QUALITY OF SHORT-TERM EMPLOYMENT STATISTICS

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Abstract

This study discusses the trade-off between timeliness and accuracy, using data from monthly employee statistics. The overall goal is to contribute to a clearer and more user-friendly communication about quality. It aims to improve communication with expert users as well as the general public. Among the tools used for monitoring the Norwegian labour market, register-based monthly wage- and employee statistics supplement benchmark indicators such as unemployment and vacancy figures. Notably, the register-based figures provide industry-specific information that is not available from the Norwegian Labour Force Survey at the same frequency and detail. The study compared four time series based on register-based employment data, the number of jobs and employees, preliminary and final figures respectively, each seasonally adjusted by type of industry.

The quality of each time series depends on the types of industry and the causes of labour market fluctuations. Three different cases were identified. First, commercial businesses like hotel, restaurant, transport, and trade experienced great fluctuations in employment during the studied period, which were timely and accurately communicated by the statistics. The 2020 pandemic led to travel restriction and curfews, which were lifted, re-introduced, and then finally withdrawn in 2021. This had serious impact on employment in these industries, and the statistics were consequently of great interest to users. Second, public sector, health, social, and educational services are less exposed to business cycles and external shocks. Since both preliminary and final figures typically show small deviations from the main trend, random delays and errors becomes relatively more important. So, while the preliminary and final figures are highly correlated, the value of predicting small short-term changes is rather limited. Third, export industries such as oil and gas extraction and manufacturing, are far more exposed to international events and external economic factors like prices and rates. Overall, the preliminary and final figures are fairly close, as are the number of jobs compared to the number of employed people. However, at certain business cycles the data diverge for a brief moment. Although the overall accuracy is fine, preliminary and final data show the opposite direction of change at odd times. In conclusion, industry-specific assessment of quality is vital for communication with users about employment statistics, especially in a situation where input data quality remains much the same.

Keywords: short-term statistics, administrative data, quality analysis

1. Why study quality every month?

Major events, such as financial crises, pandemics, and wars, cause wide-ranging consequences in a globalised economy. Equally globalised are the news media, which together with fervent political rhetoric clamour for public attention. Public and private stakeholders demand ever more and quicker information. At the same time, statistical offices are not the only providers of what is regarded as facts, data, and analyses. In this situation, providers of official statistics must constantly improve communication with users to maintain trust and relevance.

2. Why are the employment figures important?

Generally, employment and thus economic output depends on the supply of labour and capital and the demand for goods and services. In turn, employment changes depend on a number of factors, such as productivity, availability of natural resources, energy prices, and improving machinery, infrastructure, and human capital. Perhaps even more relevant for the short-term changes are national and global business cycles, government interventions, public spending or cuts, fiscal policies, monetary policies, trade policies, and tax policies. Moreover, wars, pandemics, and natural disasters can cause technological disruptions as well as abrupt changes in commodity prices, credit, and currency rates. In all, the modern economy is a complex system where multiple factors interact as well as change over time. Furthermore, professional users of employment statistics have different needs and perspectives. Each month, they form their own hypotheses about the employment statistics, and its relationship with national and international economic circumstances.

To add to the complexity, there are marked differences between industries in how the employment figures change over time, their regular patterns, long-term trends, abrupt changes, and so forth. One such difference is how industries are affected by major events. Of course, no industry is completely immune to external shocks, but their exposure to global markets, their resilience, and adaptability determine how they respond. Generally, services that provide food, water, energy, healthcare, and education are often among the least sensitive to economic fluctuations. This is both due to the stability of demand, as well as governmental funding and regulation. For those industries, relatively stable employment figures are expected. The Norwegian economy and labour market are in many ways similar to the other Nordic countries. One exception is that oil and gas exports are especially important for Norway's economy, which makes this industry more exposed to the global economy and external events.

3. How was the study organised?

The results were analysed by the economic activity, i.e. type of industries and services. There is a wide array of different products and production methods, which are grouped into 16 categories. While the classification follows international standards, the aggregation of related classes is adapted to the Norwegian economy in particular. For instance, the category “manufacturing industries” might merit a finer distinction were it more diversified and of greater economic importance.

In order to get regular and detailed information on industry, administrative registers are used as source data for the monthly employment statistics. Specifically, the input is records from the integrated job and wage reports for employees. National law and regulations oblige employers to report job and wage data for employees. The data are reported to the tax authorities, social security services, and the statistical office through a joint service. Typically, files are transmitted from the payroll system on payday, and the statistical office usually receive data without delay.

Each employment statistic consists of two parallel time series. The "Preliminary" and "Final" figures for the same month are based on data processed 4 weeks and 8 weeks later respectively. Later data contain additional reports as well as corrections to previous reports. Also, employment classification in each month is finally established by checking records for the same job in the preceding as well as the subsequent month. If a job has no record of work and pay for the reference month, but for both the surrounding months, it is assumed to be active.

4. What was the outcome?

Overall, employment figures closely follow typical measurements of economic output, as illustrated[1] in figure 1. Figure 2 shows four series, the number of jobs and employees, preliminary and final figures, respectively. Since each employee can have one or more jobs, the number of jobs is always the higher figure. Another constant feature is that the preliminary data show lower employment figures than the final data, due to the classification process described previously. Overall, there is a high correlation between preliminary and final figures for total employment, as well as between job and employee figures.

However, there are wide differences between industries in the relationship between preliminary and final figures, as illustrated in figure 3. Specifically, it is not just the ratio between the series that varies, but also their correlation. In turn, this means it is likely that the quality varies across industries. There are also wide differences between industries in the relationship

[1] Figures are found in the Annex, pages 7-12.

between jobs and employees, as illustrated in figure 4. For oil and gas extraction the series are nearly equal, while health services and education show considerable distance. More importantly, the series for jobs show a greater variation than the employee trend. The results for hotel, restaurant, and transport services are the clearest examples of this. From the present study, we cannot conclude that the number of jobs is a more sensitive indicator of economic changes than head counts.

The quality of the overall trend and total correlation between these time series is all very well, but not the main interest in the monthly data. Users who want accurate long-term trends and structural results turn to yearly publications, which are based on a combination of more data sources and more sophisticated data processing. In contrast, the monthly figures are typically compared with the previous month focusing on short-term changes. The potential value of preliminary figures, i.e. getting information four weeks early, is that they may reasonably predict the changes from one month to the next. At a minimum, the right direction of change should be indicated.

As mentioned, the mostly “non-market” economic activities include health, social, and education services. Results show that for those industries the monthly change is typically small. More importantly, the preliminary figures more often show the wrong direction of change, compared to other industries. Disturbances, such as random errors in input data, processing errors, and seasonal adjustment have greater impact on the quality in these industries. In contrast, there seems to be a more systematic pattern for utilities services, electricity, and water supply. As illustrated in figure 5, the preliminary figures typically show a decrease, while the final figures show an increase in jobs and employees. One possible explanation can be a combination of overall stability combined with consistent reporting delays.

Accommodation and food services, i.e. hotels, restaurants, was one of the worst hit sectors of the 2020 pandemic restrictions like curfew and travel ban. However, as illustrated in figure 6, the preliminary data predict the trend rather well in both good and bad times. Over a period of 96 months, the wrong preliminary figures gave the wrong direction of change in 12 cases for job figures, and 15 cases for employees. For the period from 2016 until early 2020, most of the changes as well as divergences were relatively small. Table 1 shows results from this sector for the year 2020. In April, at the time of the largest fall in employment, the preliminary, seasonally adjusted, figures showed nearly the same result as the final data. This applies to absolute figures, monthly change, as well as relative change. However, in the preceding month the preliminary data fail to warn about the coming fall, showing only one-tenth of the corresponding drop that emerged in the final statistics. For the subsequent months of 2020, the preliminary data predicted the final trend considerably better. Much the same can be said for the 2021 figures, when the sector experienced a second fall and then rebounded

substantially. Both phases are evidently connected with the re-imposing and lifting of pandemics restrictions.

Table 1: Number of jobs, seasonally adjusted. Accommodation and food services. Norway 2020.

	Jobs			Monthly change			% change		
	Preliminary	Final	P - F	Preliminary	Final	P - F	Preliminary	Final	P - F
2020M01	119 273	123 505	*-4 232*						
2020M02	120 043	124 277	*-4 234*	770	772	*- 2*	0.6	0.6	*0.0*
2020M03	119 589	119 722	*- 133*	- 454	-4 555	*4 101*	-0.4	-3.7	*3.3*
2020M04	99 309	99 446	*- 137*	-20 280	-20 276	*- 4*	-17.0	-16.9	*0.0*
2020M05	89 435	90 372	*- 937*	-9 874	-9 074	*- 800*	-9.9	-9.1	*-0.8*
2020M06	80 316	81 148	*- 832*	-9 119	-9 224	*105*	-10.2	-10.2	*0.0*
2020M07	87 131	89 079	*-1 948*	6 815	7 931	*-1 116*	8.5	9.8	*-1.3*
2020M08	98 307	99 463	*-1 156*	11 176	10 384	*792*	12.8	11.7	*1.2*
2020M09	97 925	100 958	*-3 033*	- 382	1 495	*-1 877*	-0.4	1.5	*-1.9*
2020M10	98 509	100 841	*-2 332*	584	- 117	*701*	0.6	-0.1	*0.7*
2020M11	95 468	97 761	*-2 293*	-3 041	-3 080	*39*	-3.1	-3.1	*0.0*
2020M12	90 363	92 476	*-2 113*	-5 105	-5 285	*180*	-5.3	-5.4	*0.1*

Preliminary figures for oil and gas extraction and manufacturing are somewhat less useful to predict employment change. These industries are more sensitive to external events and international economic fluctuations. Also, the domestic economic impact is typically greater than the volume indicated by the number of employees. In combination, this means expert users typically refer to other short-term indicators. Over the 96 months examined the monthly relative change in employees never exceeded three percent in any direction. However, changes in national economy, international oil prices, and currency rates made great headlines during the same period.

Finally, an example shows some typical quality aspects of administrative registers as data source. In February 2019, the preliminary employment data from financial and insurance activities showed one extreme value in an otherwise smooth trend. This turned out to be caused by an administrative reporting error. As a matter of principle, the published preliminary figures are neither retracted nor adjusted for this reason. The final figures did not show any anomalies, and the users seemed satisfied with the explanation. It is characteristic of these kind of data that the quality assessment just as well can be an explanation of clerical errors as the result of statistical estimation methods.

5. What was left out?

The following describes some limitations of the present study. Foremost, it emphasises only two sides of quality, namely timeliness and accuracy. Frequency, clarity, and consistency of the statistics is assumed to be reasonably good. The statistics are published at a constant pace, and rarely delayed or retracted. The production process is well documented and transparent. Relevance is also assumed to reflect that the employment figures are helpful to assess labour market trends for key users.

Accurate coverage and classification of employment is vital for the short-term figures. Some odd jobs such as freelancers and board of directors are not classified employment unless there is recorded a regular or hourly payment. Also, a few jobs are not reported, there is no obligation if the yearly wage is below a certain, quite low, threshold. By convention, so-called “monthly data” is collected one week per month, rather than an aggregate over the whole month. Both of these facts are expected to cause slight under-coverage of jobs.

There are also sources of processing errors. The reporting system accepts separate records on occupation, working hours, and wage corrections for “the same job”[2]. Thus, there are often multiple transactions for each job, and the reported amount of money can be zero or negative. In order to aggregate information about the same job, transactions need to be merged and the linking of records is a source of processing error.

Finally, there are limits to the length of time series and the number of variables. Data before 2016 are less comparable due to major developments in the administrative reporting system in 2015.

6. What can others learn from this?

The general public, media, and expert users demand timely and accurate statistics about the Norwegian economy. The results suggest that quality of employment data depends on the type of economic activity and the economic situation. This shows the importance of contextual knowledge, such as national and international economic circumstances as well as industry-specific factors. Furthermore, contemporary statistical skills must include methodology suitable for administrative register transactions as well as traditional survey interviews.

Two things helped understand the variation in quality. First, that results were analysed according to some purposeful categories of economic activity. Theoretical considerations as well as empirical evidence suggest employment data quality differs between industries. Second, the time series included periods of relative stability as well as upheavals in the labour market. Several fundamentally different forces cause employment fluctuations, which in turn affect input data quality and its variation across industries.

The timelier employment statistics was made possible with improved data from the joint reporting system. This system came about through a successful cooperation between different national authorities, who continue the work to improve input data quality. However, there are limited possibilities for major changes to the reporting system itself. At the same time, user demand for speed as well as details is not abating. In this situation, it is all the more important to constantly improve the communication about quality.

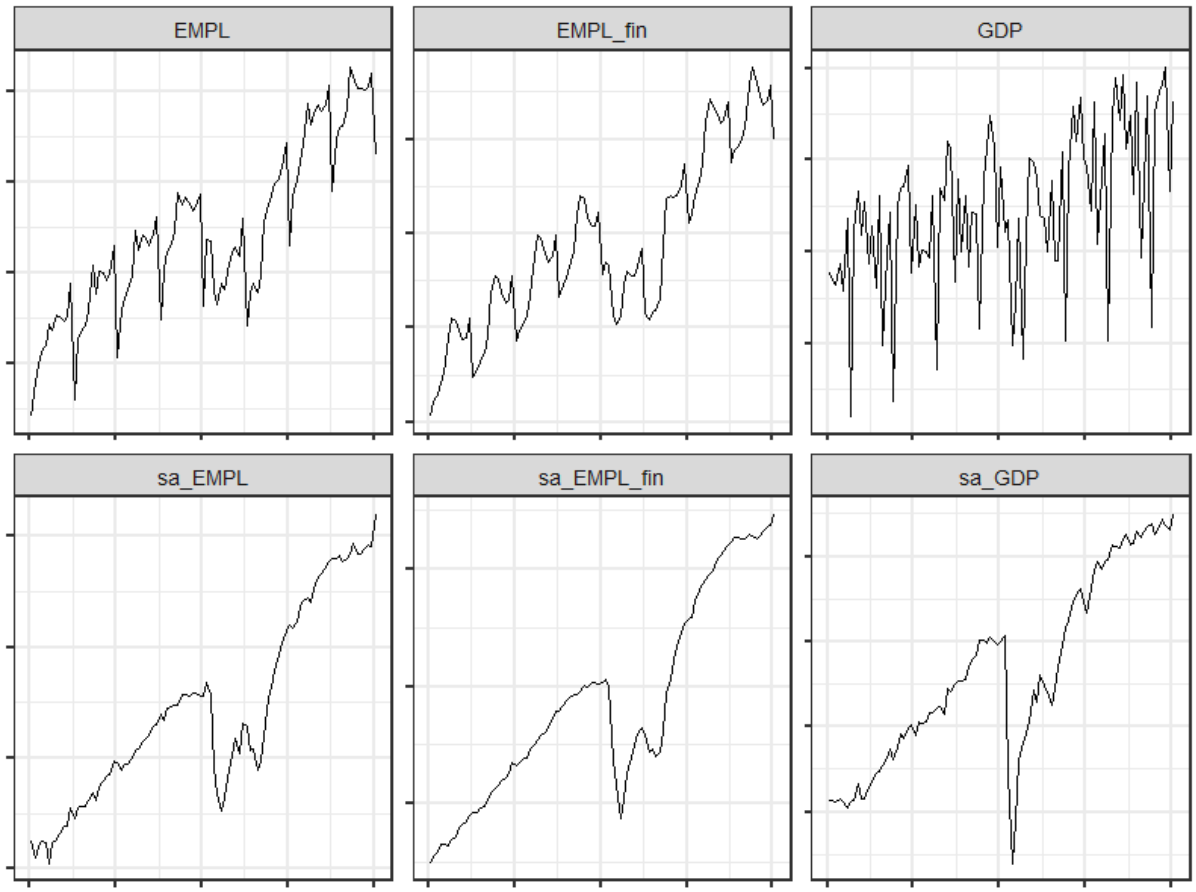
[2] Meaning work by the same employee in the same workplace, not strictly the definition of a position.

ANNEX

Some charts are simplified for illustration purposes. The exact statistical results are freely available online:
https://www.ssb.no/en/statbank (web database)
https://www.ssb.no/en/api/pxwebapi (API interface)

Part 1: Comparing monthly figures from different sources, unadjusted and seasonally adjusted.

Figure 1: Employment and economic output[3]. Norway 2016-2023. Mainland economy[4].

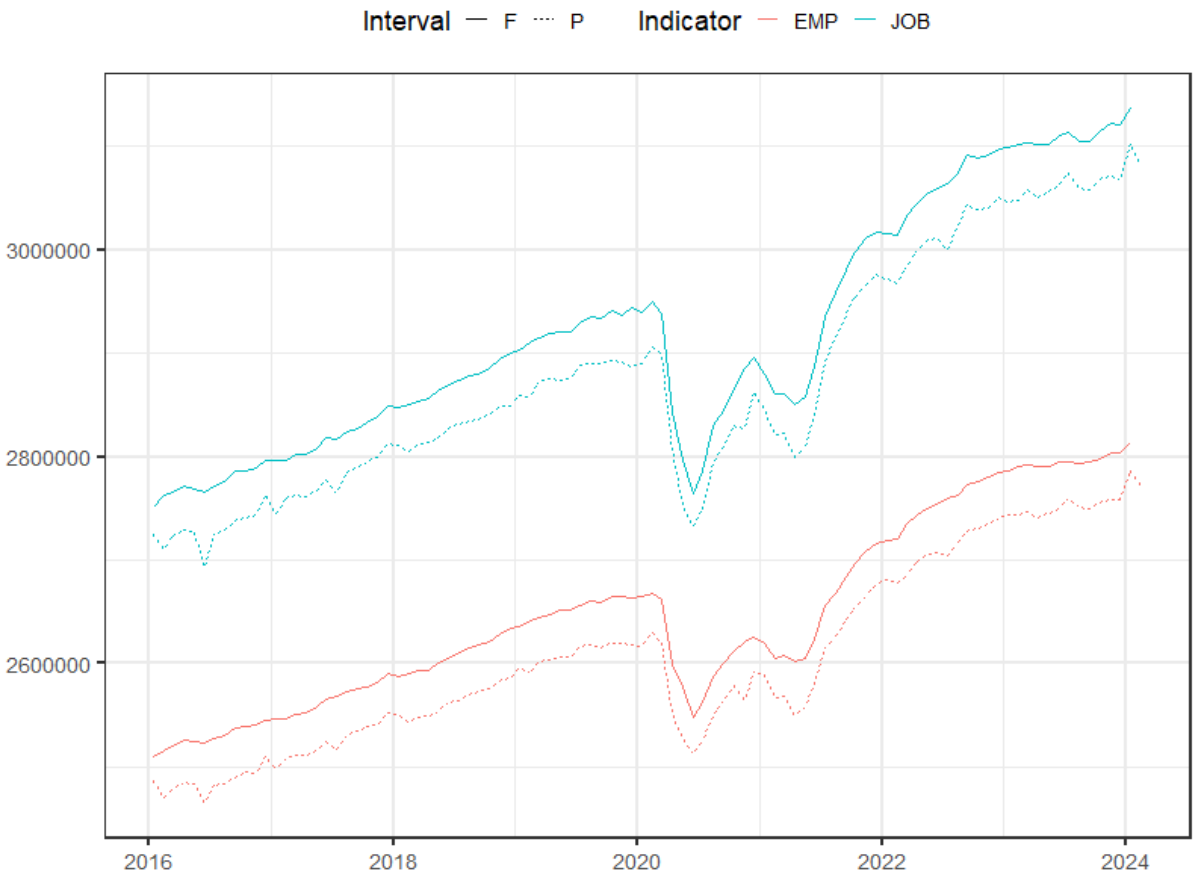


Source: Statistics Norway, tables 13126 and 11721

3 Horizontal axes (time) are fixed, vertical axes (volume) are independent.
4 Excluding offshore activities, such as oil and gas extraction, and overseas transport.

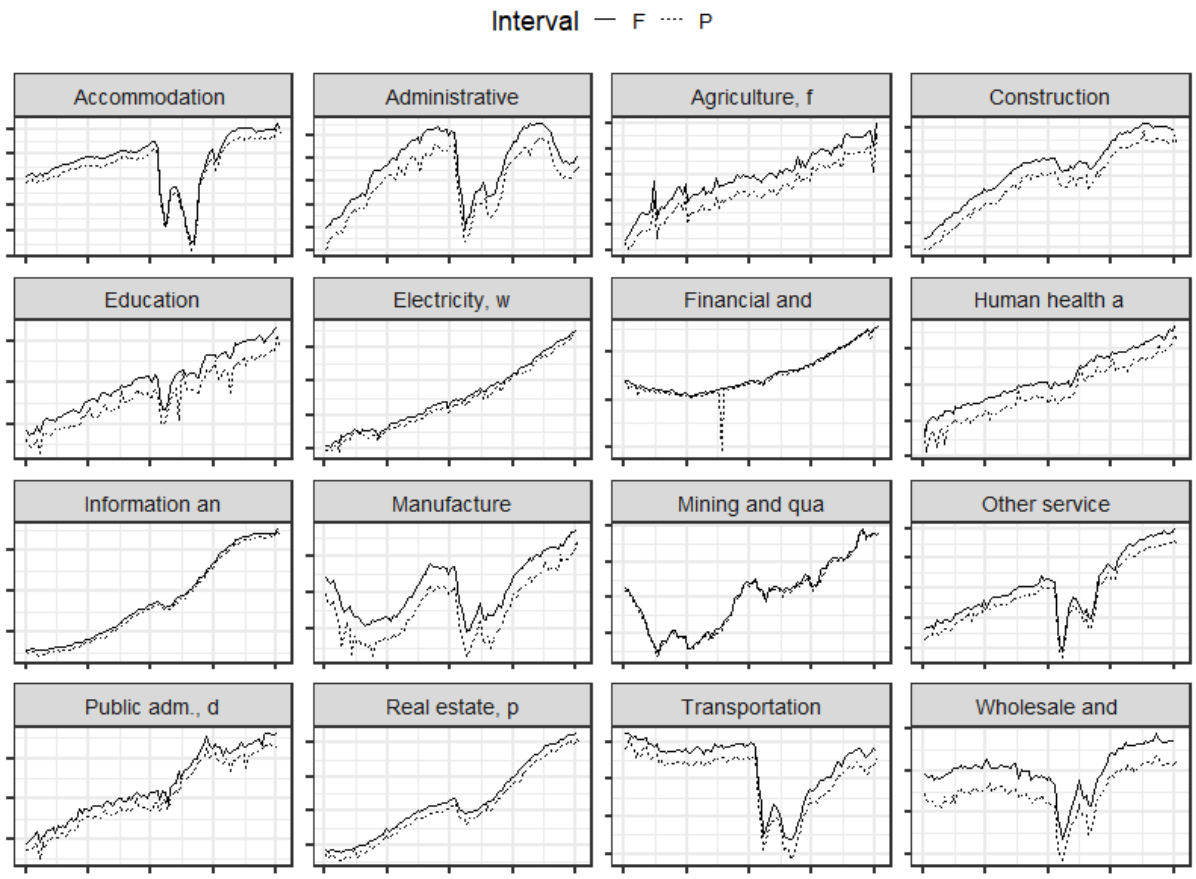
Part 2: Employment. Series are seasonally adjusted unless stated otherwise.

Figure 2: Jobs and employees, preliminary (P) and final (F). Norway 2016-2023. Total industries.



Source: Statistics Norway, table 13126

Figure 3: Preliminary and final figures by industry, number of employees[5]. Norway 2016-2023.



Source: Statistics Norway, table 13126

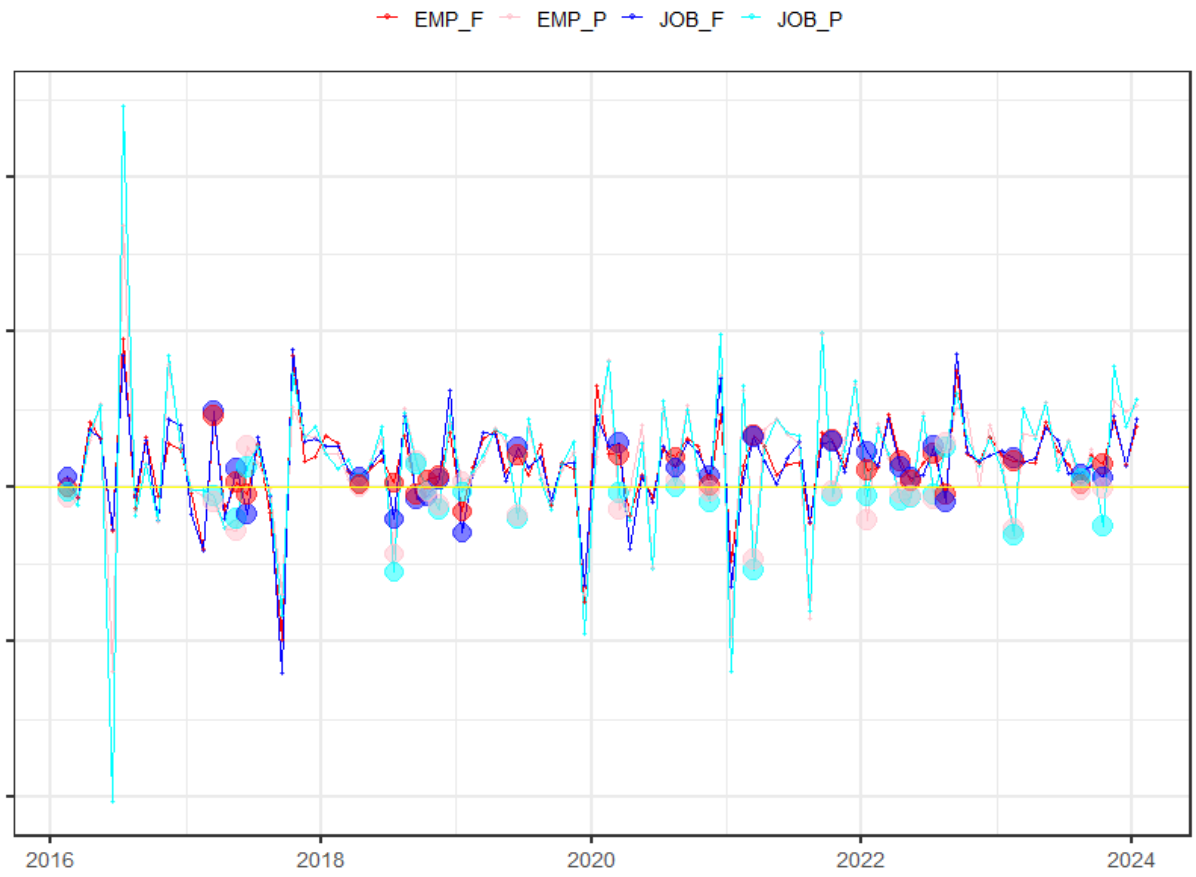
[5] Horizontal axes (time) are fixed, vertical axes (volume) are independent.

Figure 4: Jobs and employees by industry, final figures. Norway 2016-2023[6].

Source: Statistics Norway, table 13126

[6] Horizontal axes (time) are fixed, vertical axes (volume) are independent.

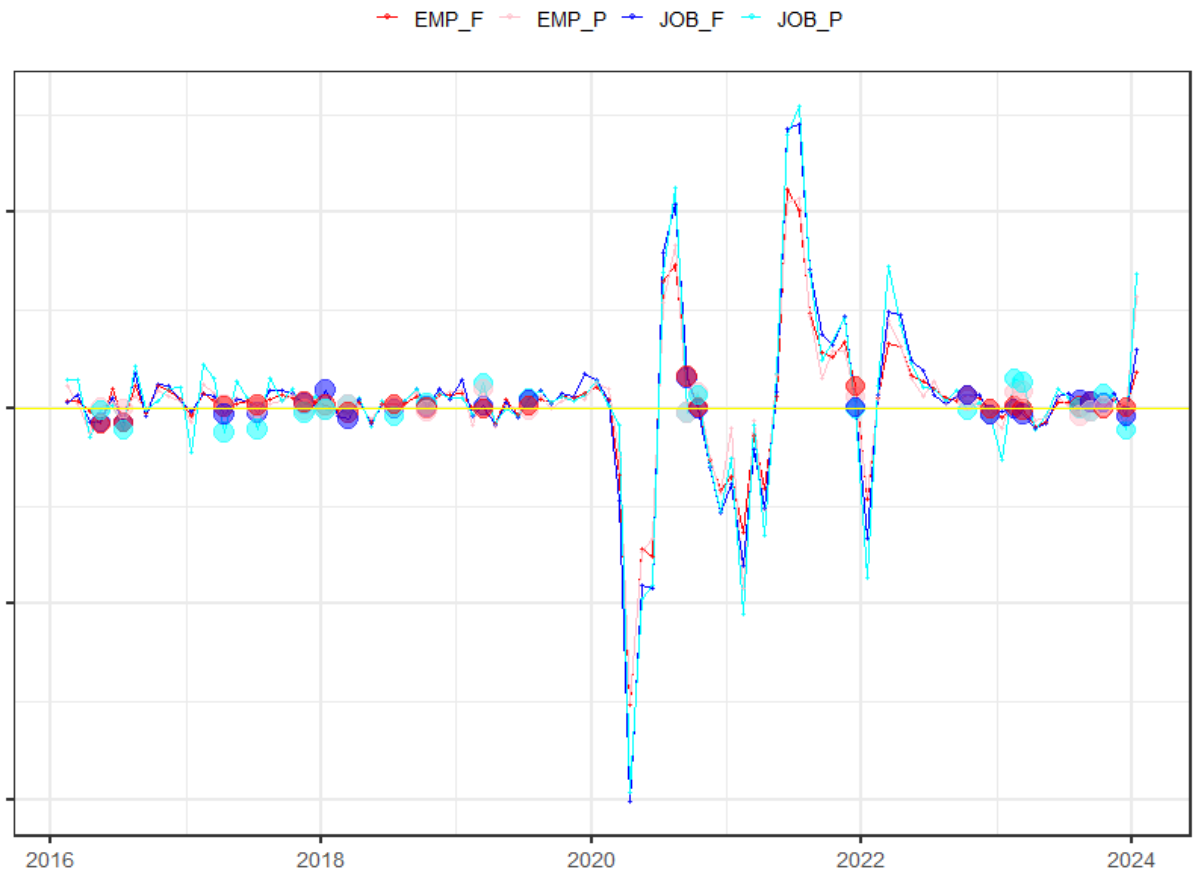
Figure 5: Monthly changes[7] in preliminary and final figures, number of jobs and employees. Norway 2016-2023. Industry: electricity and water supply



Source: Statistics Norway, table 13126

[7] Dots indicate divergence between series.

Figure 6: Monthly changes[8] in preliminary and final figures, number of jobs and employees. Norway 2016-2023. Industry: accommodation and food services



Source: Statistics Norway, table 13126

[8] Dots indicate divergence between series.