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Austrian LFS Monthly Unemployment Rates

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Abstract: Since January 2011 Statistics Austria publishes monthly unemployment rates according to international definitions. Data stem solely from the Labour Force Survey and do not include any further information like national unemployment figures. Monthly unemployment rates are based on an adopted weighting scheme derived from the standard weighting scheme for quarterly data. This procedure allows computing flash as well as final monthly unemployment estimates. Flash estimates are available in time to be used for Eurostat's harmonized unemployment statistics which are part of the Principle European Economic Indicator set. Eurostat publishes monthly unemployment rates for the whole population as well as for some subgroups. Unadjusted values, seasonally adjusted values and trends components are available in the Eurostat's data warehouse 'new cronos'. Most of Austrians (non-adjusted) monthly unemployment series (based on LFS data only) show no seasonal pattern and rather high volatility, especially series of small subgroups are quite erratic. Standard seasonal adjustment techniques recommended by Eurostat do not fit the specific Austrian situation. Therefore a new approach which is a compromise between the needs of Eurostat and the available data is pursued. Instead of applying seasonal adjustment techniques, trend calculations are carried out. Trend components are used as (seasonally) adjusted values.

Zusammenfassung: Seit Jänner 2011 produziert und veröffentlicht Statistik Austria monatliche Arbeitslosenquoten nach internationaler Definition. Die Daten stammen ausschließlich aus der Arbeitskräfteerhebung und beinhalten keine weiteren Informationen wie z.B. nationale Arbeitslosenzahlen des Arbeitsmarkservice. Für die Berechnung von monatlichen Schätzern wurde das Standardverfahren der Quartalsgewichtung an die Erfordernisse und Gegebenheiten einer Monatsgewichtung angepasst. Diese Monatsschätzer sind international vergleichbar und werden auch an Eurostat übermittelt, wo sie als Euro-Indikatoren Verwendung finden. Eurostat publiziert monatliche Arbeitslosenquoten für die Gesamtbevölkerung und einige Teilpopulationen. In eine Datenbank werden Originalwerte, saisonbereinigte Werte und Trendwert zur Verfügung gestellt. Die Zeitreihen der österreichischen monatlichen Arbeitslosenzahlen nach internationaler Definition zeigen kaum saisonale Muster und eine relativ große Volatilität, v.a. in den kleineren Teilpopulationen. Auf die Verwendung der von Eurostat empfohlenen Standardverfahren zur Saisonbereinigung konnte daher nicht zurückgegriffen werden. Statt der klassischen Saisonbereinigung wird nur eine Trendschätzung

durchgeführt, die Trendkomponenten werden als bereinigte Werte verwendet. Dieses Vorgehen ist in Einklang mit den Daten und den Erfordernissen von Eurostat.

Keywords: Weighting, Time Series, Trend Component.

1 Introduction

The harmonized monthly unemployment rate is one important Principal European Economic Indicator (PEEI) monthly published by Eurostat. In the past, Austrian unemployment figures were estimated by Eurostat, partly based on data from Statistics Austria (STAT). To account for changes in the length of time series, availability of data etc., several changes and adjustments of the estimation process took place during the last few years. With reference month January 2011 another major change in the estimation of Austrian harmonized monthly unemployment rates followed. Since 2011 Eurostat receives the premade estimates calculated by Statistics Austria, based on LFS data only. This article describes the new estimation process. It starts with a review of the used dataset, a short summary of the estimation approach previously used by Eurostat, and an overview of the new concept, goes on to the description of the monthly weighting procedure, and the estimation of unemployment figures, and ends with a discussion of the time series adjustments and an evaluation of the results based on the new estimation process.

1.1 The Austrian Microcensus

The Austrian Labour Force Survey (LFS) is based on the definitions of the International Labour Organization (ILO) of employment and unemployment (labour force concept). It is part of the Austrian microcensus, which was started in the early seventies of the last century and was completely renewed in 2004. The sample of the microcensus is a regionally (NUTS-2) stratified random sample of private households, and the selection frame is the Austrian central population register. Each household is assigned to a reference week and most of the questions refer to that week. The households are evenly distributed across all weeks of a quarter. The Austrian microcensus is a rotating sample. Each quarter one fifth of the whole sample is interviewed for the first time, one fifth is interviewed for the second time, and so on. Once a household is selected, it stays within the microcensus for five quarters. The first survey is a face-to-face (F2F) interview and the following interviews are computer-assisted telephone interviews (CATI). Since the 2^{nd} quarter of 2006 the F2F interviews have also been computer-assisted (CAPI = computer assisted personal interviews); before the 2^{nd} quarter of 2006, these interviews were based on paper and pencil (PAPI). Both CAPI and CATI interviewers must conduct the survey within five weeks from the end of the reference week. For the 3^{rd} quarter, this time limit is extended to six weeks after the end of the reference week. The Austrian microcensus is regulated by law (Erwerbs- und Wohnungsstatistikverordnung (EWStV) 549/2003, from 2010 onwards Erwerbs- und Wohnungsstatistikverordnung (EWStV) 111/2010). Each quarter, approximately 23,000 households are selected, which means that about 50,000 persons are legally bound to participate. Nevertheless, interviewees are not forced to answer the

questions personally; any other adult living in the same household is allowed to answer by proxy. For more information on the Austrian microcensus see Kytir and Stadler (2004). Quarterly and yearly results from the LFS are published on a regular basis and provide a deep insight into the Austrian labour market.

1.2 Harmonized Monthly Unemployment Rates

Eurostat, the statistical institute of the European Union, publishes harmonized monthly unemployment rates (i.e. following the ILO definitions, and adjusting seasonality) for all 27 EU member states, some aggregates like EU27 or euro area, and some other important non European states (US and Japan) with a time lag of one month. The unemployment rate is the ratio between unemployed persons (aged 15 to 74) and the total labour force (also between 15 to 74 years of age). The labour force is the total number of persons employed and unemployed.

$$\frac{U_{age\in[15;74]}}{U_{age\in[15;74]} + E_{age\in[15;74]}}\,, \tag{1}$$

where U denotes the total number of people unemployed and E stands for the total number of people employed. Depending on the circumstances of data availability in the single countries, Eurostat uses one of several different methods to produce these harmonized figures. Until reference month December 2010, Eurostat's estimation of Austrian monthly unemployment figures was based on two different data sources. The level of the unemployment rate was based on (quarterly) LFS data, which are internationally comparable as they follow the definitions of the ILO. The short-term trend of the estimates reflected the development of the national monthly figures of registered unemployed from the Public Employment Service Austria (AMS), the country's national unemployment agency. Seasonal adjustment (s.a.) was done with TRAMOS/SEATS (Gomez & Maravall, 1996). About 30 days after the end of the reference month flash estimates[1] of monthly unemployment are published. As soon as the latest quarterly LFS data were available, monthly unemployment rates were revised and revisions were published in the subsequent press release. Eurostat receives the final Austrian LFS dataset within twelve weeks from the end of the reference period at the latest (see Council Regulation (EC) No 577/98). For some months the change of unemployment figures between flash and final estimates were rather high and posed problems for users. Table 1 gives the changes in the seasonally adjusted monthly unemployment rates of the whole population (aged 15 to 74) for 2009, estimated by Eurostat at different points in time. The first row gives the estimates published one month after the reference month, the second row shows the estimates published two months after the reference month, the last row gives the 'final' estimates, published in January 2011.

For some subgroups these changes were even higher, e.g. the seasonally adjusted unemployment rate of men in April 2010 was initially estimated to be 5.3 %, one month later – after the inclusion of new quarterly LFS data – it was estimated to be 4.0 %.

[1] Flash estimates are available shortly after the reference period but do not include the whole information. Flash estimates are preliminary and get replaced by final estimates as soon as final figures are available.

Table 1: S.a. monthly unemployment rates (in percent) by Eurostat at different points in time, 2009.

	Months 2009											
	1	2	3	4	5	6	7	8	9	10	11	12
1^{st}	4.0	4.5	4.5	4.2	4.3	4.4	4.4	4.7	4.8	4.7	5.5	5.4
2^{nd}	4.3	4.5	4.3	4.3	4.4	4.4	4.8	4.7	4.7	5.6	5.5	5.4
fin	4.3	4.5	4.6	4.7	4.8	5.0	5.2	5.2	5.1	4.9	4.7	4.6

1.3 An Alternative Approach

In contrast to the approach used by Eurostat, the new monthly unemployment rates are based on LFS data only, i.e. without any direct use of data on unemployment based on national definitions. The main issue of this new approach is the use of an adopted weighting scheme for monthly data. This monthly weighting procedure was developed within the frame of a project financed by Eurostat, which started on the 1^{st} of January 2007 and ended on the 31^{st} of December 2008 (Fröhlich, Gumprecht, & Haslinger, 2009). Preliminary (flash) monthly LFS unemployment rates of all (sub-)populations can be produced within a time lag of 25 days after the end of the reference month, early enough to be used by Eurostat. Final monthly LFS rates are available at the time the quarterly LFS dataset is finalized. A comparison of flash and final monthly estimates shows rather low difference, i.e. the changes between flash and final estimates are small. Most of the time series show no seasonal pattern and rather high volatility, especially series of small subgroups (with small sample sizes) are highly erratic. Nevertheless, the unemployment rates simply calculated from monthly weighted data do not fulfil all standards needed to be accepted as 'harmonized' by Eurostat. Firstly, Eurostat requests seasonal adjustment for all series. However, various monthly time series show no seasonal pattern, and classical seasonal adjustment, as required by Eurostat, should not be done. Secondly, these simple monthly estimates are not fully consistent with regular quarterly results in the sense that the three months mean of a quarter does not give exactly the same value as the regular published quarterly result. This consistency is required by Eurostat and solved by revising the monthly estimates after quarterly estimates are available. The solutions of both problems are accredited by Eurostat.

In the following sections the idea behind the weighting of quarterly and monthly LFS data is described. Once weighted monthly LFS data are available time series can be established and analysed. Depending on the characteristics of the Austrian monthly time series and some features claimed by Eurostat, seasonal adjustment and trend estimation is discussed. Finally the adjusted series, based on this alternative approach, are presented and evaluated.

2 Weighting of LFS Data

The Austrian microcensus is a regionally (NUTS-2) stratified random sample of households with different sample fractions for each region. Different sample fractions for some

districts within a region are caused by organisational reasons. To get an unbiased picture of the total population based on the microcensus sample, sample values have to be weighted for all strata separately. In the current weighting procedure of the Austrian microcensus demographic (sex, age, nationality), regional (NUTS-2 region) and household (number of persons living in the household) information are used.

Quarterly data of the Austrian microcensus are weighted to fit to the quarterly stock figures of population statistics derived from data of the register of residents. Calibration is performed by iterative proportional fitting. Here, the special sampling design of the microcensus, i.e. regional stratification according to NUTS-2 and individual sampling fractions for these regions, is considered. As a result, microcensus data show the same distribution of persons by NUTS-2 region, age and sex, as well as by NUTS-2 region and nationality, and by NUTS-2 region and household size as the statistical population register POPREG. A detailed description of the weighting procedure for quarterly microcensus data can be found in Haslinger and Kytir (2006).

Weighting for monthly data is performed along the lines of quarterly data weighting. The following population characteristics are used for calibration:

- Total number of persons in private households in NUTS-2 region b (nine categories), age class a (0–2 years, 3–5 years, 6–9, 10–14, ..., 80–84, 85+) and sex s, according to population statistics (POPREG).
- Total number of persons in private households with nationality n (Austria, EU-15 excluding Austria, Former Yugoslavia, Turkey, Others) according to population statistics (POPREG).[2]
- Total number of households in NUTS-2 region b (nine regions) with g (1, 2, ..., 6+) residents in a quarter.

For all three months of a quarter the same calibration specifications are used, namely the ones of the quarter, i.e. the specifications refer to the first day of the quarter. For the flash estimates the weighting specifications stem from the previous quarter as the values of the current quarter are not yet available at the time of estimation. Incidentally, there is a negligible difference between the use of specifications from the previous or the current quarter as population statistics are very stable and show nearly no changes within such a short period like a few months. For the sake of accuracy, calibration specifications for the final monthly estimates (based on the complete monthly dataset) stem from the current quarter. Final monthly estimates of all three months of a quarter can be calculated at the same time, namely at the time when the regular quarterly LFS dataset is completed. Final monthly estimates can be calculated twelve weeks after the end of the reference quarter at the latest (deadline for transmitting quarterly results to Eurostat), usually Austrian results are available earlier (approximately within nine weeks after the end of the reference quarter).

Summarizing the results (details can be found in Fröhlich et al., 2009) of the unemployment rates based on this monthly weights, one can see that differences between flash and final estimates are much smaller than the revisions of the Eurostat estimates. This big

[2]This is a deviation from the quarterly weighting scheme where the distribution of nationality within each NUTS-2 region, not only within total Austria, is used.

disadvantage of the Eurostat estimates could thus be avoided. However, the problem of strongly fluctuating values especially in smaller subgroups like young women (plots are given in the next sections) is an obvious drawback of this monthly weighting approach. In addition, seasonal adjustment of the time series by applying standard methods failed in the past.

3 Austrian Time Series and Seasonality

In the next sections the problems of identifying seasonal patterns, running some sort of seasonal adjustment and smoothing of the time series are discussed. Sections 3 to 5 stem from a working paper sent to Eurostat for review and approval of the new estimation process. Monthly weights and corresponding values were estimated for all months since January 2004. For some of the following discussions no differentiations between flash and final estimates are made. When the focus is on the whole time series and their decompositions, only final monthly series from January 2004 until June 2010 are taken into account to find an adequate adjustment procedure. The differentiation between flash and final estimates becomes relevant again when the behaviour of flash- and final estimates at turning points, quality indicators for monthly estimates and the problem of consistency between monthly and quarterly unemployment values are discussed.

3.1 Evaluation of Austrian Time Series

To overview the situation in Austria the levels of employees, total labour force, and unemployed persons aged 15 to 74 are shown in the first row of Figure 1. Series of employees and labour force show a clear trend as well as an obvious seasonal structure. High values in summer half-year, low values in winter, and an increasing trend. This meets one's expectations of the Austrian labour market. The series of unemployed persons is not that well-defined. There is a more or less horizontal movement from 2004 until 2006, followed by a decrease until the middle of 2008 and a steep increase until autumn 2009 when the series turned again. Since the second half of 2009 unemployment is again decreasing. All along, series show high volatility in which no clear seasonal pattern can be identified.

For calculating monthly unemployment rates total numbers of unemployment as well as employment are needed, see Equation (1). For the calculation of seasonally adjusted monthly unemployment rates Eurostat recommends an indirect way. Employment and unemployment levels of the smallest subgroups, i.e. young (aged 15 to 24) and older (aged 25 to 74) men and women, should be adjusted. Adjusted subgroups should be cumulated to corresponding super-groups. Rates of all different sub- and super-groups are estimated using the corresponding adjusted levels.

Most series of employment levels show seasonal patterns and can be adjusted using ARIMA X12 (*The X-12-ARIMA Seasonal Adjustment Program*, 2002), see second row in Figure 1. The seasonal behaviour of employment can be seen in series of young and older men, as well as in the series of young women. Even though the picture is not that clear for women as it is for men. There is no such structure in data of employed women aged 25 to 74 - neither in the picture, nor indicated by the F-test which is automatically done in

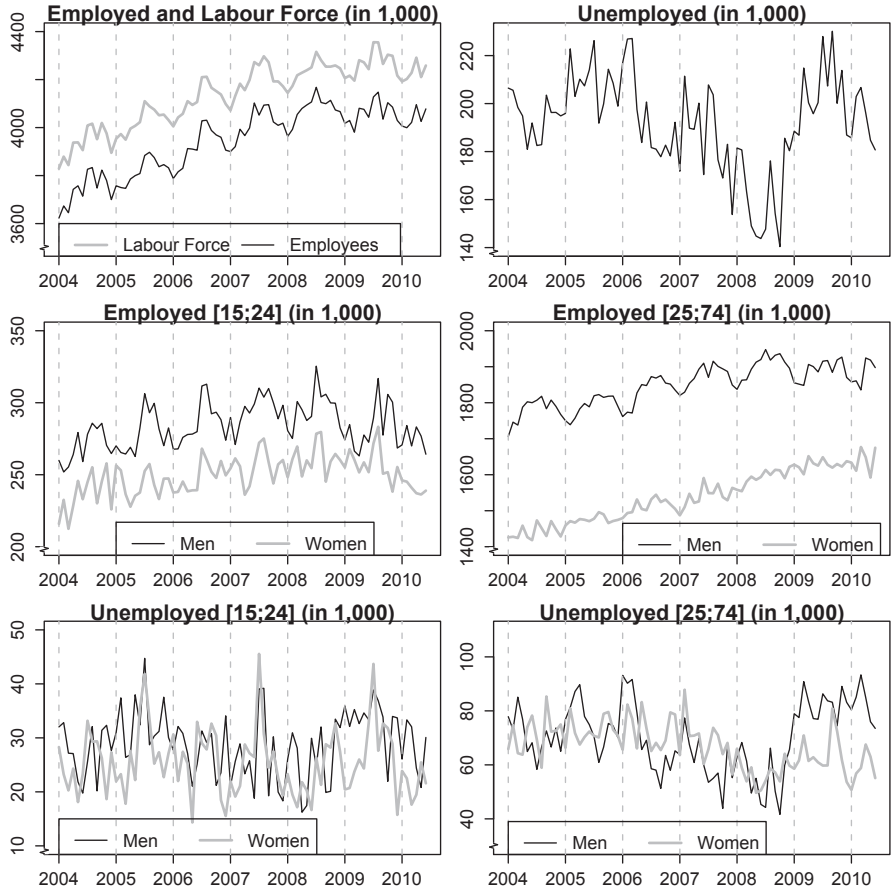

Figure 1: Monthly levels of employees, labour force and unemployed.

the ARIMA X12 program. In general, time series of unemployment show less seasonal structure than series on employment, see third row in Figure 1. A rather obvious pattern can be seen in the group of men aged 25 to 74. Unemployment decreases in spring and it increases in autumn. Unemployment maxima are in winter, the minima are in summer. A clear break can be seen in 2008. Until autumn 2008 unemployment shows a decreasing trend, then it jumps upwards to the level of the beginning of 2006 where it stays until the middle of 2010. The series of young men aged 15 to 24 shows no seasonal structure at all. Series are quite erratic and the trend shows neither a clear direction, nor explicit turning points, maybe some kind of wave movement can be seen. Regarding the age groups of women, the picture is the opposite way around. No seasonal pattern can be found in the unemployment series of women aged 25 to 74, but some kind of structure is inherent in the series of young women. In contrast to the picture of male unemployment, time series show clear peaks in summer.

Currently one cannot assume a clear seasonal structure in all relevant time series and therefore classical seasonal adjustment procedures should not be applied, and some alternative kind of adjustment has to be done. As time series grow longer, the situation might change. The possibility of applying standard seasonal adjustment procedures should be evaluated from time to time, e.g. once a year.

3.2 Consistency: Months and Quarters, Sub- and Super-groups

For harmonized monthly unemployment figures, Eurostat demands seasonally adjusted values, and Eurostat also needs consistency of monthly quarterly and annual data of unemployment[3]. The mean of monthly unadjusted levels should be exactly the same as the unadjusted quarterly levels. Thus the aim is to produce final unadjusted monthly unemployment estimates where the 3-months average gives the final quarterly estimate. As there are slight differences in the weighting procedure between months and quarters, there might be some slight differences in the estimates, compare columns 'q' and 'Not consistent $\bar{m}$' of Table 2. To avoid such discrepancies, total unadjusted final monthly unemployment numbers are slightly adopted. The adjustment is fairly simple, monthly values are multiplied by a factor ($\frac{q}{\bar{m}}$), and this simple computation gives monthly values where the quarterly mean fits exactly the corresponding value of the quarter, that is based on a slightly different weighting scheme. These values will be called month-quarter ($m - q$) consistent. They are calculated as soon as final quarterly results are available. Another requirement from Eurostat concerning monthly unemployment estimates is the prementioned consistency of sub- and super-groups (see previous section). All super-groups should be cumulations of adequate subgroups of the lowest level (i.e. sex and age group), e.g. $U_{Men} = U_{Men[15;24]} + U_{Men[25;74]}$. This demand is also easy to fulfil. Cumulating month-quarter consistent subgroups lead to month-quarter consistent super-groups.

The original final monthly unemployment and employment levels of the smallest subgroups will be benchmarked to quarterly values. These values will be used to calculate trends, super-groups and everything else. Also quality indicators will be based on these benchmarked values.

Table 2: Monthly (m) and quarterly (q) total unemployment, first half-year 2010.

Year	Quarter	Month	LFS	Not consistent		$m - q$ consistent	
			q	m	$\bar{m}$	m	$\bar{m}$
2010	1	1		181.074		185.706	
		2	198.4	197.777	193.6	202.917	198.4
		3		201.851		206.713	
	2	4		196.394		196.132	
		5	187.2	185.275	187.3	184.732	187.2
		6		180.271		180.693	

4 Seasonal Adjustment and Trend Estimation

In addition to the production of seasonally adjusted series, the adjustment (trend calculation) has another advantage, namely the smoothing of the time series. Solely to reduce the problem of erratic fluctuation of monthly unemployment estimates, especially for the

[3]Consistency of employment values is not that important, as no monthly values of employment are published. Nevertheless they have an influence on unemployment. Therefore also employment numbers are adjusted to guarantee consistency of monthly and quarterly values.

subgroups of men and women aged 15 to 24, smoothing would be very helpful. Nevertheless it is not recommendable to apply standard seasonal adjustment techniques if there is no identifiable seasonality. Thus, as long as no seasonal pattern can be identified in all Austrian unemployment figures, some kind of compromise between (classical) seasonal adjustment and no treatment of the series has to be made. Though the trend is estimated and published as adjusted values[4].

Using the trend leads to the question how to calculate it. For Austria a trend-filter is used as implemented in ARIMA X12 and described in detail in the upcoming section. The length of the trend-filter influences the smoothness of the series: the longer the filter, the smoother the series. Not adjusted (n.a.) unemployment series are rather unsteady, especially for younger persons, see plot 5 in Figure 1. It is a quite challenging exercise to select the length of the trend-filter in a way that series become smooth enough to show no unexplainable behaviour anymore, and on the same time stay flexible enough to show 'real' developments and volatility. The length of the filter was chosen to produce a LFS trend series where the volatility is similar to the volatility of the adjusted AMS data. The fundamental idea behind is, that although the definitions of the national and the international way of measuring unemployment are different, the volatility of the series should be similar. AMS series are administrative data. As they are not based on a survey, the inherent volatility shows the 'real' fluctuation of unemployment. Assuming that the 'real' fluctuation of unemployment based on the ILO definitions is the same as in national data, the aim was to find a filterlength for the trend which gives an adjusted line with a similar degree of smoothness as the seasonally adjusted series of the administrative data. A filter of length 5 fulfils this requirement. The selection itself is not based on a mathematical optimization model but on expert opinion.

4.1 Trend Calculation

The maths behind the trend series is – along general lines – as follows. Firstly, the original series are adjusted to remove single, non seasonal effects by using a RegARIMA model[5]. This model is also used to prolong the series on both sides, i.e. the past as well as the future. These projections are necessary if a symmetric filter should be used for seasonal adjustment and for trend calculation. Secondly, the pre-adjusted series are seasonally adjusted by a moving average of order 3 x 3 for each month. The preliminary estimate of the seasonal component is used to compute a preliminary seasonally adjusted series. Finally a Henderson filter (see e.g. Trewin, 2003) of length 5 is used to get the trend component out of the pre-seasonally adjusted series. The weights of a Henderson filter are defined to lead to a maximal smoothing of the input-series. As the input-series are already seasonally adjusted, filter lengths of less than a year are allowed. All estimations are carried out with ARIMA X12 called by the R package 'x12' from Kowarik (2009).

[4]For other European countries (e.g. Germany and Finland) also trend values are used instead of seasonally adjusted monthly unemployment values.

[5]RegArima is a combination of linear regression and a seasonal ARIMA model. Trading day effects and outlier effects are modelled with linear regression whereas the regression residuals are modelled with a seasonal ARIMA to estimate trend, cycle and seasonal components in the series (*The X-12-ARIMA Seasonal Adjustment Program*, 2002).

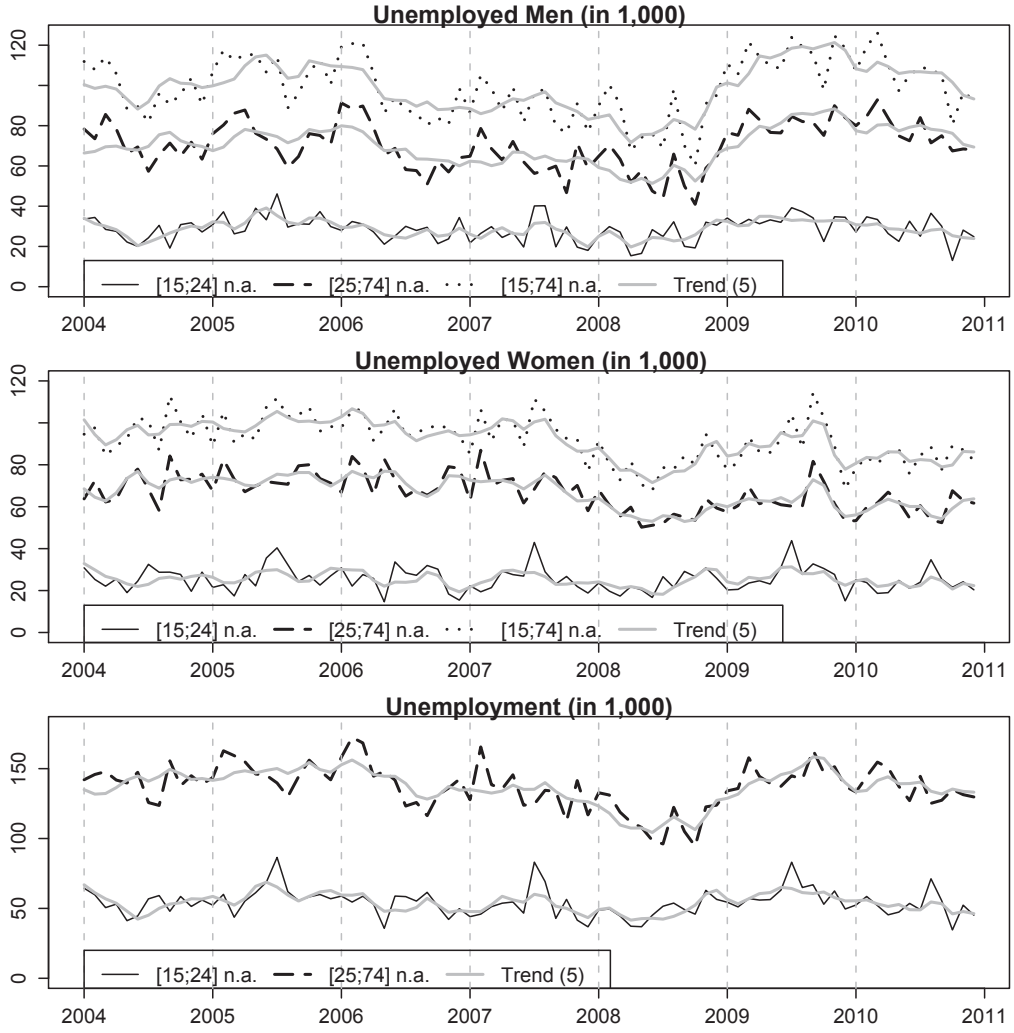

Figure 2: LFS unemployment: totals and adjusted series of super-groups.

This method of adjustment works well for super-groups and the big subgroups of elder men and women, see Figure 2 for men, women, younger and elder persons.

A major problem of the smallest subgroups (young men and young women) are the small sample sizes. The number of unemployed young persons aged 15 to 24 is rather small in Austria. The microcensus sample has approximately 100 unemployed persons in this age class each month. A further separation by sex reduces the sample sizes of these subgroups to approximately 50, in some months even less, e.g. only 29 women at the age of 15 to 24 who were unemployed in April 2010 were interviewed for the microcensus. For this reason it is not very prudent to publish monthly unemployment estimates for young men and women separately[6]. As a kind of compromise between reliability and information needs, young persons will be treated together on a monthly basis. If users are interested in further details, they have to consult quarterly LFS results.

[6]Nevertheless all estimates are computed as they are needed for building super-groups.

5 Outcome and Evaluation

For the decision whether (flash) monthly unemployment estimates are good enough to be used and published, some kind of quality evaluation is needed. There are several criteria relevant for the quality of monthly unemployment estimates. The difference between flash and final estimates of unadjusted and trend values is one aspect. In this context sample sizes of the subgroups, early response rates etc. can be interesting. Furthermore the results of some quality indicators suggested by Eurostat are given. Another very important issue is the behaviour of the trend values over time, especially the behaviour when new values enter the calculations, and the behaviour when flash estimates are replaced by final estimates which are available together with the final quarterly LFS data. An interesting subject in this context is the identification of turning points.

5.1 Late-Response Analysis

Whenever flash estimates are applied, one of the first quality indicators that come into mind is the number of observations available for flash estimates. The early response rates (= number of observations available for flash estimation divided by the number of all observations), and the mean early response sample sizes of all sub- and super-groups for 2010 are given in Table 3. For 2009 and 2010 monthly unemployment figures were produced in a test run. In general, the early response rate is increasing in the course of a quarter. This can be explained by the organisation of data collection. In the first months of a quarter also some interviews of the previous quarter have to be done, especially at the beginning of the new quarter. After five (in summer six) weeks data collection for the previous quarter is completed and interviewers can concentrate on the current reference quarter. Some interviews concerning the last month of a quarter fall in the next quarter and time pressure increases to finish data collection of the prior quarter. In general around 90 % of all interviews are available for flash estimates. There are only two months where the early response rate is conspicuously low, namely July and December 2010. Due to STAT internal organisational reasons flash estimates were done earlier than necessary to fulfil Eurostat deadline. More problematic than a small early response rate (equivalent to a high late-response rate) which stands for a smaller sample size, is a potential late response bias. A substantial analysis of the late response problem is given in Fröhlich et al. (2009). The conclusion was to treat late-response just as classical non-response and correct a possible bias via weighting.

5.2 Evaluation of Flash Estimates

To evaluate the reliability of flash estimates (not adjusted unemployment rates), the following indicators, partly suggested in a document for the LAMAS (Working Group Labour Market Statistics) meeting in September 2008 (Eurostat, 2008), can be used:

- Average difference in percentage points between final and flash estimates.
- Average absolute difference in percentage points between final and flash estimates.
- Maximum absolute differences between flash and final estimates.

Table 3: Early response rates (in percent) and mean sample sizes, 2010.

Months	Pop.	Men	Women	Pop.		Men		Women	
2010	[15;74]	[15;74]	[15;74]	[15;24]	[25;74]	[15;24]	[25;74]	[15;24]	[25;74]
1	90.65	90.49	90.80	89.54	90.85	89.83	90.62	89.23	91.08
2	92.14	91.83	92.43	89.71	92.58	89.52	92.30	89.94	92.84
3	94.29	94.01	94.57	93.19	94.49	92.56	94.29	93.88	94.68
4	90.47	90.59	90.35	90.56	90.45	91.33	90.46	89.77	90.45
5	93.99	93.39	94.58	92.93	94.19	92.23	93.62	93.73	94.72
6	96.08	95.94	96.22	94.15	96.44	93.77	96.38	94.56	96.50
7	85.63	85.74	85.52	84.47	85.84	84.54	85.97	84.40	85.71
8	92.74	92.42	93.05	90.75	93.11	90.73	92.76	90.77	93.44
9	95.86	96.00	95.73	94.97	96.02	94.94	96.21	95.01	95.85
10	90.21	90.33	90.10	88.46	90.53	88.32	90.71	88.60	90.35
11	94.04	93.92	94.16	93.19	94.20	92.45	94.21	94.02	94.18
12	82.41	81.93	82.86	82.41	82.41	82.73	81.78	82.06	82.99
$\bar{n}$	10190	4981	5208	1552	8638	806	4175	746	4463

- Percentage of correct direction (up or down) of provisional month-to-month changes. Two different variations of this indicator are calculated: changes from previous month to current month ($lag = 1$), changes from last year's month to current month ($lag = 12$).

The indicators are calculated for the period January 2009 until December 2010, they are given in Table 4. Time series of flash and final monthly unemployment rates for the total population, men, women, young persons and elder ones are given in Figure 3.

Table 4: Quality indicators for flash monthly unemployment rates.

	Average diff. in %-points	Average abs. revision in %-points	Maximum abs. revision	% correct dir. of month-to-month changes ($lag = 1$)	% correct dir. of month-to-month changes ($lag = 12$)
Population	-0.0327	0.1328	0.4381	91.30	100.00
Men	-0.0106	0.1950	0.6054	69.57	91.67
Women	-0.0585	0.1949	0.3996	91.30	66.67
Youth	-0.0027	0.3725	1.4841	91.30	100.00
Non-Youth	-0.0296	0.1270	0.4125	78.26	83.33
Men [25;74]	-0.0432	0.1832	0.5894	82.61	83.33
Women [25;74]	-0.0135	0.1600	0.3789	82.61	91.67

Values of the quality indicators are quite satisfactory. The average difference in percentage points indicates that the flash estimates slightly overestimate the final unemployment rates, for the whole population as well as all subgroups. The biggest absolute difference is found in the smallest subgroup, i.e. young persons. The degree of revision

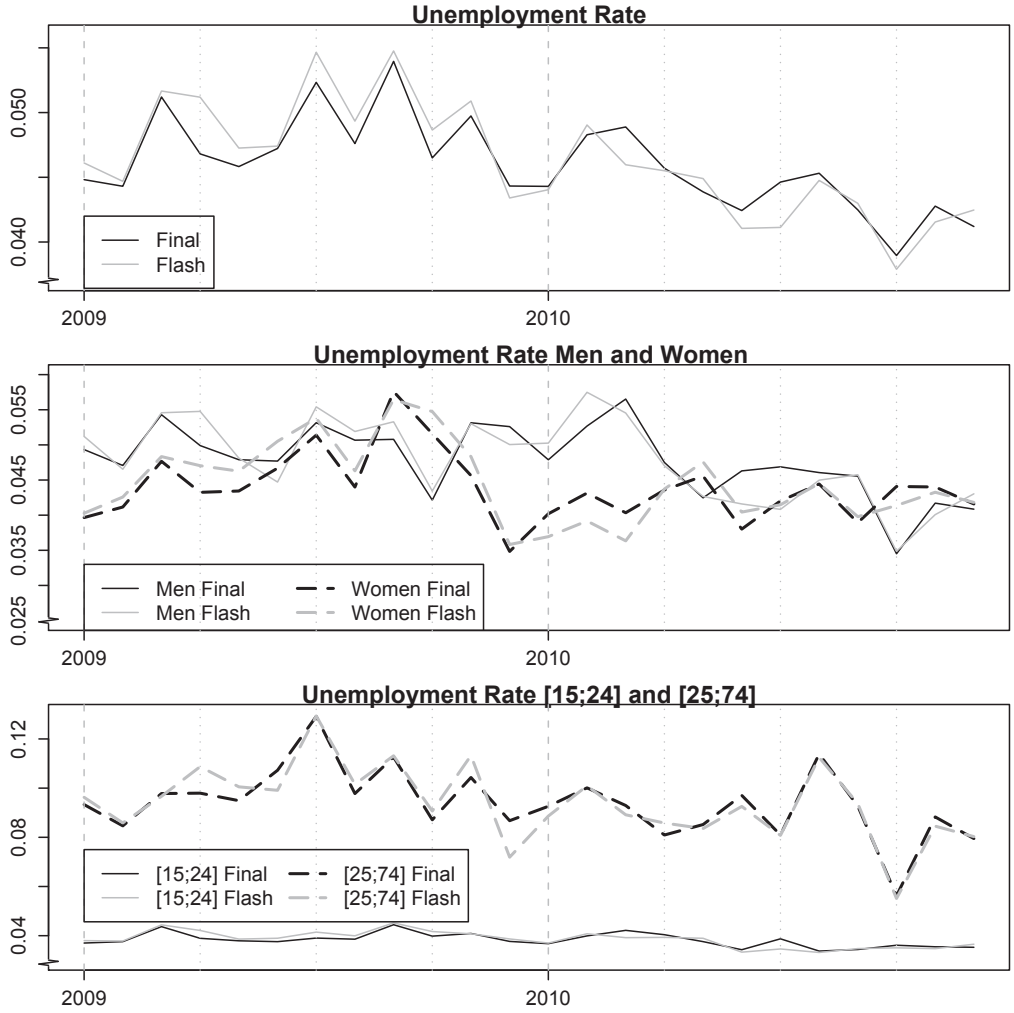

Figure 3: Flash- and final unemployment rate of subgroups.

increases with a decrease in sample size. The percentage of correct directions of month-to-month ($lag = 1$) changes is at least (rounded) 70 % for all groups. Regarding month-to-month changes with lag 12 the percentage of correct directions is fine, except for the subgroup women (66.67 %) where flash estimates of the first three months of 2010 show a rather poor performance.

5.3 Behaviour at Turning Points

Whenever trend series are used, the aim is to get an idea of the medium- or longterm development of the series. Whenever the shape of the time series changes significantly this change should be indicated by the trend, random movements should not be integrated in the trend. It always takes some time to see a 'real' turning point in the trend series. To get a picture how fast structural changes are visible in the trend, an analysis of the behaviour at turning points is important.

The following Figure 4 shows how long it takes for the trend to capture shifts in

directions. The bold gray line always shows the trend estimation based on the whole series from January 2004 until December 2010, i.e. the best, in the sense of most current and 'all-inclusive', trend values.

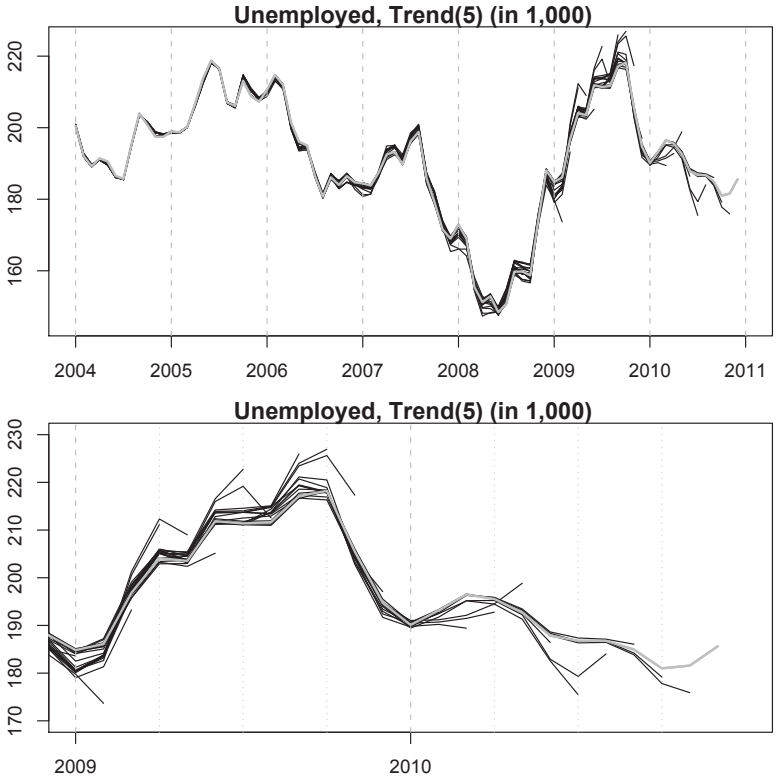

Figure 4: Total unemployment: trend revisions.

For each single month since January 2009 the trend was calculated, always using final monthly values for prior months (if already available at this point in time), and flash estimates for the last few months where final estimates were not available yet. Each trend for each month is shown by its own black line. At the beginning of the time span all trend lines are the same, for the first years it does not make any difference whether the trend function is estimated with data until e.g. March or April 2010. The farther away in the past, the less influence has a new monthly value. Trend values in the recent past are more agile. The first plot in Figure 4 provides an overview of the whole series of unemployment, the second one provides an insight to the months since January 2009. In autumn 2009 the unemployment trend turned. From January 2009 until September unemployment steadily increased and finally turned to a steep decrease in the last quarter of 2009. This turning point illustrates the performance of the calculated trend figures. In September 2009 the monthly unemployment trend is estimated to be approximately 225 (thousand) which is a clear increase of unemployment since the previous month, in October the estimated trend figure for September is a bit lower but still very close to the value estimated in the previous period. Doing the trend calculation with data up to November gives a trend value for September which is again a bit smaller, but nearly the same as before. One would still believe that unemployment strongly increased from August 2009 to September

2009. One month later in December the estimated trend value for September decreases to a level of less than 220 (thousand), showing still an increase from August to September but a more moderate one. From now on trend estimates for September are more or less stable. Including October 2009 gives a similar picture, trend estimates from October and November are too high, from December onwards the calculated trend values are settled. The difference for each month since January 2009 between the first trend estimate and the last (current) trend estimation including all data until December 2010 is given in Table 5. The biggest differences are found in February, July and November 2009 and July 2010 – as already seen in Figure 4.

When monthly unemployment values and trends are published, the published trend series are always the most current ones, i.e. every month the whole trend series are updated. Revised trend values of the long ago past will be fairly the same as before, whereas values in the recent past can change more until they stabilize after a few months at the latest.

Table 5: Revision first versus last time trend estimation, since January 2009 (in thousand).

Year	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
2009	1.22	12.45	3.60	7.02	5.47	6.72	11.35	0.87	8.84	8.72	11.83	2.35
2010	0.47	0.39	7.07	2.77	6.16	1.45	11.30	2.74	1.12	1.83	5.68	

6 Conclusions and Further Steps

Austrian monthly unemployment figures are estimated from monthly weighted LFS data. At the cutting edge, i.e. for the latest one to three months (depending on the completion of the final quarterly LFS data), monthly weights and monthly unemployment figures are preliminary ones. Once the LFS dataset of a whole quarter is finished, preliminary monthly weights are replaced by final monthly weights. Final monthly weights and the availability of quarterly values allow estimation of not seasonally adjusted final monthly unemployment figures. Once these values are available, flash estimates are automatically replaced by final estimates. Monthly LFS unemployment series of most sub- and supergroups do not show significant seasonal patterns, therefore only the trend is calculated and used as adjusted series. Every time, i.e. each month when a new monthly unemployment values becomes available, the whole trend series is recalculated. Revisions in the recent past can be meaningful, revision of the long ago past are negligible. Trend values stabilize after a while but they never get immovable, they will always stay fluctuating.

This estimation procedure is in line with Eurostat's standards for monthly unemployment figures used as Principle European Indicator (PEEI). From reference month January 2011 onwards, STAT computes Austrian monthly unemployment data, forwards data to Eurostat, and Eurostat uses these figures for the PEEIs. It is worth mentioning once again that these monthly figures used as PEEIs are not simply weighted values. The monthly

weighted values are adjusted in various respects to fulfil all requirements like month-quarter or sub-super-group consistency. Therefore they are slightly different to monthly weighted values one gets directly from the LFS dataset.

Even the major part of the project is implemented, there is still some work left open and some efforts to be done. Now the attention should be turned to the implementation of a quality monitoring process. Depending on available data and the length (better say extension) of the series, there are different quality aspects to be regarded. Every month the trend revisions can be observed. Every quarter, when quarterly LFS values and final monthly figures are estimated, early response rates and revisions of flash and final estimates can be checked. Finally once a year, when all months of the previous year are available, a substantial quality report including quality indicators recommended by Eurostat, and trend revisions of the past year should be provided. Furthermore an elaborate evaluation of the adjustment procedure makes sense. This includes checking whether the length of the trend filter is still adequate or better be adjusted, whether a seasonal pattern rose up and classical seasonal adjustment becomes possible, etc. Another major project in the future is the improvement of the whole LFS weighting procedure, based on the idea to include administrative data on employment as additional weighting specifications, which will also affect monthly unemployment figures.

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