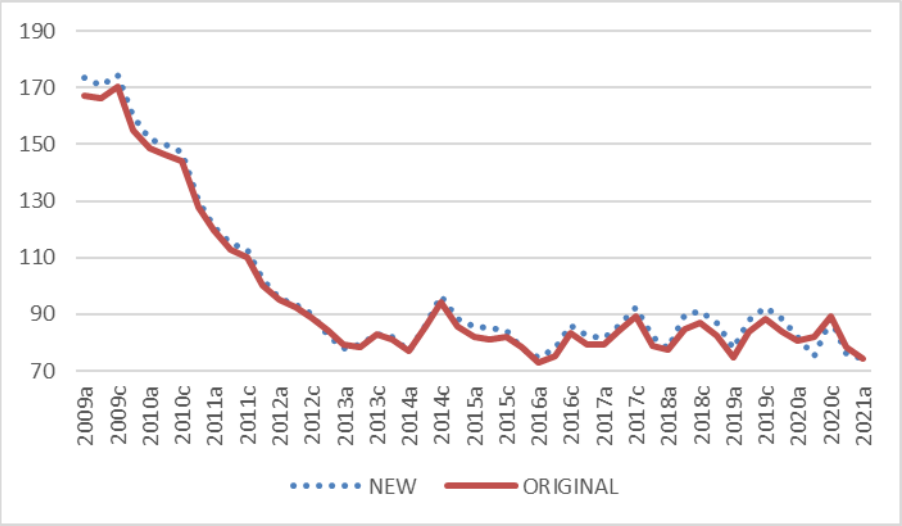


Table 4.2.1 Change by year and quarter – Employed males 15-24 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	5,198	3.17	3.23	-0.06
	2010	3,078	2.16	2.13	0.03
	2011	2,066	,1.89	1.95	-0.05
	2012	325	0.32	0.84	-0.52
	2013	33	0.03	0.05	-0.01
	2014	1,489	1.69	1.71	-0.02
	2015	2,408	2.94	2.73	0.21
	2016	2,552	3.26	3.34	-0.08
	2017	2,679	3.24	3.5	-0.26
	2018	3,505	4.15	4.25	-0.1
	2019	3,908	4.72	4.45	0.28
	2020	-2,178	-2.66	2.54	-5.2
QUARTER	A	1,908	1.86	2.5	-0.63
	B	2,021	1.97	2.89	-0.92
	C	2,424	2.42	2.25	0.17
	D	2,000	2.06	2.61	-0.55

- The size of revision in the number of employed males 15 – 24 years old ranges from -2,178 to 5,198 persons (rate of change from -2.66% to 4.72%). The change is positive for all years (that is, the revision increases the number of employed males 15 – 24 years old) with only exception the year 2020, when there is a decrease.
- Throughout the period 2009-2019 the change is mainly due to the new weighting procedure. In 2020, the change is due mainly to the correction of the number of employed[2] (-5.2%).
- In the 1st, the 2nd, and the 4th quarter we observe a negative effect of the correction in the number of employed, while in the 3rd quarter the correction has a positive effect.

[2] The correction of the number of employed results from the sum of the estimated number of persons who are not employed (though they report an absence from work) and the estimated number of persons that would report (if asked) a casual work

Graph 4.2.2 Change by year and quarter – Employed males 25-64 years old

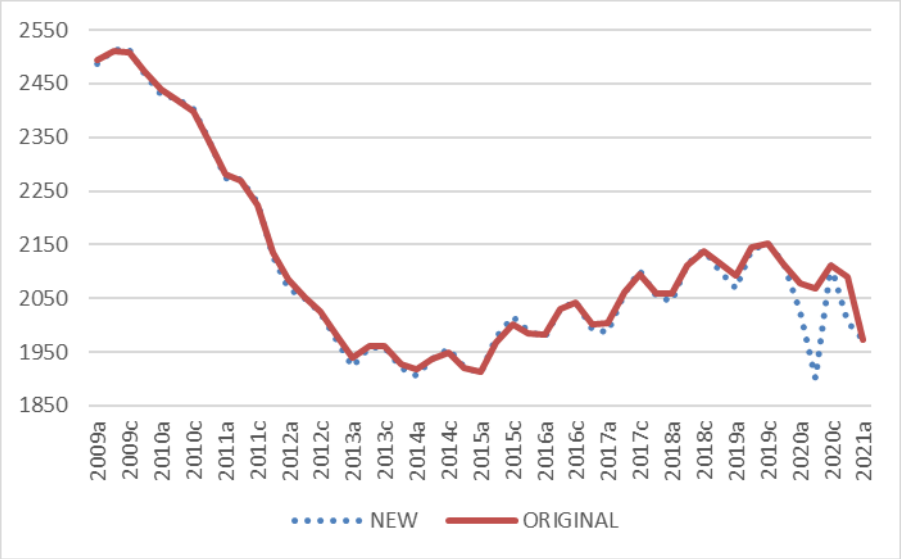


Table 4.2.2 Change by year and quarter – Employed males 25-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	-633	-0.03	0.34	-0.37
	2010	92	0.01	0.34	-0.34
	2011	-949	-0.04	0.39	-0.43
	2012	-7,864	-0.38	0.25	-0.63
	2013	-6,619	-0.34	0.15	-0.49
	2014	-328	-0.02	0.4	-0.42
	2015	6,392	0.32	0.7	-0.38
	2016	-2,964	-0.15	0.18	-0.33
	2017	-3,897	-0.2	0.13	-0.33
	2018	-6,608	-0.32	0.02	-0.34
	2019	-6,350	-0.3	0.03	-0.33
	2020	-75,907	-3.66	0.43	-4.09
QUARTER	A	-14,917	-0.72	0.19	-0.91
	B	-13,466	-0.65	0.27	-0.92
	C	3,737	0.18	0.37	-0.19
	D	-10,566	-0.51	0.28	-0.79

- The size of revision in the number of employed males 25 – 64 years old ranges from -75,907 to 6,392 persons (rate of change from -3.66% to 0.32%). Most years the change is negative.
- During 2009-2019 the change is quite small (rate of change from -0.38% to 0.32%). Throughout all this period, the effect of the new weighting is positive, while the effect of the correction in the number of employed is negative.
- In 2020 we observe the greatest change, which is mainly due to the correction in the number of employed (-4.09%).
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.3 Change by year and quarter – Employed males 20-64 years old

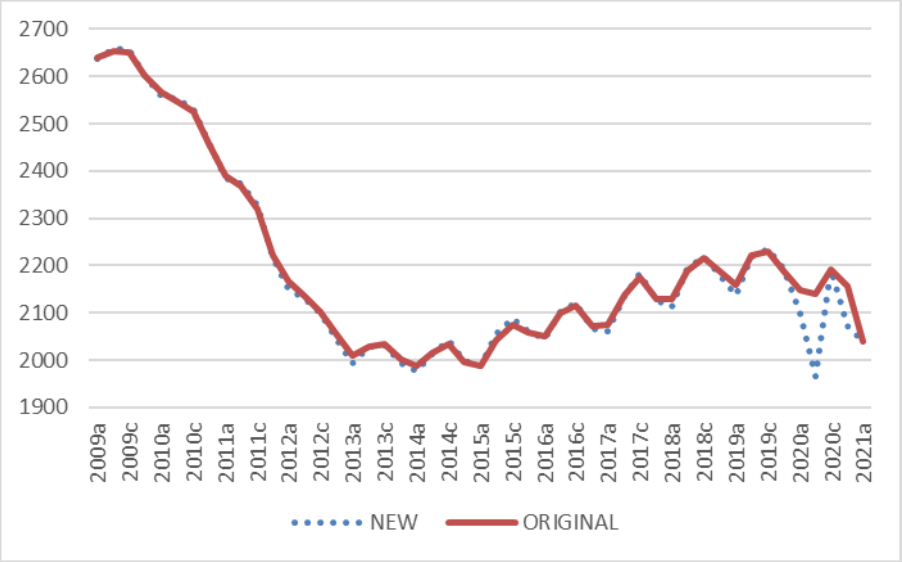


Table 4.2.3 Change by year and quarter – Employed males 20-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	1,915	0.07	0.42	-0.35
	2010	1,372	0.06	0.37	-0.31
	2011	17	0	0.42	-0.42
	2012	-8,549	-0.4	0.22	-0.63
	2013	-7,130	-0.35	0.11	-0.47
	2014	-179	-0.01	0.39	-0.4
	2015	7,849	0.38	0.74	-0.36
	2016	-970	-0.05	0.26	-0.31
	2017	-2,449	-0.12	0.2	-0.33
	2018	-3,691	-0.17	0.15	-0.33
	2019	-3,008	-0.14	0.16	-0.31
	2020	-77,690	-3.62	0.5	-4.12
QUARTER	A	-13,985	-0.65	0.25	-0.9
	B	-12,467	-0.59	0.33	-0.92
	C	5,117	0.23	0.41	-0.18
	D	-9,503	-0.44	0.33	-0.78

- The size of revision in the number of employed males 20 – 24 years old ranges from -77,690 to 7,849 persons (rate of change from -3.62% to 0.38%). Most years the change is negative.
- During 2009-2019 the change is quite small (rate of change from -0.40% to 0.38%). Throughout all this period, the effect of the new weighting is positive, while the effect of the correction in the number of employed is negative.
- In 2020 we observe the greatest change, which is mainly due to the correction in the number of employed (-4.00%).
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.4 Change by year and quarter – Employed males 65 -74 years old

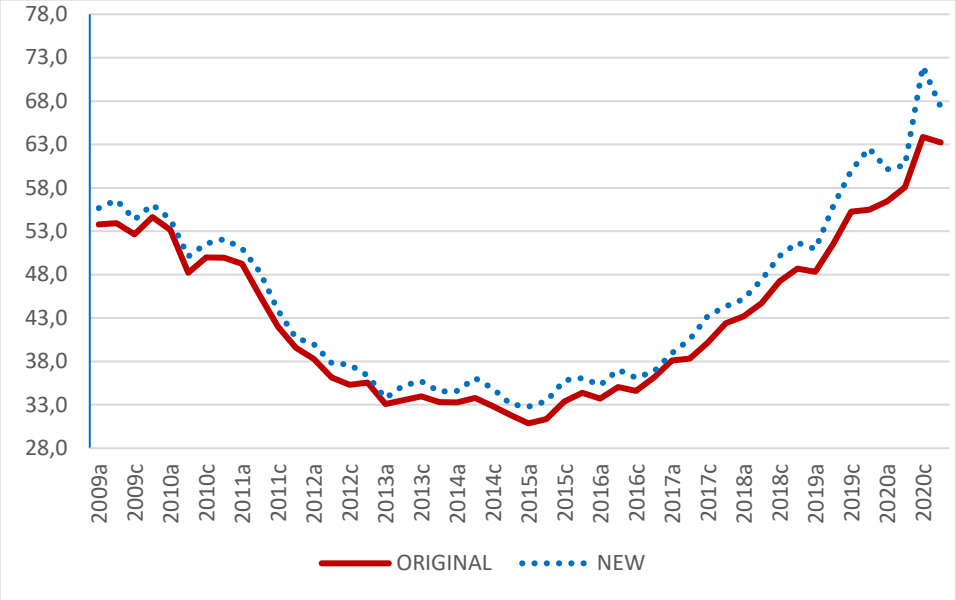


Table 4.2.4 Change by year and quarter – Employed males 65-74 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	1,918	3.57	4.34	-0.78
	2010	1,689	3.36	4.81	-1.45
	2011	1,868	4.23	5.58	-1.34
	2012	1,621	4.46	5.31	-0.84
	2013	1,337	4.00	5.25	-1.25
	2014	1,722	5.23	7.11	-1.88
	2015	2,022	6.22	7.43	-1.21
	2016	1,434	4.11	4.33	-0.22
	2017	2,021	5.09	5.64	-0.56
	2018	2,633	5.73	5.92	-0.20
	2019	4,690	8.91	9.38	-0.48
	2020	4,622	7.65	11.83	-4.17
QUARTER	A	1,764	4.14	6.25	-2.11
	B	2,400	5.64	6.77	-1.12
	C	2,826	6.5	6.81	-0.3
	D	2,204	5.03	6.64	-1.61

- The size of revision in the number of employed males 65-74 years old ranges from 1,337 to 4,690 persons (rate of change from 3.36% to 8.91%). The change is positive all years.
- Throughout the time period 2009-2020, the largest part of the change is due to the different weighting scheme. All years, the correction for the number of employed is negative and peaks in 2020.
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.5 Change by year and quarter – Employed males 75+ years old

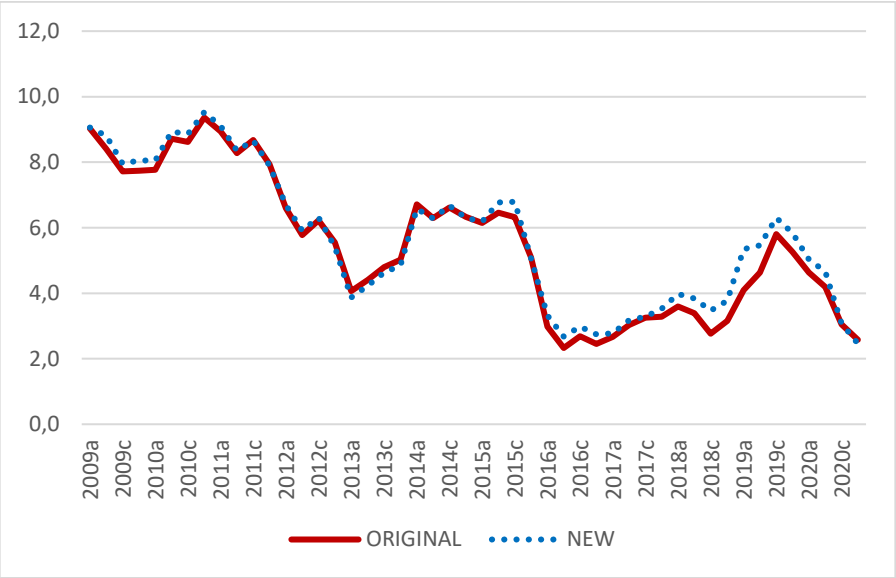


Table 4.2.5 Change by year and quarter – Employed males 75+ years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	246	2.99	2.99	0
	2010	227	2.63	2.63	0
	2011	45	0.53	0.53	0
	2012	45	0.74	0.74	0
	2013	-177	-3.88	-3.88	0
	2014	-28	-0.43	-0.43	0
	2015	198	3.3	3.3	0
	2016	319	12.2	12.2	0
	2017	131	4.27	4.27	0
	2018	539	16.7	16.7	0
	2019	790	15.96	15.96	0
	2020	193	5.34	5.95	-0.61
QUARTER	A	230	4.11	4.11	0
	B	266	4.84	4.97	-0.13
	C	206	3.71	3.71	0
	D	141	2.65	2.65	0

- The size of revision in the number of employed males 74 years old or mote, ranges from -177 to 790 persons (rate of change from -3.88% to 16.70%). Most years the change is positive.
- Throughout the time period 2009-2020, the revision is determined only be the different weighting scheme. All years 2009-2019, the correction for the number of employed is has no effect and is negative in 2020.
- In all quarters but the third, the correction of the number of employed has no effect on the revision.

Graph 4.2.6 Change by year and quarter – Employed females 15-24 years old

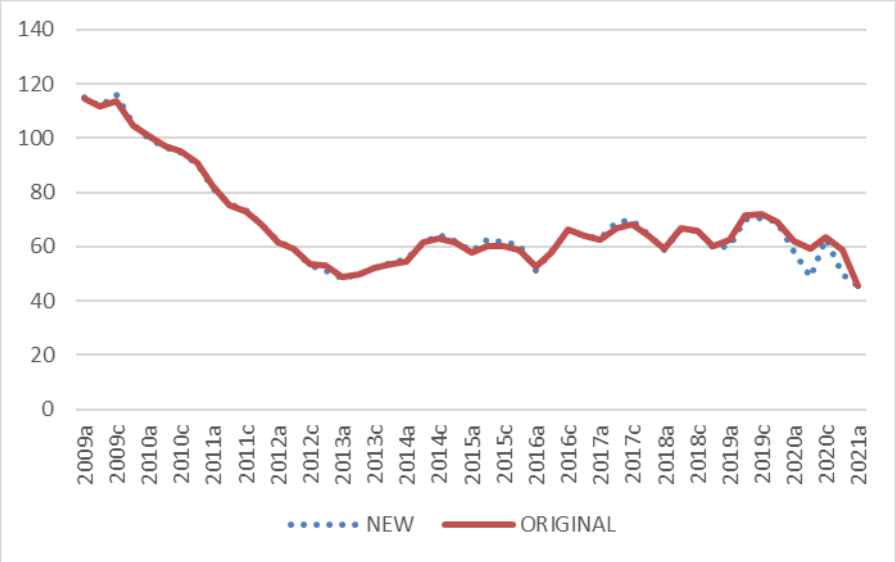


Table 4.2.6 Change by year and quarter – Employed females 15-24 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	758	0.68	1	-0.32
	2010	-625	-0.65	-0.64	-0.01
	2011	-28	-0.01	0.02	-0.03
	2012	-533	-1	-1.7	0.7
	2013	48	0.07	-1.02	1.09
	2014	722	1.2	1.05	0.16
	2015	1,631	2.75	2.23	0.52
	2016	-297	-0.55	-0.91	0.36
	2017	1,206	1.81	1.63	0.18
	2018	-436	-0.7	-0.73	0.04
	2019	-1,353	-2.01	-2.29	0.28
	2020	-5,893	-9.9	-1.05	-8.86
QUARTER	A	-666	-1.02	-0.35	-0.67
	B	-664	-1.11	-0.21	-0.91
	C	366	0.48	-0.05	0.53
	D	-637	-1.12	-0.19	-0.92

- The size of revision in the number of employed females 15 – 24 years old, ranges from -5,893 to 1,631 persons (rate of change from -9.9% to 2.7%). The change is positive in 6 years (that is, the revision increased the number of employed women 15 – 24 years old) and negative for 6 years.
- Throughout the time period 2009-2019, the largest part of the change is due to the different weighting scheme. On the contrary, in 2020, the correction in the number of employed has a huge impact (-8.86%).
- In the 1st, the 2nd, and the 4th quarter we observe a negative effect of the correction in the number of employed, while in the 3rd quarter the correction has a positive effect.

Graph 4.2.7 Change by year and quarter – Employed females 25-64 years old

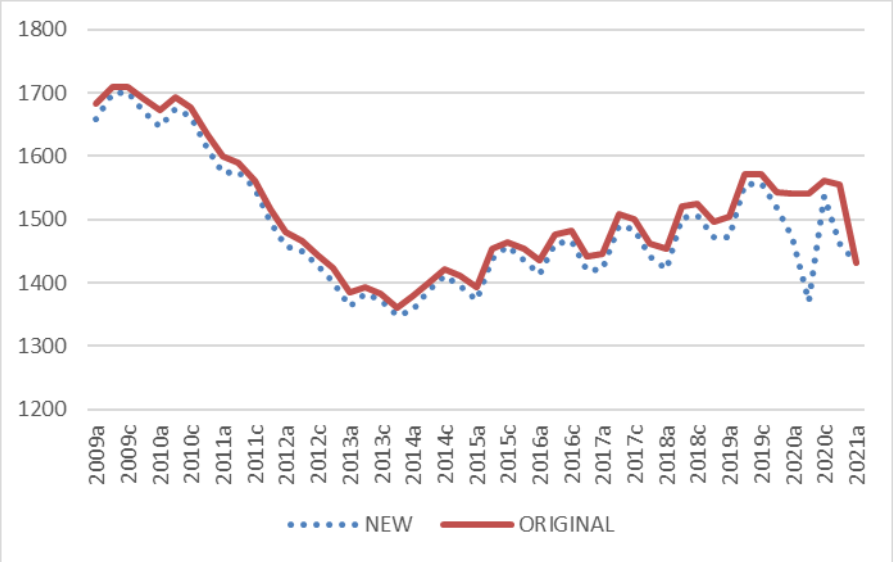


Table 4.2.7 Change by year and quarter – Employed females 25-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	-15,488	-0.91	-0.41	-0.5
	2010	-20,265	-1.22	-0.71	-0.5
	2011	-17,296	-1.1	-0.75	-0.36
	2012	-19,478	-1.34	-0.89	-0.46
	2013	-14,478	-1.05	-0.62	-0.43
	2014	-15,330	-1.1	-0.68	-0.41
	2015	-15,313	-1.07	-0.7	-0.37
	2016	-18,258	-1.26	-0.77	-0.49
	2017	-20,074	-1.36	-0.92	-0.44
	2018	-23,198	-1.56	-0.95	-0.61
	2019	-21,042	-1.37	-0.96	-0.41
	2020	-89,691	-5.8	-1.16	-4.64
QUARTER	A	-28,656	-1.91	-0.82	-1.09
	B	-27,503	-1.8	-0.76	-1.03
	C	-14,258	-0.94	-0.74	-0.2
	D	-26,220	-1.73	-0.85	-0.88

- The size of revision in the number of employed females 25 – 64 years old, ranges from -89,691 to -14,478 persons (rate of change from -5.80% to -0.91%). All years, the revision results in negative change.
- Both the effect of weighting and the effect of the correction in the number of employed are negative all years.
- In 2020 we observe the largest revision, which is due mainly to the correction in the number of employed (-4.64%) .
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.8 Change by year and quarter – Employed females 20-64 years old

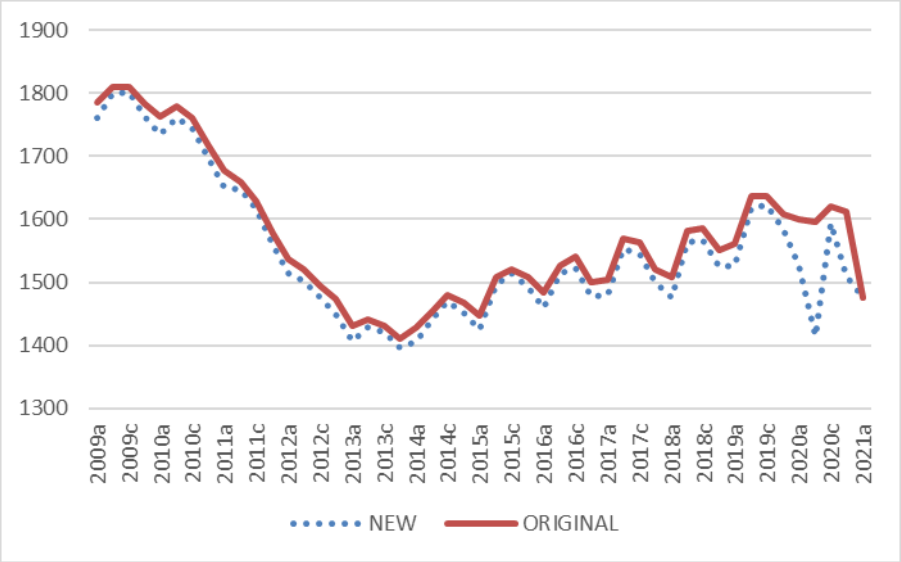


Table 4.2.8 Change by year and quarter – Employed females 20-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	-15,715	-0.88	-0.38	-0.49
	2010	-20,892	-1.19	-0.71	-0.48
	2011	-17,404	-1.06	-0.71	-0.35
	2012	-20,388	-1.36	-0.93	-0.43
	2013	-14,966	-1.05	-0.66	-0.39
	2014	-15,016	-1.03	-0.64	-0.4
	2015	-13,838	-0.93	-0.59	-0.34
	2016	-18,881	-1.25	-0.78	-0.47
	2017	-19,994	-1.3	-0.88	-0.42
	2018	-24,387	-1.57	-0.98	-0.59
	2019	-22,942	-1.43	-1.04	-0.4
	2020	-95,734	-5.98	-1.16	-4.81
QUARTER	A	-29,694	-1.9	-0.82	-1.08
	B	-28,517	-1.79	-0.76	-1.04
	C	-14,541	-0.92	-0.74	-0.18
	D	-27,301	-1.74	-0.84	-0.89

- The size of revision in the number of employed females 20 – 64 years old, ranges from -95,734 to -13,838 persons (rate of change from -5.98% to -0.88%). All years, the revision results in negative change.
- Throughout the time period 2009-2019 the change is small (rate of change from -1.57% to -0.87%). Both the effect of weighting and the effect of the correction in the number of employed are negative all years.
- In 2020 we observe the largest revision, which is due mainly to the correction in the number of employed (-4.81%)
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.9 Change by year and quarter – Employed females 65-74 years old

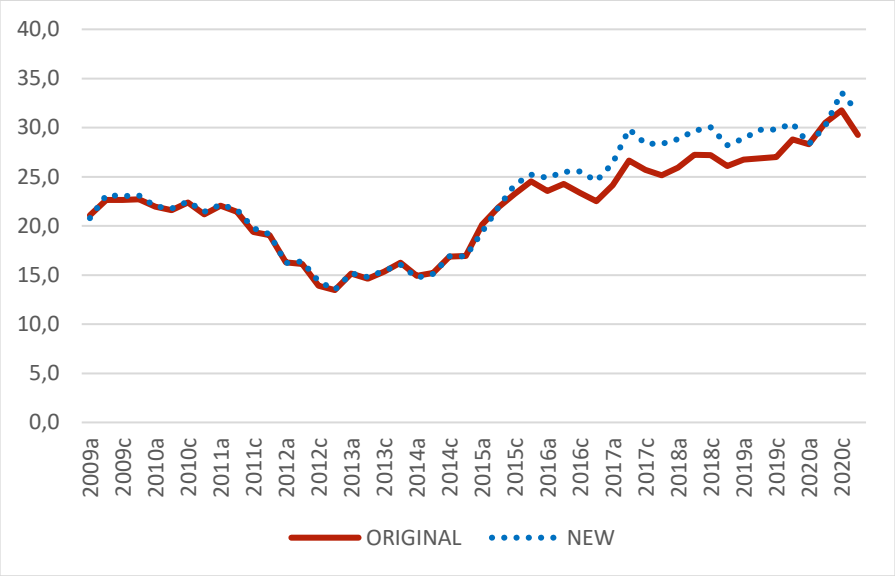


Table 4.2.9 Change by year and quarter – Employed females 65-74 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	241	1.08	2.03	-0.95
	2010	145	0.67	2.10	-1.43
	2011	200	0.97	2.02	-1.05
	2012	175	1.17	1.89	-0.73
	2013	21	0.14	1.37	-1.23
	2014	-71	-0.45	1.81	-2.26
	2015	228	1.01	2.85	-1.84
	2016	1,699	7.25	8.85	-1.59
	2017	2,828	11.13	12.44	-1.31
	2018	2,564	9.63	10.7	-1.06
	2019	2,363	8.64	9.66	-1.02
	2020	944	3.15	7.97	-4.82
QUARTER	A	621	2.86	5.21	-2.34
	B	885	3.95	5.78	-1.83
	C	1,229	5.48	6.40	-0.91
	D	1,044	4.71	6.45	-1.73

- The size of revision in the number of employed females 65-74 years old, ranges from -71 to 2,828 persons (rate of change from -0.45% to 11.3%). Apart from 2014, all years the change is positive
- Throughout the time period 2009-2020, the largest part of the change is due to the different weighting scheme. The effect of weighting increases considerably after 2015. The effect of the correction in the number of employed is negative for all years and has maximum value in 2020.
- In all quarters, the correction has a negative effect which is considerably smaller in the 3rd quarter.

Graph 4.2.10 Change by year and quarter – Employed females 75+ years old

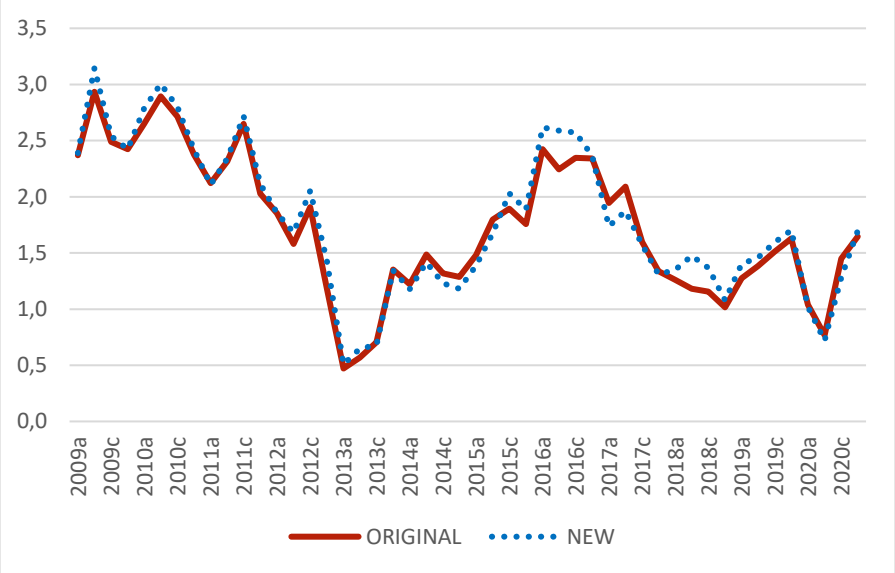


Table 4.2.10 Change by year and quarter – Employed females 75+ years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	70	2.75	2.75	0
	2010	93	3.51	3.51	0
	2011	42	1.84	1.84	0
	2012	125	7.65	7.65	0
	2013	19	2.51	2.51	0
	2014	-76	-5.72	-5.72	0
	2015	11	0.63	0.63	0
	2016	196	8.38	8.38	0
	2017	-121	-6.91	-6.91	0
	2018	164	14.21	14.21	0
	2019	90	6.18	6.18	0
	2020	-46	-3.73	-3.73	0
QUARTER	A	19	1.13	1.13	0
	B	65	3.66	3.66	0
	C	58	3.19	3.19	0
	D	48	2.81	2.81	0

- The size of revision in the number of employed females 75 years old or more, ranges from -121 to 196 persons (rate of change from -6.91% to 8.38%). Apart from 2014 and 2020, all years the change is positive
- All years 2009-2020 the revision is due only to the new weighting methodology.

Graph 4.2.11 Change by year and quarter – Unemployed males 15-24 years old

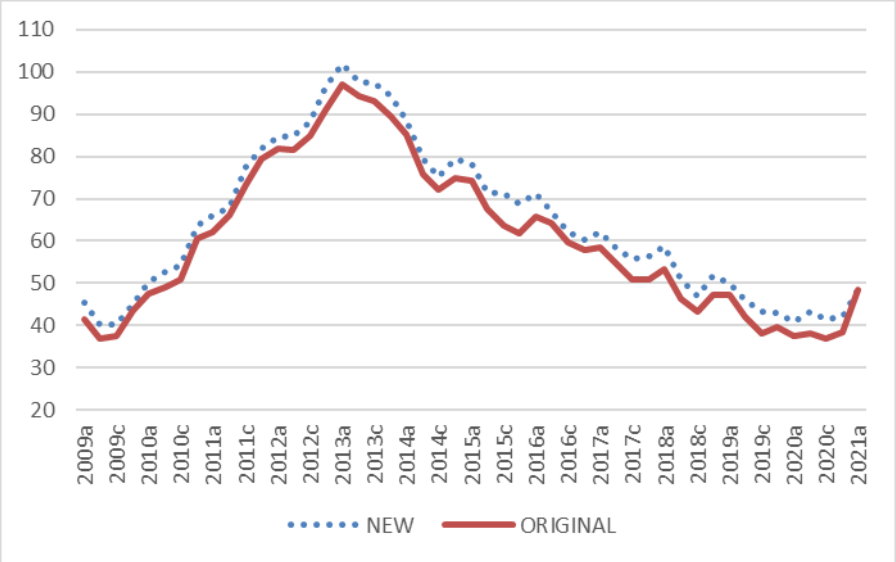


Table 4.2.11 Change by year and quarter – Unemployed males 15-24 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	2,884	7.34	7.13	0.2
	2010	3,211	6.25	6.14	0.1
	2011	3,111	4.49	4.36	0.13
	2012	3,677	4.3	4.1	0.19
	2013	4,295	4.6	4.51	0.09
	2014	3,664	4.79	4.67	0.11
	2015	5,644	8.64	8.54	0.1
	2016	3,338	5.33	5.22	0.11
	2017	4,414	8.32	8.12	0.2
	2018	4,687	9.83	9.69	0.14
	2019	3,863	9.44	9.36	0.08
	2020	4,086	10.83	9.05	1.78
QUARTER	A	3,825	6.53	6.24	0.3
	B	3,668	6.9	6.48	0.42
	C	4,125	7.73	7.64	0.08
	D	4,007	6.89	6.61	0.28

- The size of revision in the number of unemployed males 15-24 years old, ranges from 2,884 to 5,644 persons (rate of change from 4.30% to 10.83%). All years the change is positive.
- Throughout the time period 2009-2020 the largest part of the change is due to the different weighting scheme. The effect of the correction in the number of unemployed is quite small and becomes significant only in 2020 (1.78%). All years, both the weighting and the correction have a positive effect.
- The effect of correction in the number of unemployed is much smaller in the 3rd quarter.

Graph 4.2.12 Change by year and quarter – Unemployed males 25-64 years old

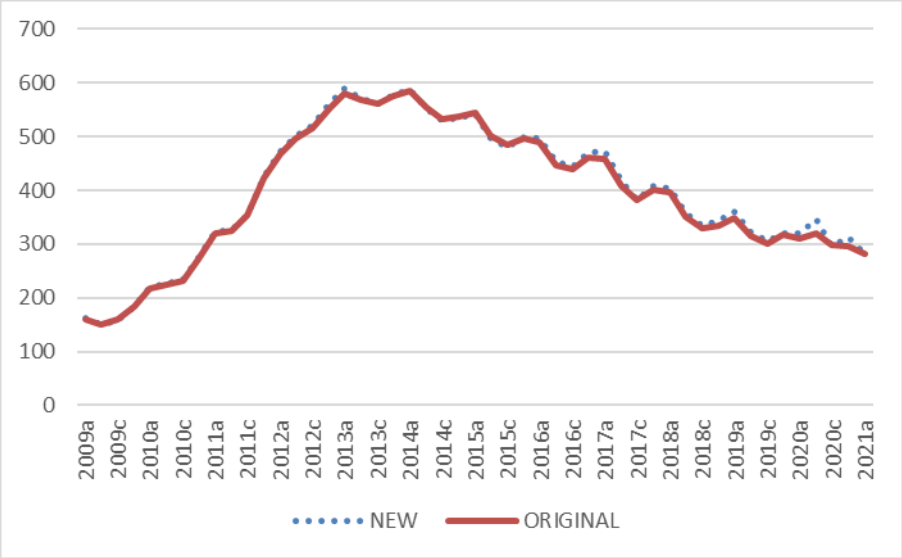


Table 4.2.12 Change by year and quarter – Unemployed males 25-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	9	0	-0.85	0.85
	2010	1,337	0.57	0.04	0.54
	2011	2,499	0.71	0.28	0.43
	2012	5,666	1.09	0.68	0.41
	2013	4,324	0.75	0.45	0.3
	2014	-1,329	-0.25	-0.52	0.27
	2015	-2,374	-0.47	-0.75	0.28
	2016	6,746	1.47	1.21	0.26
	2017	6,516	1.51	1.19	0.32
	2018	7,068	1.99	1.61	0.39
	2019	6,382	1.96	1.6	0.36
	2020	12,875	4.15	0.08	4.07
QUARTER	A	5,679	1.51	0.64	0.88
	B	5,052	1.43	0.52	0.91
	C	1,075	0.25	0	0.25
	D	4,767	1.31	0.52	0.79

- The size of revision in the number of unemployed males 25-64 years old, ranges from -2,374 to 12,875 persons (rate of change from -0.47% to 4.15%). Apart 2014 and 2015, the change is positive.
- Throughout 2009-2019 the change in the weighting and the correction in the number of unemployed contribute to similar degree in the total change. Only in 2020, the effect of the correction becomes prominent (4.07%).
- The effect of correction in the number of unemployed is much smaller in the 3rd quarter.

Graph 4.2.13 Change by year and quarter – Unemployed males 65+ years old

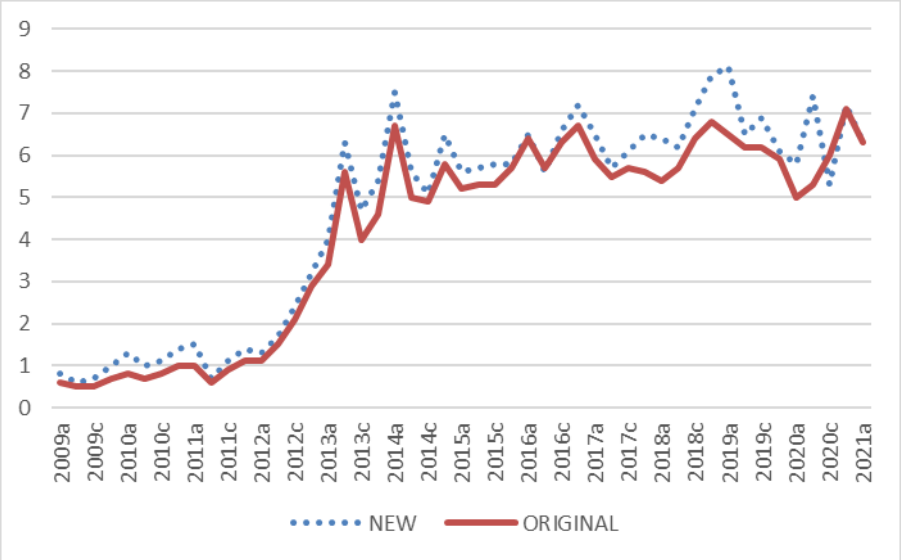


Table 4.2.13 Change by year and quarter – Unemployed males 65-74 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	205	36.03	3.56	32.48
	2010	363	44.29	9.84	34.45
	2011	285	30.87	4.6	26.27
	2012	251	13.71	4.98	8.73
	2013	669	15.54	10.92	4.61
	2014	583	10.18	5.97	4.21
	2015	362	6.79	4.14	2.66
	2016	209	3.15	1.88	1.27
	2017	505	8.89	6.65	2.24
	2018	812	13.39	11.93	1.45
	2019	713	11.25	9.08	2.17
	2020	577	11.37	-2.13	13.51
QUARTER	A	612	22.8	5.98	16.82
	B	445	14.91	6.25	8.66
	C	319	14.45	6.37	8.08
	D	469	16.34	5.21	11.13

- The size of revision in the number of unemployed males 65 years old or more, ranges from 205 to 812 persons (rate of change from 3.15% to 44.29%). All years the change is positive.
- It should be noted that the very big differences between the initial and the final estimates correspond to very small initial estimates.
- Concerning the contribution of the weighting and the correction in the number of unemployed in the total revision, we cannot observe any regular pattern throughout the revision period. Some years the effect of weighting is more prominent, some other years the effect of correction is larger, while in other years they have a similar contribution.
- In 2020 is the only year when the change in the weighting procedure results in a decrease in the number of unemployed. The same year the effect of the correction in the number of unemployed is quite significant (13.51%).

Graph 4.2.14 Change by year and quarter – Unemployed females 15-24 years old

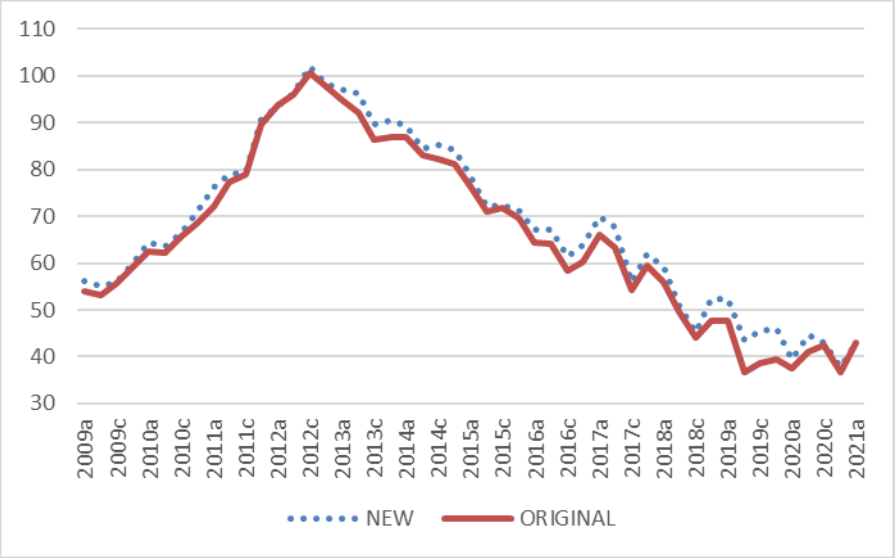


Table 4.2.14 Change by year and quarter – Unemployed females 15-24 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	1,301	2.38	2.23	0.15
	2010	1,598	2.47	2.37	0.09
	2011	1,862	2.45	2.37	0.07
	2012	464	0.46	0.44	0.03
	2013	3,286	3.67	3.66	0
	2014	2,522	3.03	2.98	0.05
	2015	1,345	1.84	1.82	0.03
	2016	3,068	4.97	4.91	0.06
	2017	3,009	4.86	4.8	0.06
	2018	2,625	5.27	5.17	0.1
	2019	6,254	15.75	15.68	0.07
	2020	1,754	4.44	2.85	1.59
QUARTER	A	2,622	4.3	4.1	0.2
	B	2,569	4.78	4.52	0.26
	C	1,906	3.47	3.43	0.04
	D	2,599	4.64	4.37	0.27

- The size of revision in the number of unemployed females 15-24 years old, ranges from 464 to 6,254 persons (rate of change from 0.46% to 15.75%). All years the change is positive.
- Throughout the time period 2009-2020 the largest part of the change is due to the different weighting scheme. The effect of the correction in the number of unemployed is quite small and becomes significant only in 2020 (1.59%). All years, both the weighting and the correction have a positive effect.
- The effect of the correction in the number of unemployed is much smaller in the 3rd quarter.

Graph 4.2.15 Change by year and quarter – Unemployed females 25-64 years old

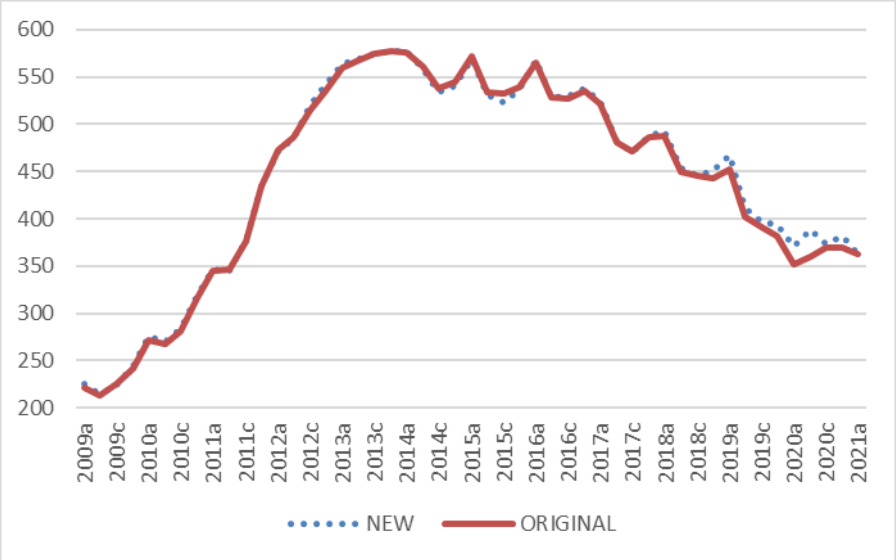


Table 4.2.15 Change by year and quarter – Unemployed females 25-64 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	1,696	0.74	0.06	0.69
	2010	2,844	1.02	0.47	0.55
	2011	204	0.06	-0.27	0.33
	2012	2,347	0.44	0.17	0.27
	2013	1,011	0.18	-0.06	0.24
	2014	-2,915	-0.53	-0.77	0.23
	2015	-4,566	-0.85	-1.07	0.23
	2016	2,002	0.37	0.1	0.27
	2017	1,127	0.22	-0.05	0.27
	2018	4,334	0.95	0.6	0.35
	2019	10,695	2.61	2.33	0.28
	2020	15,888	4.42	1.52	2.9
QUARTER	A	4,664	1.26	0.56	0.7
	B	3,288	0.93	0.21	0.72
	C	171	0.11	-0.11	0.21
	D	3,432	0.91	0.34	0.58

- The size of revision in the number of unemployed females 25-64 years old, ranges from -4,566 to 15,888 persons (rate of change from -0.85% to 4.42%). Apart 2014 and 2015, the change is positive.
- Concerning the contribution of the weighting and the correction in the number of unemployed in the total revision, varies - some years have similar magnitude, other years have opposite effect and other years contribute to quite different extent. The correction in the number of unemployed is significant in 2020 (2.90%).
- The effect of the correction in the number of unemployed is much smaller in the 3rd quarter.

Graph 4.2.16 Change by year and quarter – Unemployed females 65-74 years old

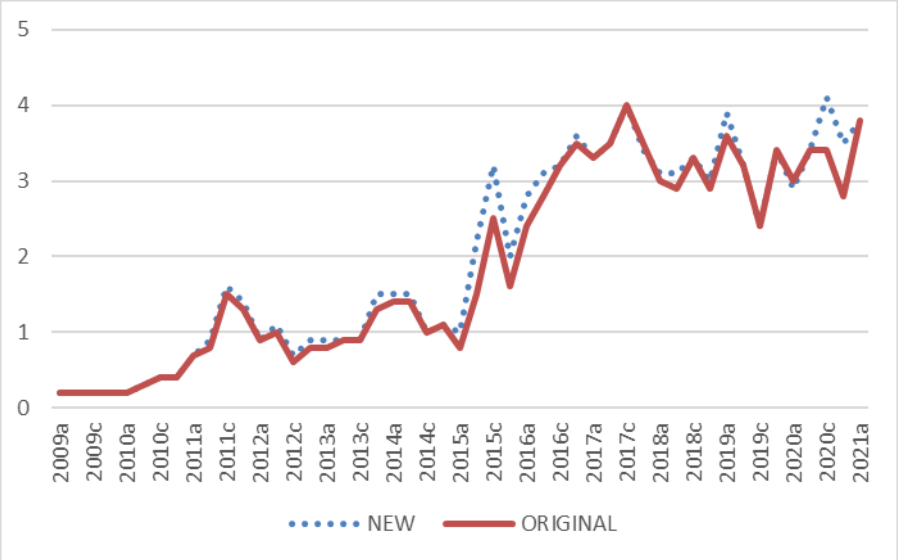


Table 4.2.16 Change by year and quarter – Unemployed females 65-74 years old

		Difference of final from initial estimate	% Difference final from initial	% of difference due to weighting	% of difference due to correction
YEAR	2009	1	0.26	0.26	0
	2010	-7	-2.67	-2.67	0
	2011	44	3.94	3.94	0
	2012	69	9.17	9.17	0
	2013	53	4.9	4.9	0
	2014	46	3.17	3.17	0
	2015	501	30.8	30.8	0
	2016	157	5.93	5.93	0
	2017	3	0.09	0.09	0
	2018	85	2.9	2.9	0
	2019	63	1.69	1.69	0
	2020	355	11.58	11.58	0
QUARTER	A	80	4.63	4.63	0
	B	123	7.56	7.56	0
	C	130	5.64	5.64	0
	D	124	6.09	6.09	0

- The size of revision in the number of unemployed females 65 year old or more, ranges from -7 to 501 persons (rate of change from -2.67% to 30.80%). The rate of change varies significantly from year to year, but it should be noted that the observed differences are based in extremely small samples (1 – 3 persons).
- Concerning the contribution of the weighting and the correction in the number of unemployed in the total revision, we observe no effect from correction: the revision is due only to the change in the weighting scheme.

4.3 Changes in estimates in the year 2020

Table 4.3.1 presents percentage changes between the revised estimates of consecutive quarters (for the time period 2nd quarter 2009 to 1st quarter 2021 (with 2021 estimates produced by the new survey).

Table 4.3.1 Percentage changes between the revised estimates of consecutive quarters

	EMPLOYED FEMALES				EMPLOYED MALES				UNEMPLOYED FEMALES			UNEMPLOYED MALES		
% DIFFERENCE BETWEEN ESTIMATES	15-24	20 - 64	25-64	65+	15-24	20 - 64	25-64	65+	15-24	25-64	65+	15-24	25-64	65+
2009b - 2009a	-2.8	2.1	2.4	13.4	-1.6	0.8	1.0	1.1	-2.1	-5.0	0.0	-11.5	-6.9	-25.0
2009c - 2009b	3.8	0.2	0.2	-2.7	1.9	-0.1	0.0	-4.7	1.5	4.8	0.0	0.2	4.4	16.7
2009d - 2009c	-9.2	-2.2	-1.8	-0.4	-8.1	-2.0	-1.8	2.9	7.5	8.9	0.0	12.2	16.4	42.9
2010a - 2009d	-5.3	-1.6	-1.4	-2.7	-5.2	-1.7	-1.5	-2.7	7.2	12.9	0.0	10.8	20.0	30.0
2010b - 2010a	-3.2	1.5	1.7	0.0	-1.2	-0.2	-0.3	-5.4	-1.1	-1.8	50.0	5.2	2.9	-23.1
2010c - 2010b	-2.1	-0.9	-0.8	2.0	-1.8	-0.9	-0.9	2.4	4.6	4.7	33.3	3.0	3.2	10.0
2010d - 2010c	-4.4	-2.9	-3.0	-5.5	-11.8	-2.8	-2.4	2.0	6.6	12.6	0.0	17.1	17.5	27.3
2011a - 2010d	-9.9	-2.6	-2.3	1.7	-6.9	-3.1	-3.0	-2.4	7.6	8.7	75.0	4.1	17.7	7.1
2011b - 2011a	-6.6	-0.2	0.1	-1.2	-4.7	-0.4	-0.1	-5.7	3.5	-0.5	28.6	2.7	1.1	-53.3
2011c - 2011b	-3.7	-1.9	-1.7	-6.3	-2.2	-2.0	-1.9	-7.4	0.5	9.4	77.8	14.0	8.0	57.1
2011d - 2011c	-7.1	-3.6	-3.4	-5.3	-9.3	-4.8	-4.5	-7.4	14.4	15.1	-12.5	5.8	20.7	27.3
2012a - 2011d	-8.8	-2.9	-2.6	-15.0	-6.3	-2.9	-2.8	-3.9	3.0	8.6	-35.7	3.2	11.0	-7.1
2012b - 2012a	-4.8	-0.7	-0.6	0.0	-2.5	-1.0	-1.0	-6.4	2.9	2.7	22.2	0.4	5.9	30.8
2012c - 2012b	-9.7	-1.8	-1.5	-9.4	-3.4	-1.4	-1.3	0.5	6.0	7.3	-36.4	4.0	4.1	41.2
2012d - 2012c	-4.1	-1.9	-1.9	-9.1	-8.4	-2.7	-2.5	-4.8	-3.4	4.2	28.6	9.1	7.7	33.3
2013a - 2012d	-5.5	-2.8	-2.7	5.4	-5.7	-2.4	-2.4	-10.0	-1.3	4.1	0.0	5.7	5.2	25.0
2013b - 2013a	3.3	1.5	1.5	-1.3	1.5	1.8	1.8	5.1	-1.0	0.9	0.0	-4.0	-3.2	57.5
2013c - 2013b	4.6	-0.7	-0.7	3.9	4.8	0.2	0.1	2.0	-6.8	0.9	0.0	-0.3	-1.7	-25.4
2013d - 2013c	3.4	-1.6	-1.9	8.1	-1.3	-1.9	-2.0	-2.2	1.0	0.5	66.7	-3.2	2.6	14.9
2014a - 2013d	2.2	0.8	0.7	-8.6	-5.6	-0.8	-0.7	4.6	-1.2	0.0	0.0	-6.2	1.6	38.9
2014b - 2014a	11.1	2.5	2.2	3.8	11.5	1.9	1.6	2.9	-5.7	-3.2	0.0	-10.2	-6.0	-25.3
2014c - 2014b	5.4	1.9	1.7	10.3	12.2	1.4	0.9	-2.1	1.2	-4.5	-33.3	-5.3	-3.9	-8.9
2014d - 2014c	-4.0	-1.3	-1.1	-0.5	-8.7	-2.0	-1.7	-5.1	-1.5	1.3	10.0	5.6	1.0	27.5
2015a - 2014d	-5.6	-1.7	-1.7	14.9	-2.7	-0.6	-0.7	-1.0	-6.3	5.3	-9.1	-1.5	1.1	-13.8
2015b - 2015a	6.7	4.9	4.8	13.5	-0.8	3.4	3.6	3.1	-8.4	-6.7	120.0	-8.6	-8.0	1.8
2015c - 2015b	-1.3	1.3	1.3	11.0	-0.8	1.7	1.8	6.0	0.1	-1.4	45.5	-0.7	-3.7	1.8
2015d - 2015c	-1.6	-1.5	-1.5	3.4	-7.5	-1.3	-1.2	-3.5	-1.4	2.6	-37.5	-3.1	4.0	0.0
2016a - 2015d	-15.5	-2.1	-1.5	1.5	-4.5	-0.8	-0.6	-6.1	-5.6	5.7	40.0	3.3	-0.5	12.1
2016b - 2016a	14.3	3.7	3.4	2.2	4.2	2.7	2.7	2.8	0.0	-6.8	10.7	-5.8	-8.5	-13.8
2016c - 2016b	12.3	0.6	0.3	0.0	10.9	0.9	0.7	-1.5	-8.9	0.1	3.2	-7.5	-2.1	17.9
2016d - 2016c	-2.9	-2.9	-3.1	-4.3	-4.2	-2.6	-2.6	1.3	4.1	1.5	12.5	-2.7	5.8	9.1
2017a - 2016d	-1.4	0.0	0.1	4.5	-1.5	-0.3	-0.2	5.3	9.4	-2.3	-8.3	3.0	0.4	-9.7
2017b - 2017a	9.9	5.0	4.9	12.8	6.0	3.6	3.6	4.8	-3.2	-8.2	6.1	-6.4	-11.5	-12.3
2017c - 2017b	0.7	-0.4	-0.5	-5.7	6.8	2.3	2.1	6.4	-17.3	-2.5	14.3	-4.1	-8.3	7.0
2017d - 2017c	-7.3	-2.9	-2.8	-0.7	-11.0	-2.6	-2.3	3.0	10.7	3.7	-15.0	0.7	6.4	6.6
2018a - 2017d	-9.1	-1.7	-1.4	1.7	-5.4	-0.6	-0.5	2.7	-4.5	1.1	-8.8	4.8	-0.7	-1.5
2018b - 2018a	13.1	6.0	5.7	3.0	15.4	3.8	3.4	4.1	-13.5	-7.9	0.0	-13.4	-11.4	-3.1
2018c - 2018b	-0.9	0.2	0.2	1.0	1.7	1.2	1.2	4.7	-11.4	-1.9	6.5	-8.0	-6.9	14.5
2018d - 2018c	-9.1	-2.7	-2.3	-6.7	-4.8	-1.8	-1.8	3.5	15.5	1.3	-9.1	10.4	3.0	11.3
2019a - 2018d	0.5	0.2	0.1	3.4	-10.0	-1.9	-1.5	1.4	0.2	3.7	30.0	-3.5	4.9	2.5
2019b - 2019a	16.5	6.0	5.6	3.0	12.4	3.8	3.4	9.1	-16.8	-11.8	-17.9	-8.0	-10.7	-19.8
2019c - 2019b	1.0	0.2	0.1	0.6	5.0	0.8	0.6	8.0	4.4	-3.6	-25.0	-6.1	-5.1	6.2
2019d - 2019c	-2.1	-2.3	-2.5	2.2	-4.3	-1.8	-1.7	3.2	1.1	-0.8	41.7	-0.5	5.1	-11.6
2020a - 2019d	-15.3	-3.7	-3.1	-8.7	-6.8	-4.4	-4.3	-4.7	-14.3	-6.0	-14.7	-4.9	0.2	-4.9
2020b - 2020a	-16.9	-7.3	-6.8	5.5	-8.5	-6.3	-6.2	0.2	13.2	5.0	17.2	5.4	7.6	27.6
2020c - 2020b	30.0	12.7	12.1	12.9	17.3	11.4	11.2	15.0	-3.4	-4.0	20.6	-3.7	-14.1	-28.4
2020d - 2020c	-21.2	-5.2	-4.8	-4.9	-13.8	-5.4	-5.0	-7.1	-12.3	2.2	-14.6	1.0	5.4	35.8
2021a - 2020d	-8.4	-2.3	-2.1	-1.5	-2.5	-1.5	-1.6	-3.3	13.8	-5.0	8.6	15.5	-10.1	-12.5

Table 4.3.2 presents the corresponding differences between consecutive quarter estimates (for the time period 2019 4^{o} quarter – 2021 1^{o} quarter), computed using the initial survey estimates.

Table 4.3.2: Percentage changes between the initial estimates of consecutive quarters

	EMPLOYED FEMALE				EMPLOYED MALE				UNEMPLOYED FEMALE			UNEMPLOYED MALE		
% DIFFERENCE BETWEEN ESTIMATES	15-24	20 - 64	25-64	65+	15-24	20 - 64	25-64	65+	15-24	25-64	65+	15-24	25-64	65+
2019d - 2019c	-3.8	-1.8	-1.8	6.7	-5.0	-1.8	-1.7	-0.7	2.1	-2.5	41.7	3.4	5.5	-4.8
2020a - 2019d	-10.1	-0.6	-0.1	-3.3	-3.7	-1.8	-1.7	0.7	-4.6	-7.8	-11.8	-4.8	-2.0	-15.3
2020b - 2020a	-4.8	-0.2	0.0	6.1	1.2	-0.4	-0.5	2.0	9.6	2.5	13.3	1.6	3.1	6.0
2020c - 2020b	7.8	1.6	1.3	6.4	9.0	2.3	2.1	7.4	2.9	2.8	0.0	-3.4	-7.0	13.2
2020d - 2020c	-7.7	-0.5	-0.4	-6.9	-11.9	-1.5	-1.1	-1.6	-13.4	-0.2	-17.6	4.1	-0.6	18.3
2021a - 2020d	-22.4	-8.4	-7.9	5.8	-5.7	-5.4	-5.5	2.6	17.2	-1.8	35.7	26.0	-5.0	-11.3

We observe that the revision is shifting the break of the timeseries form the 1st quarter of 2021 to the 2nd quarter of 2020. This is more evident in the timeseries for persons 25 – 64 (and 20 – 64) years old. This effect is easily explained if we take in to account the fact that in this quarter we had the greatest impact of the COVID pandemic restrictive measures. A similar effect is observed in the 4th quarter 2020 (when restrictive measures were applied again).

5. Changes in the estimated unemployment rate

The change in the estimates of the number of employed and unemployed affects the estimated unemployment rate. Table 5.1 shows, by quarter and by sex, the initial unemployment rate, the estimated unemployment rate after the new weighting is applied and the final unemployment rate - that is, the unemployment rate resulting from the revision of the number of employed and unemployed.

Table 5.2 presents the corresponding differences between the initial and the revised unemployment rates. In most cases, the new weighting procedure increases the unemployment rate – for the total and for both sexes. The difference varies from -0.2% to 0.6% for the total, from -0.2% to 0.4% for men, and from -0.2% to 0.9% for women.

In most quarters, the final revised unemployment rate is higher than the initial. From 2009 to 2019 the change in the unemployment rate is on average 0.3% (0.2% for men and 0.4% for women). In 2020, the impact of the revision is stronger: the total unemployment rate increases on average by 1.3 percentage points (the corresponding increase is 1 for men and 1.7 for women). The largest increase is recorded in the 2nd quarter of 2020 (2.6 percentage points for the total 2.1 for men and 3.2 for women). These large differences because in that quarter (due to the COVID-19 pandemic) a large number of people declared absence from work during the reference week. According to the new definition, some of the above persons are no longer classified as employed and some of them are classified as unemployed (see Chapter 4.1). As a result, the unemployment rate rises as the number of employed decreases and the number of unemployed increases.

Table 5.1: Unemployment rate by sex and quarter (initial estimate, estimate after new weighting and final estimate)

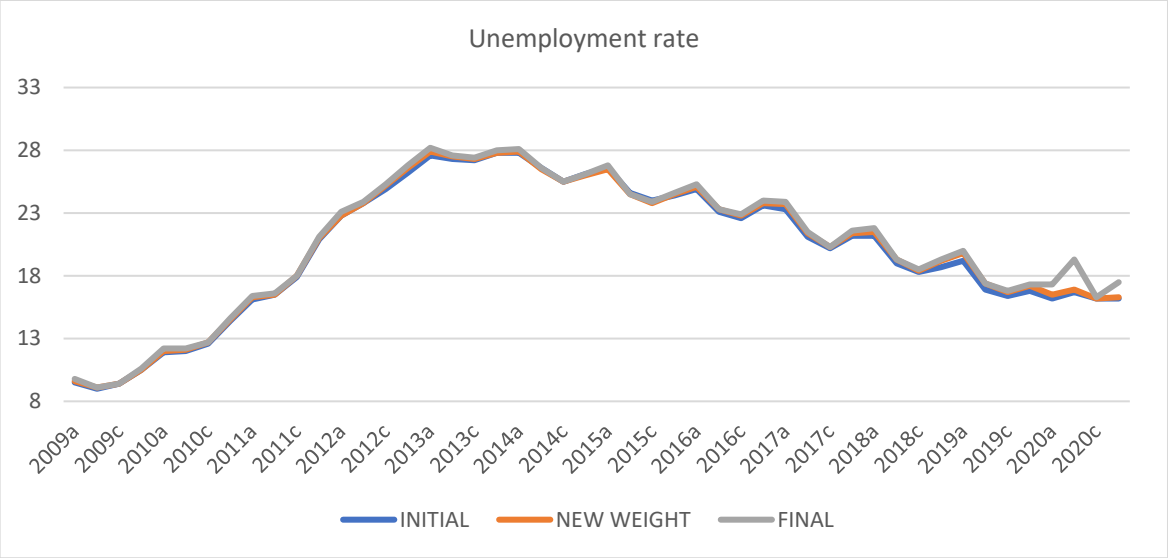
	TOTAL			MALES			FEMALES		
QUARTER	INITIAL RATE	RATE WITH NEW WEIGHTS	FINAL RATE	INITIAL RATE	RATE WITH NEW WEIGHTS	FINAL RATE	INITIAL RATE	RATE WITH NEW WEIGHTS	FINAL RATE
2009a	9.5	9.6	9.8	6.9	7.0	7.1	13.1	13.3	13.6
2009b	9.0	9.1	9.1	6.4	6.5	6.5	12.6	12.7	12.8
2009c	9.4	9.4	9.4	6.7	6.7	6.7	13.2	13.2	13.2
2009d	10.5	10.5	10.6	7.8	7.8	7.9	14.2	14.3	14.5
2010a	11.9	12.0	12.2	9.2	9.2	9.3	15.6	15.9	16.1
2010b	12.0	12.1	12.2	9.5	9.6	9.6	15.4	15.6	15.7
2010c	12.6	12.7	12.7	9.8	9.9	10.0	16.2	16.4	16.4
2010d	14.4	14.5	14.6	11.7	11.7	11.8	18.1	18.3	18.4
2011a	16.1	16.3	16.4	13.5	13.6	13.7	19.6	19.9	20.1
2011b	16.5	16.5	16.6	13.8	13.9	13.9	20.1	20.2	20.2
2011c	17.9	18.0	18.0	15.2	15.2	15.3	21.6	21.8	21.8
2011d	20.9	21.0	21.1	18.1	18.1	18.3	24.7	24.8	24.9
2012a	22.8	22.8	23.1	19.9	19.9	20.2	26.6	26.7	26.9
2012b	23.8	23.8	23.9	21.0	21.0	21.2	27.4	27.5	27.6
2012c	24.9	25.2	25.3	21.8	22.0	22.1	28.9	29.3	29.4
2012d	26.2	26.6	26.8	23.5	23.8	24.0	29.8	30.3	30.4
2013a	27.6	27.9	28.2	24.9	25.2	25.5	31.1	31.5	31.7
2013b	27.3	27.5	27.6	24.3	24.5	24.6	31.2	31.5	31.5
2013c	27.2	27.3	27.4	24.0	24.1	24.2	31.3	31.5	31.6
2013d	27.8	27.8	28.0	24.7	24.7	24.9	31.7	31.9	32.0
2014a	27.8	27.9	28.1	25.0	25.0	25.2	31.4	31.6	31.9
2014b	26.6	26.5	26.6	23.5	23.5	23.6	30.4	30.5	30.5
2014c	25.5	25.5	25.5	22.6	22.5	22.6	29.2	29.3	29.3
2014d	26.1	26.0	26.1	23.3	23.1	23.3	29.6	29.6	29.8
2015a	26.6	26.5	26.8	23.5	23.3	23.5	30.6	30.6	30.9
2015b	24.6	24.5	24.5	21.5	21.4	21.5	28.3	28.3	28.4
2015c	24.0	23.8	23.9	20.7	20.6	20.6	28.1	27.9	27.9
2015d	24.4	24.5	24.6	21.2	21.3	21.4	28.4	28.5	28.6
2016a	24.9	25.1	25.3	21.2	21.4	21.5	29.5	29.7	29.9
2016b	23.1	23.3	23.3	19.4	19.6	19.7	27.6	27.8	27.9
2016c	22.6	22.8	22.9	18.9	19.1	19.1	27.2	27.5	27.6
2016d	23.6	23.8	24.0	19.9	20.1	20.3	28.1	28.4	28.6
2017a	23.3	23.7	23.9	19.8	20.2	20.4	27.8	28.1	28.3
2017b	21.1	21.4	21.5	17.7	18.0	18.0	25.4	25.7	25.8
2017c	20.2	20.3	20.3	16.5	16.5	16.6	24.9	25.0	25.1
2017d	21.2	21.4	21.6	17.3	17.6	17.7	26.1	26.3	26.5
2018a	21.2	21.5	21.8	17.2	17.6	17.8	26.2	26.5	26.9
2018b	19.0	19.3	19.3	15.2	15.5	15.6	23.7	24.0	24.1
2018c	18.3	18.4	18.5	14.3	14.5	14.5	23.3	23.5	23.5
2018d	18.7	19.2	19.3	14.7	15.1	15.2	23.7	24.3	24.5
2019a	19.2	19.8	20.0	15.4	15.7	16.0	24.0	24.8	25.1
2019b	16.9	17.4	17.4	13.7	14.0	14.0	20.9	21.6	21.7
2019c	16.4	16.7	16.8	13.0	13.3	13.3	20.5	21.1	21.1
2019d	16.8	17.2	17.3	13.8	13.9	14.0	20.5	21.4	21.5
2020a	16.2	16.5	17.3	13.7	13.8	14.5	19.3	20.1	20.9
2020b	16.7	16.9	19.3	14.1	14.1	16.2	19.9	20.5	23.1
2020c	16.2	16.2	16.3	13.1	13.0	13.1	20.0	20.3	20.5
2020d	16.2	16.3	17.5	13.3	13.4	14.4	19.9	20.1	21.5

Table 5.2: Change in unemployment rate by sex and quarter

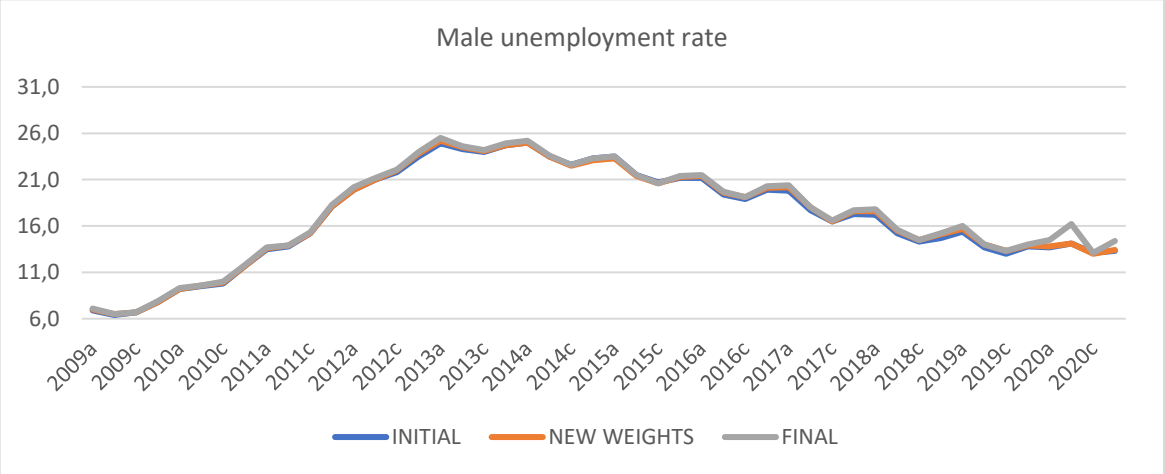
	TOTAL		MALES		FEMALES			TOTAL		MALES		FEMALES	
QUARTER	CHANGE DUE TO WEIGHTING	TOTAL CHANGE	CHANGE DUE TO WEIGHTING	TOTAL CHANGE	CHANGE DUE TO WEIGHTING	TOTAL CHANGE	QUATER	CHANGE DUE TO WEIGHTING	TOTAL CHANGE	CHANGE DUE TO WEIGHTING	TOTAL CHANGE	CHANGE DUE TO WEIGHTING	TOTAL CHANGE
2009a	0.1	0.3	0.1	0.2	0.2	0.5	2015a	-0.1	0.2	-0.2	0.0	0.0	0.3
2009b	0.1	0.1	0.1	0.1	0.1	0.2	2015b	-0.1	-0.1	-0.1	0.0	0.0	0.1
2009c	0.0	0.0	0.0	0.0	0.0	0.0	2015c	-0.2	-0.1	-0.1	-0.1	-0.2	-0.2
2009d	0.0	0.1	0.0	0.1	0.1	0.3	2015d	0.1	0.2	0.1	0.2	0.1	0.2
2010a	0.1	0.3	0.0	0.1	0.3	0.5	2016a	0.2	0.4	0.2	0.3	0.2	0.4
2010b	0.1	0.2	0.1	0.1	0.2	0.3	2016b	0.2	0.2	0.2	0.3	0.2	0.3
2010c	0.1	0.1	0.1	0.2	0.2	0.2	2016c	0.2	0.3	0.2	0.2	0.3	0.4
2010d	0.1	0.2	0.0	0.1	0.2	0.3	2016d	0.2	0.4	0.2	0.4	0.3	0.5
2011a	0.2	0.3	0.1	0.2	0.3	0.5	2017a	0.4	0.6	0.4	0.6	0.3	0.5
2011b	0.0	0.1	0.1	0.1	0.1	0.1	2017b	0.3	0.4	0.3	0.3	0.3	0.4
2011c	0.1	0.1	0.0	0.1	0.2	0.2	2017c	0.1	0.1	0.0	0.1	0.1	0.2
2011d	0.1	0.2	0.0	0.2	0.1	0.2	2017d	0.2	0.4	0.3	0.4	0.2	0.4
2012a	0.0	0.3	0.0	0.3	0.1	0.3	2018a	0.3	0.6	0.4	0.6	0.3	0.7
2012b	0.0	0.1	0.0	0.2	0.1	0.2	2018b	0.3	0.3	0.3	0.4	0.3	0.4
2012c	0.3	0.4	0.2	0.3	0.4	0.5	2018c	0.1	0.2	0.2	0.2	0.2	0.2
2012d	0.4	0.6	0.3	0.5	0.5	0.6	2018d	0.5	0.6	0.4	0.5	0.6	0.8
2013a	0.3	0.6	0.3	0.6	0.4	0.6	2019a	0.6	0.8	0.3	0.6	0.8	1.1
2013b	0.2	0.3	0.2	0.3	0.3	0.3	2019b	0.5	0.5	0.3	0.3	0.7	0.8
2013c	0.1	0.2	0.1	0.2	0.2	0.3	2019c	0.3	0.4	0.3	0.3	0.6	0.6
2013d	0.0	0.2	0.0	0.2	0.2	0.3	2019d	0.4	0.5	0.1	0.2	0.9	1.0
2014a	0.1	0.3	0.0	0.2	0.2	0.5	2020a	0.3	1.1	0.1	0.8	0.8	1.6
2014b	-0.1	0.0	0.0	0.1	0.1	0.1	2020b	0.2	2.6	0.0	2.1	0.6	3.2
2014c	0.0	0.0	-0.1	0.0	0.1	0.1	2020c	0.0	0.1	-0.1	0.0	0.3	0.5
2014d	-0.1	0.0	-0.2	0.0	0.0	0.2	2020d	0.1	1.3	0.1	1.1	0.2	1.6

The following graphs present the evolution of unemployment rate for the total, male and female for the time period 2009-2020.

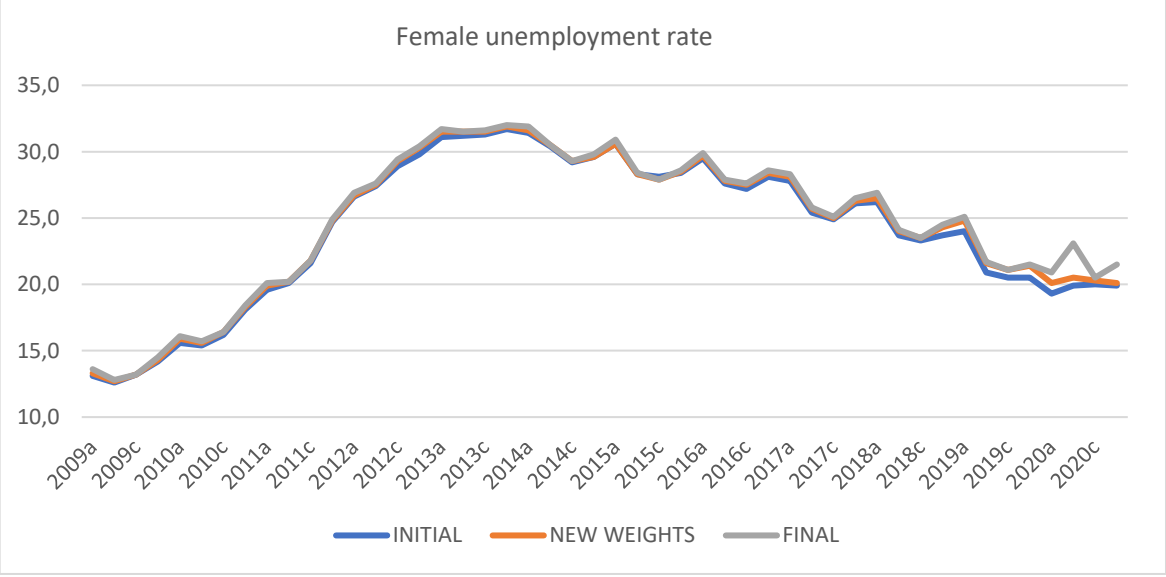
Graph 5.1: Total unemployment rate (Initial, after new weighting, final)



Graph 5.2: Male unemployment rate (Initial, after new weighting, final)



Graph 5.3: Female unemployment rate (Initial, after new weighting, final)



6. Cocnlusions

Although the observed differences between the quarterly estimates in the 4th quarter of 2020 and those produced by the pilot are significant, they do not allow a safe assessment of the impact of the changes introduced by the new regulation of the LFS survey.

Any difference between the quarterly estimates and the pilot estimates has two components: The difference that results from the fact that these estimates are produced from different samples and the difference that is due to changes in methodology (change of questionnaire, definitions, etc.). In order to assess the possible effect of the different sample, we can calculate – for all previous quarters of the survey - the difference between the quarterly estimates and those produced based on the sample of the 1st wave[3].

This calculation indicates that the differences between the pilot and the quarterly survey of the fourth quarter of 2020 may simply be due to the fact that the pilots' results come from a sample which is about half that of the first wave: for example, in the case of employed women aged 25-64, the difference between pilot and LFS quarterly estimate is 2.1% while the corresponding difference between quarterly estimates and first wave estimates in the time period 2017-2019 ranges from -1.8% to 3.7%.

Therefore, due to the observed large differences between the quarterly estimates and the estimates produced by the 1st wave of the survey, we can conclude that it is not safe to use the observed differences between the pilot survey and the 4th quarter LFS to safely assess the impact of the new definition of employment and changes in LFS methodology.

The impact of the change in weighing scheme can be accurately estimated for each quarter of the survey up to 2020. The observed differences in the case of employed are rather small. There are more significant differences in the estimated number of unemployed. These changes can be incorporated at the level of individual into the database (by recalculating each individual's weighting factor) and allow the production of revised estimates for each survey variable for the years 2009-2020.

The effect of the changes in employment definition and the survey questionnaire can be assessed by using correction factors, at an aggregated level, for the various combinations of sex, age group, professional status, and reason of absence from work in the previous quarters. These correction factors are calculated based on the results of the survey of the first quarter of 2021 and are applied to the results of the years 2009-2020.

The final revised series result from the combination of the application of the new weighting at the individual level and the revised results at the aggregated level of combinations of sex, age group and professional status. The observed changes in the time period 2009-2019 are small while significant revisions occur only in the year 2020, a period characterized by the effects of the COVID pandemic on the labour market.

[3] The comparison was implemented for the years 2017 – 2019. We should not that the pilot is more similar to the 1st wave of the survey since they are implemented in households interviewed for the first time.

ANNEX: REVISION OF MONTHLY RESULTS

Production of the Labour Force Survey monthly results

Labour Force Survey's monthly results are computed by seasonally adjusting estimates that are produced using the subsample that is surveyed for the corresponding month.

Every time that the results for a new month are published, the whole timeseries is re-adjusted, and as a result, previous monthly estimates are revised.

Additionally, when the final results for a new quarter are published, the monthly results of the corresponding months are benchmarked to the quarterly results, in order that the arithmetic mean of the 3 monthly estimates of a characteristic to be equal with the quarterly estimate.

Adjusting monthly results to the revised quarterly results

After computing quarterly break-free timeseries for employed and unemployed by sex and age groups, the corresponding monthly timeseries should be benchmarked to the **revised** quarterly timeseries in order that the mean monthly estimates to be still equal to the quarterly results.

In order to benchmark the monthly results, a proportional correction factor was applied to the original monthly results. The proportional correction gives smoother changes between the last month of a quarter and the first month of the following quarter. The result of the revision can be found at ELSTAT's website.

Computation of the proportional correction factor

Let us suppose that before the revision, we had the following quarterly and monthly results for a particular characteristic:

Step 1

			Original results	
Year	**Quarter**	**Month**	**Q**	**M**
N	**Q4**		90.000	
N+1	**Q1**	**Q1M1**	100.000	95.000
N+1	**Q1**	**Q1M2**	100.000	100.000
N+1	**Q1**	**Q1M3**	100.000	105.000
N+1	**Q2**	**Q2M1**	120.000	110.000
N+1	**Q2**	**Q2M2**	120.000	120.000
N+1	**Q2**	**Q2M3**	120.000	130.000
N+1	**Q3**		140.000	

We can see that the mean of the three monthly estimates (for example, (Q1M1 + Q1M2 + Q1M3)/3) is equal to the corresponding quarterly estimate: (95000+100000+105000)/3 = 100000.

Let us suppose that after the revision of the quarterly results we have:

Step 2

			Original results		Revised quarterly results	Absolute difference between quarterly results	Percentage difference between quarterly results
Year	**Quarter**	**Month**	**Q**	**M**			
N	**Q4**		90.000		90.000	0	0
N+1	**Q1**	**Q1M1**	100.000	95.000			
N+1	**Q1**	**Q1M2**	100.000	100.000	110.000	10.000	10
N+1	**Q1**	**Q1M3**	100.000	105.000			
N+1	**Q2**	**Q2M1**	120.000	110.000			
N+1	**Q2**	**Q2M2**	120.000	120.000	160.000	40.000	33
N+1	**Q2**	**Q2M3**	120.000	130.000			
N+1	**Q3**		140.000		190.000	50.000	36

In a first step, we define for each "middle" month a percentage of change equal to quarterly change, while for the other months we define a percentage of change "between" the quarterly changes of consecutive quarters:

Step 3

			Original results		Percentage difference between quarterly results	Percentage for monthly results
Year	**Quarter**	**Month**	**Q**	**M**		
N	**Q4**		90.000		0	
N+1	**Q1**	**Q1M1**	100.000	95.000		0 + (10 – 0)*(2/3) = 7
N+1	**Q1**	**Q1M2**	100.000	100.000	10	*10*
N+1	**Q1**	**Q1M3**	100.000	105.000		10 + (33 – 10) * (1/3) = 18
N+1	**Q2**	**Q2M1**	120.000	110.000		10 + (33 – 10) * (2/3) = 26
N+1	**Q2**	**Q2M2**	120.000	120.000	33	*33*
N+1	**Q2**	**Q2M3**	120.000	130.000		33 + (36 – 33)*(1/3) = 34
N+1	**Q3**		140.000		36	

Applying these percentages of change we end up in a first monthly estimate

Step 4

			Original results	Revised quarterly results	% Change	1st monthly estimation	Mean of monthly estimates
Year	**Quarter**	**Month**	**M**	**Q**			
N	**Q4**				0		
N+1	**Q1**	**Q1M1**	95.000	110.000	7	101.333	
N+1	**Q1**	**Q1M2**	100.000	110.000	10	*110.000*	*111.667*
N+1	**Q1**	**Q1M3**	105.000	110.000	18	123.667	
N+1	**Q2**	**Q2M1**	110.000	160.000	26	138.111	
N+1	**Q2**	**Q2M2**	120.000	160.000	33	*160.000*	*157.492*
N+1	**Q2**	**Q2M3**	130.000	160.000	34	174.365	
N+1	**Q3**				36		

We observe (in the last column of the table is Step 4), that the mean of the new monthly estimates differs from the quarterly estimate. We will proceed with a last step where we multiply each monthly estimate by the quarterly estimate and divide by the mean of the monthly estimates computed in Step 4.

Step 5

			Original results	Revised quarterly results	1st monthly estimation	Mean of monthly estimates	Final monthly estimation	Mean of monthly estimates
Year	**Quarter**	**Month**	**M**	**Q**				
N+1	**Q1**	**Q1M1**	95.000	110.000	101.333		99.821	
N+1	**Q1**	**Q1M2**	100.000	110.000	*110.000*	*111.667*	108.358	*110.000*
N+1	**Q1**	**Q1M3**	105.000	110.000	123.667		121.821	
N+1	**Q2**	**Q2M1**	110.000	160.000	138.111		140.310	
N+1	**Q2**	**Q2M2**	120.000	160.000	*160.000*	*157.492*	162.548	*160.000*
N+1	**Q2**	**Q2M3**	130.000	160.000	174.365		177.142	