

## **Improvement of Seasonally Adjusted Values of Report on Employment Service: Based Mainly on Working Day Adjustment**

### **Summary**

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#### **Research Period**

April to September 2005

#### **Objective of Survey and Research**

This research examined improvement of the seasonal adjustment method concerning the “Report on Employment Service”, statistics on the use of public employment security offices, often called by its nickname “Hello Work”, as typified by the active job opening rate. The research was conducted at the request of the Ministry of Health, Labour and Welfare.

Today, the values in the Report on Employment Service are seasonally adjusted by a method called X-11. It has been pointed out for some time that the seasonally adjusted values derived from X-11 have large variances based on working days. In other words, in months where there are more Saturdays, Sundays, and national holidays than in other years as a result of how days fall on the calendar, there is a tendency for the number of job applicants and job offers to fall. Moreover, because this tendency is more evident in the number of job applicants than job offers, the ratio of job offers to applicants tends to jump in months with many Saturdays, Sundays, etc. In addition, this tendency has been particularly strong in the last several years. Therefore, it is becoming difficult, particularly in recent years, to grasp the short-term trend of the active job opening rate, etc. without the information of the calendar. This obviously is an inconvenience on statistics users and may, depending on circumstances, mislead people to making false judgment of the situation.

To ameliorate this situation, this research aims to remove the factors of working days from the data in the Reports on Employment Service by using a seasonal adjustment program called X-12-ARIMA.

## Contents of the Report

### 1. Subject and method

This research focused on a total of seven series, including five series of the number of new job applications, the number of new job offers, the number of effective job applicants, the number of effective job offers, and the number of cases of employment, and two processed series of the new job opening rate and the active job opening rate. For each series, we considered both the data of the sum of the country as a whole and data of each prefecture. For each, university graduates were excluded, and part-timers were included.

The main objective of the research was to remove fluctuations caused by factors of working days from seasonally adjusted values. At the same time, we paid a close attention to minimizing adjustment of past seasonally adjusted values (retrospective adjustment) as much as possible when the values were recalculated subsequent to addition of new data.

To achieve these objectives, we set several candidates for the various calculation conditions (called “options”) of X-12-ARIMA, and selected among them those that were relatively good. For the selection, we used the indicators of AICC, out-of-sample forecast error, and power spectrum.

### 2. Result

As a result of our examination, we obtained the conclusion that the following are effective:

- (1) To remove the effect of day-of-week composition and holidays from the data in advance through some kind of regression analysis and
- (2) To quickly reflect structural changes, the measurement period for the regression analysis should be set at 10 years to make it as short as possible.

We shall call these calculations conditions the “new options.”

By comparing the seasonally adjusted values based on the new options to the currently published values, we confirmed the following:

- (1) The variances derived from working days disappear cleanly (Figure 1) and
- (2) There is less retrospective adjustment resulting from addition of new data, and seasonally adjusted values stabilize (Figures 2 and 3).

We believe that we were able to achieve the set objectives.

### 3. Considerations on implementation

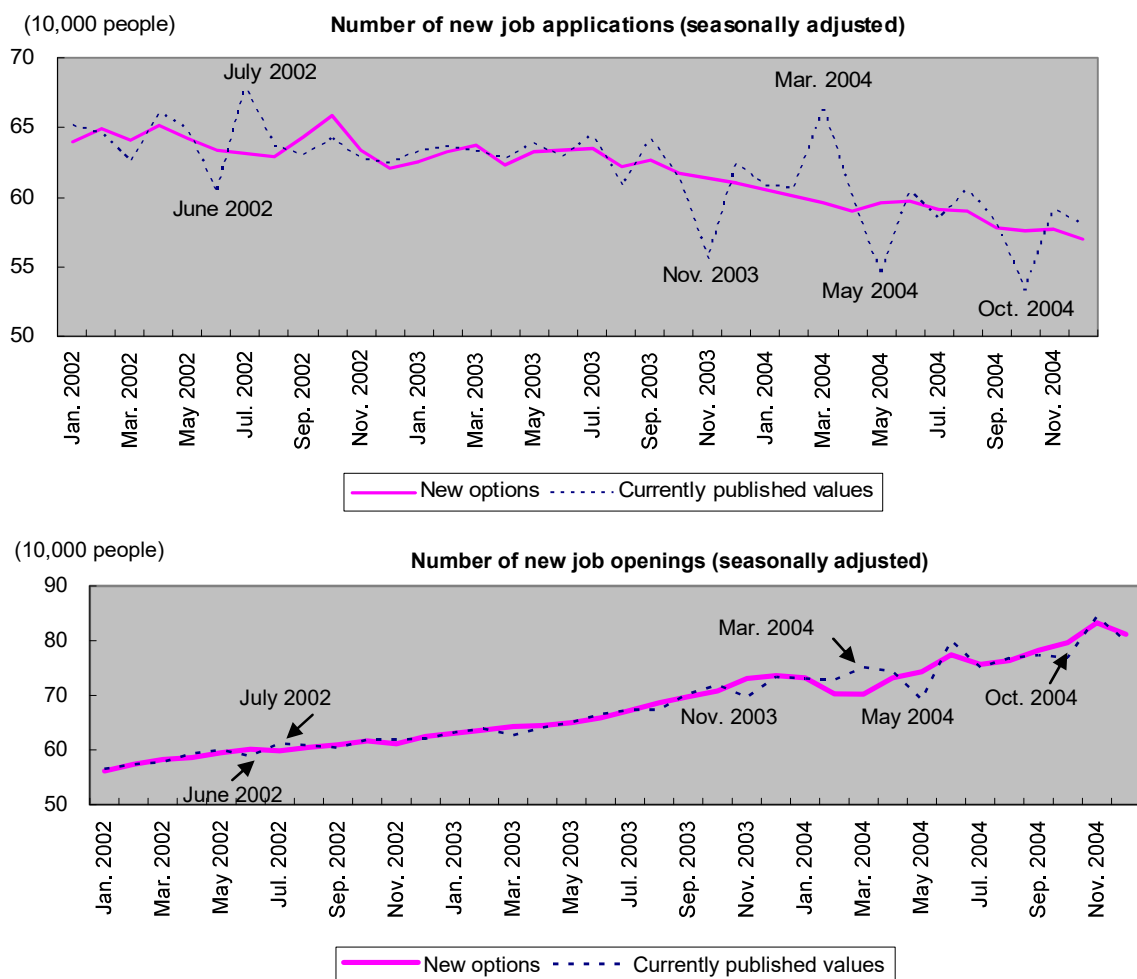
However, attention should be given to a number of points when implementing the new options.

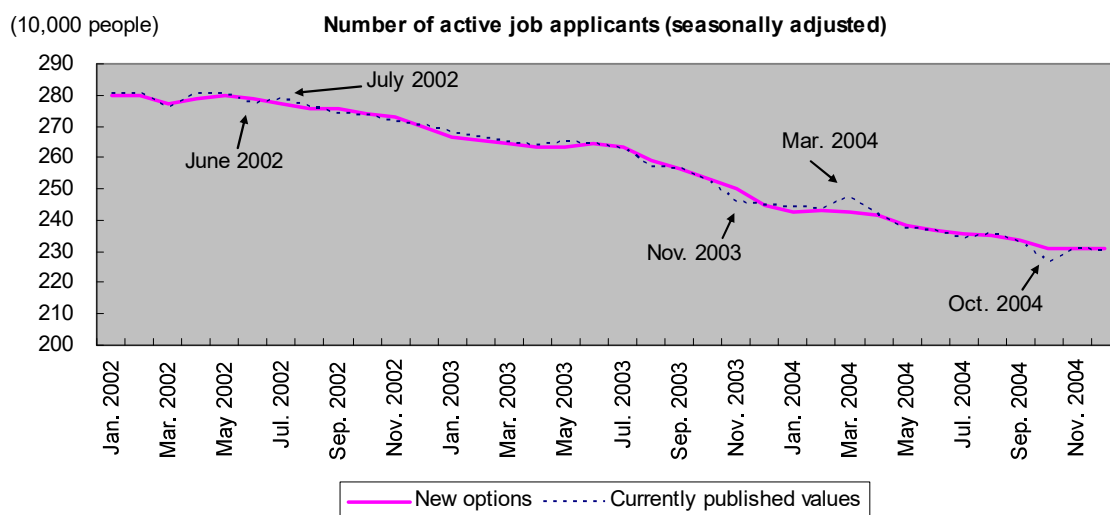
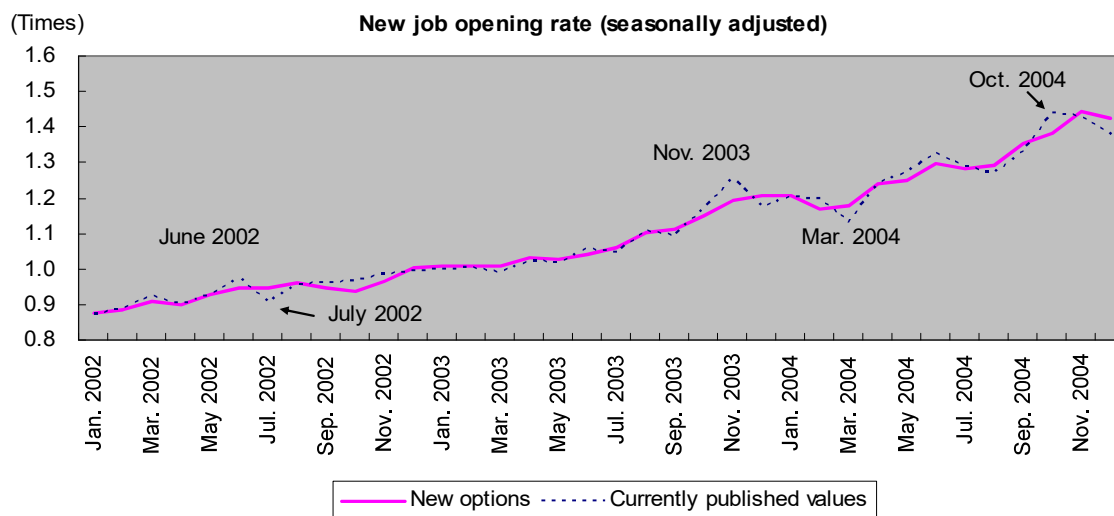
One is consideration on past data. Because regression analysis is conducted on data

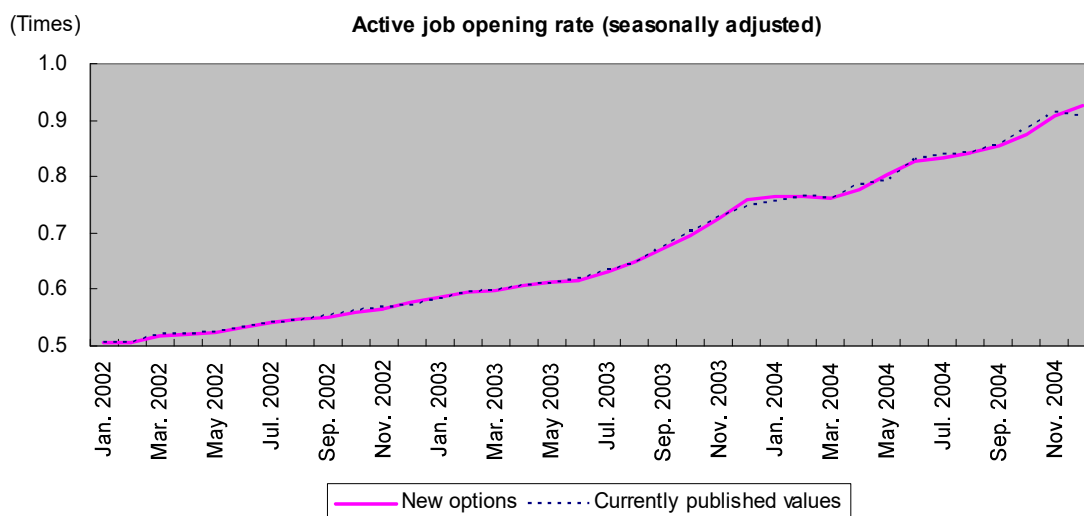
of the last 10 years, there is “working-day adjustment” that does not fit with the actual situation of the past when the results of the regression analysis are mechanically applied to the past data. To prevent this, we recommend a method of limiting the retrospective adjustment resulting from addition of new data to the last five years (“six-previous-years fixation method”).

The other is the need for continuous check. Because the new options have been set so that they fit stably even when new data are added, we believe there is no need for frequent changes. However, since we do not know when an unexpected structural change will occur in the future, we need to continuously monitor how the options fit. In particular, we need to pay constant attention to system changes, such as amendment of the National Holiday Law or Employment Insurance Law and review of the “Hello Work” public employment security offices’ operations that may have an impact on job-offer and job-application behavior.

**Figure 1. Seasonally Adjusted Values Based on the New Options (National Data)  
(Variances derived from working days disappeared with the new options)**







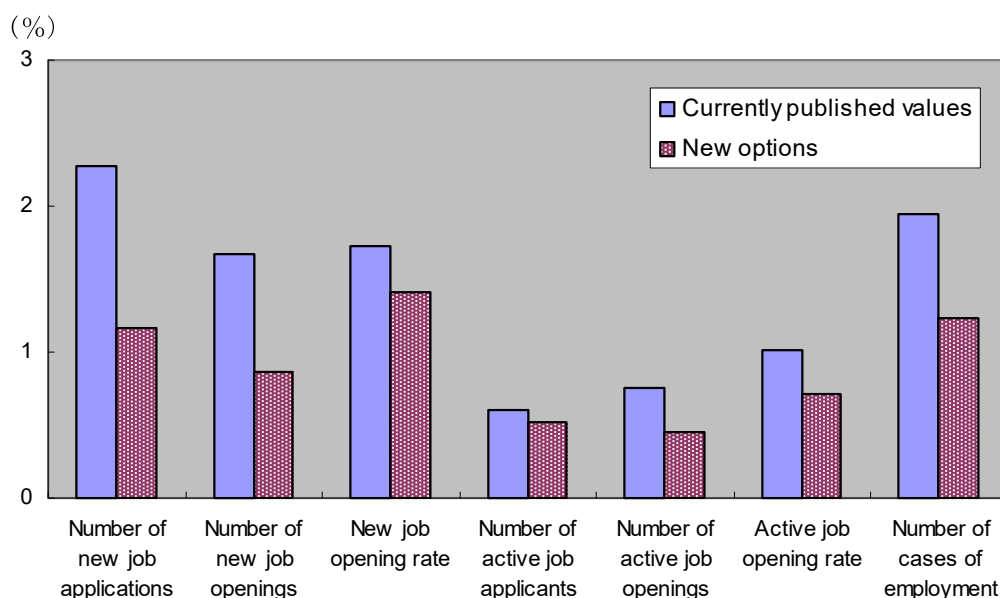
Note: The month and year written in the figures is the month in which there are particularly more or fewer working days than the preceding and following years. Working days refer to days other than Saturdays, Sundays, national holidays, special holidays (the Rites of Imperial Funeral, marriage of Crown Prince, etc.), substitute holidays (when a national holiday falls on a Sunday, since 1973), May 4 (since 1986), and December 29 to January 3.

Reference: working days in recent years

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2000	19	20	22	20	20	22	20	23	20	21	20	19
2001	19	19	21	20	21	21	21	23	19	22	21	18
2002	19	19	20	21	21	20	23	22	19	22	20	19
2003	19	19	20	21	21	21	22	21	20	22	18	19
2004	19	19	23	21	18	22	21	22	20	20	20	18

**Figure 2. Difference after Revision of Seasonally Adjusted Values a Year Later (National Data)**

(The difference is smaller when using the new options (Stability increased))



Note: The average absolute values of percentage change from the original published values to the revised values of a year later are indicated. For both the “currently published values” and “new options,” the current publication method that uses the predicted seasonal factors is assumed. From the revision of 12 months preceding the publication in January 1996 (January to December 1995) to the revision of 12 months preceding the publication in January 2005 (January to December 2004), we calculated the average of a total of 120 months (10 years x 12 months).

**Figure 3. Number of Prefectures in which the Difference Narrowed after Revision Using the New Options (Stability increased for all series in almost all prefectures)**

	(Number of prefectures)
	Prefectures in which difference after revision narrowed
Number of new job applications	47
Number of new job openings	47
New job opening rate	47
Number of active job applicants	43
Number of active job openings	47
Active job opening rate	47
Number of cases of employment	47

Note:

- 1) The difference between the currently published values and revised values based on the new options was calculated from data on prefectures using the same method as method used in Figure 2. The number of prefectures in which the difference narrowed after revision using

- the new options is indicated.
- 2) Although the seasonally adjusted values of the number of cases of employment by prefecture are not currently published, the estimate was taken using the same method as used in other series.

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1. Trends of job offers and applications by day of the week
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Reference materials