Seasonal and working day adjustment for the Industry Production Index – *Methodological Note*

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Introduction

This methodological note describes a study to seasonal and working day adjustment of the monthly Production Index (PI) of the manufacturing industry with the software programme Arima-X-12. This programme is an improved and extended version of Arima-X11 which is used for the current adjustments. Arima-X12 is at the Statistics Netherlands linked with the user shell Vivaldi. The new method of seasonal and woking day adjustment is operating since October 2003.

The monthly PI is composed at the 4-digit level of the Standaard Bedrijfsindeling (SBI)[1]. This is also the basic level for trading day and seasonal adjustments. Internal research[2] demonstrated that aggregates are best composed according to the direct method of adjustment: first combine the original series to an aggregate and then adjust the series. The research was based on 136 PI-series. Separate regression models are developed for all of the 136 series. For analysing purposes, the time series run initially from January 1990 to December 2001. The manufacturing industry is defined by SBI code 15-37 or the equivalent NACE code D.

The methodological note describes the techniques and methods behind the composition of the regression models. With a view to the periodic revisions of the models, the most important model specifications are mentioned in Appendix A. By this, revisions may be concentrated to the more erratic series.

Composition of setups

General approach

Figure 1: composition of setup
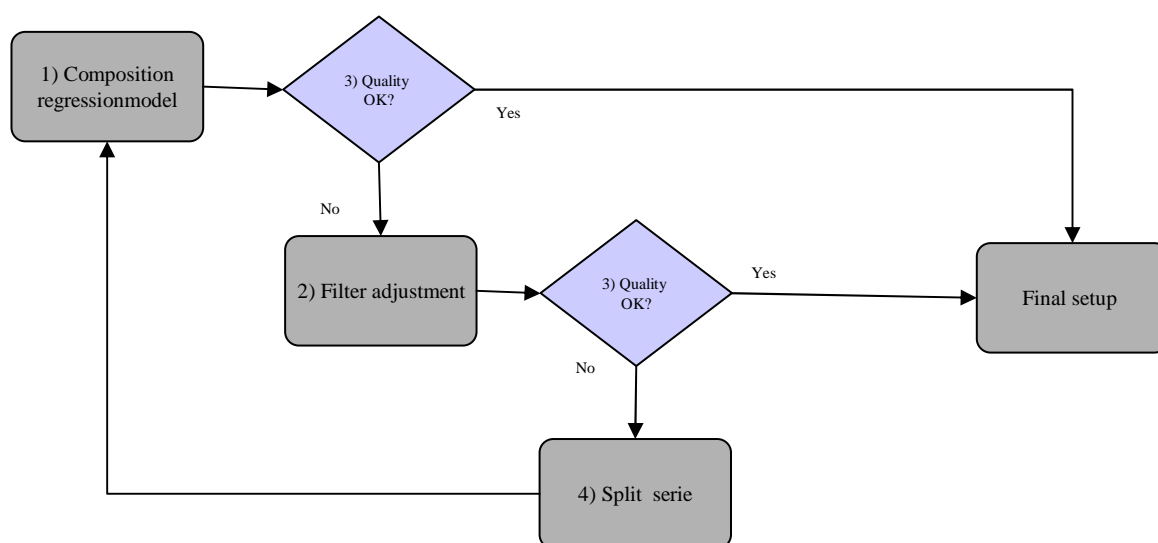
The regression models are implemented in so called setups. These setups are connected to series. The adjusted series are the result of running the setups with their connected series. Figure 1 explains in headlines how a final setup is made. In the first stage, extensive tests are performed to get the optimal regression model. The resulting model is judged by quality criteria. If the criteria are not met, the second stage will be fine-tuning the model by adjusting the seasonal and trend filters. If the model still fails to meet the quality criteria, the series will be split and the process starts again. In the next paragraphs, the stages as well as the quality checks will be explained in detail.

1) Composition of regression models

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[1] The Eurostat equivalent of the Standaard Bedrijfsindeling is the NACE (General Industrial Classification of Economic Activities within the European Communities).
[2] M. Jansen, Werkdag- en seizoencorrectie methodiek voor de Produktie-index, CBS (internal note), 2002.

- Decomposition

With Arima-X-12 two main types of decomposition can be performed: additive or multiplicative. The type of decomposition is selected according to (one of) the following 3 methods:
1). Automatic: Arima-X-12 performs an automatic decision between the two types of transformation
2). Statistical: compare the F11-values in table D8A with an additive and a multiplicative run and choose the decomposition with the highest F-value.
3). Visual: if the trend of the original series is upward or downward and/or if the peaks increase or decrease in time, choose for multiplicative decomposition. Choose for additive decomposition if the trend is smooth and constant over time.

For most of the series, the three methods give the same conclusion and the type of decomposition is unambiguously selected. For series with adverse conclusions the choice is based on the second method.

- ARIMA-model

For all setups, the programme is instructed to select the Arima-model automatically. Standard definitions are:
- method=best: the estimated model with the lowest within-sample forecast error
- mode=forecast: the model will be used to produce a year of forecasts.

- Regression variables

Arima-X-12 distinguishes two main groups of regression variables: trading day and user-defined. Both groups are judged through the Chi-squared Test, which is expressed in a P-value. Under the condition of a 95-percent confidence interval, the P-value may not exceed 0,05. Judgement of the individual regression variables is based on the t-values. Regression variables with t-values ranging from -1,96 to 1,96 lie within the 95-percent confidence interval and are considered as sufficiently stable to include in the model. A regression model can be composed by a maximum of 5 different regression variables. Research has been done on the following effects:

1) Trading day effects: * 6 Day-effects * 5 Working days / weekend	4) Holidays * Holidays (f) * Holidays / Transition days
2) Length of month / year: * Length of month * Leap year	5) Staggered holidays * North (n) * Centre (m) * South (z) * N+m * N+z * M+z * N+m+z
3) Degree-days *not applied*	

Regression variables are selected according to a fixed procedure. Starting point is a standard set which contains regression variables for 6 day effects, length-of-month, staggered holidays (n+m+z) and holidays (f). The regression variables will be judged on their t- and P-values. If necessary, a new set is composed by replacing, deleting or adding regression variables. The new set of variables will again be judged on their t- and P-values. This process is continued until the 'ideal' set of regression variables is found for the concerning series.

The following comments are relevant for the selection of regression variables:
- The 6 day effect regression variables are judged by their collective P-value. If the value exceeds 0,05, the variable is removed and the 5 Working days / Weekend-variable is tested. When this value again exceeds 0,05, no regression variable for trading day effects is included in the model.
- The standard set of regression variables contains a length-of-month variable. The regression variable is removed from the original set if the t-value is not significant. In these cases the leap year regression variable is tested for significance.
- The degree-day regression variable is only tested in plausible cases like the series for extraction and distribution of natural gas. Thus far, the degree-day regression variable is not applied in the Industry Production Index series because of technical complications.

- A significant holiday regression variable is always tested for significance of the combined holiday/transition day variable. If the t-value of the latter is higher, the holiday/transition day regression variable will be added to the model. In cases that the holiday variable is not significant, no further testing of the holiday/transition day regression variable is done.
- For determination of the staggered holiday significance the default variable is n+m+z. Then, by causal significance the non-significant regions are one by one removed (backward-regression). The final variable is subjected to a plausibility test by the composers of the PI.
- The sign of t-values and parameter estimates should be interpreted as follows. A negative t-value or parameter estimate will upgrade the original data of the PI and a positive sign will devalue the index. Negative values for staggered holiday regression variables indicate an overrepresentation of the concerning region comparing to the average. If, for example, the northern regions' summer holiday for a specific year is planned in July, the July index will be upward adjusted. Conversely, if region north is strongly underrepresented comparing to the average, this will be expressed in a positive t-value or parameter estimate for the northern region. In this case, the July index will be upgraded.
- Holiday and holiday/transition day regression variables always have negative signs.
- Length-of-month and degree-days regression always have positive signs.

- Outliers and level shifts

The default critical value for tracing outliers is 3.0. For some series a higher or lower critical value is chosen, ranging from 2.5 to 3.3. Deviations from the default value were made if the resulting adjustment improved. For some series a clear level shift was found which disturbs the calculation of the seasonal pattern. The abrupt change is ignored by defining the date of the level shift in the model. Seven series were treated this way.

- Sigma limits

The default value for sigmalim is (1.20 , 2.00). The sigmalim controls the type of extreme value adjustment performing during seasonal adjustment. A few series have other values chosen, in order to improve the seasonal adjustment.

2) Selection of filters

- Seasonal filter

The seasonal filter estimates the seasonal components of a series. Default adjustment for the filter is Moving Seasonality Ratio (MSR), which means the programme will chose the final seasonal filter automatically. The seasonal filter can also be manually adjusted. For monthly series from 1990, three possible filters are available: 3x3, 3x5 and 3x9. For many erratic series a slower 3x9 filter is chosen manually. This filter produces more stable estimations of start- and final values. For some other series a separate filter is chosen for each month.

- Henderson filter
The Henderson filter is a trend filter. It estimates the trend-cycle component or the long-term movement of series. The programme selects automatically the optimal Henderson-filter. Most of the series have a 13-term Hendersonfilter.

3) Quality check

- Quality Measures

The quality of an adjustment is expressed in 11 M-measures, which are automatically generated by the programme. The M-measures indicate different statistical diagnostics. Their value can range from 0,0 to 3,0, and ideally they lie next to zero. The main M-measures are:

M2: The relative contribution of the irregular component to the stationary portion of the variance (from Table F 2.F).
M7: The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).
M10: The size of the fluctuations in the seasonal component throughout the last three years
M11: The average linear movement in the seasonal component throughout the last three years.

The overall acceptability of an adjustment is measured in Q-measures:

Q: Overall index of the acceptability of the seasonal adjustment
Q2: Q statistic computed without the M2 Quality Measure statistic

The Q-measures can range from 0,0 to 3,0, with 0,0 as best performance. Both for the individual M- and Q-measures applies that values above 1,0 are better avoided. Especially M7 should not exceed 1,0. Generally, the quality of an adjustment is considered as reliable if the values of the mentioned measures do not exceed 0,7.

- Visual check

The quality of adjustments is also visually checked by graphs. Especially the following tables were inspected:

A1: time series data
B1xA8 : series adjusted for calendar effects (i.e. trading day, holiday day, transition day, staggered holiday, length of month/year effects), but including outliers
D11xA8: Final seasonally adjusted data, with replacement of outliers
D12: Final trend cycle

4) Split series
If series did not succeed to pass the quality check after the model composition and filter adjustment, the series were shortened in order to get better results. The process then starts again with the composition of the setup on basis of the shortened series. In total fourteen series were treated this way.

Practicalities

- Graphs
Graphs of all 136 series are available at the author. For all series two graphs are presented. The upper one contains the original time series and the series adjusted for calendar effects, but including outliers. The lower graph includes the final seasonally adjusted data (also adjusted for calendar effects), with replacement of outliers and the final trend cycle. For most series two years of estimations are shown in the upper graph. For technical reasons, no estimations are shown for series without an automatically chosen ARIMA-model. The graphs can be useful for analyses on behalf of future updates of the setups.

- Output files
Output files of all series are available at the author. All generated tables, model specifications and statistical analyses can be shown in the output files of the ARIMA-X-12 programme. The files can be useful for analyses on behalf of future updates of the setups.

- User-defined regression files
Two types of user-defined regression variables are defined in the models: holiday and staggered holiday regression variables. The user-defined regression variables are attached to the models by separate files. The regression variables are updated to December 2004 and should be updated each year.

- Publication tables
Two kinds of tables are particularly used for monthly publication:
- B1*A8 (with forced yearly totals): original series (A1) adjusted for working day patterns and modified to force the yearly totals of the adjusted series and the original series to be the same.
- D11*A8 (with forced yearly totals): B1*A8 table, adjusted for seasonal influences and modified to force the yearly totals of the seasonally adjusted series and the original series to be the same.

APPENDIX A
Model Specifications

Explanation of abbreviations:

DC = type of decomposition (additive / multiplicative)	TD = trading day regression	FB = holiday / transition day regression
SF = seasonal filter	LM/LY = length of month / year regression	N, M, Z = north, centre, south regression
HF = Henderson trend filter	F = holiday regression	TC = temporary change
V = variable filter	S = stable filter	

SBI	Start	DC	SF	HF	Arimamodel	TD	LM LY	Holi-day	Stagg. holiday	Levelshft Temp.ch.	Outliers	M-values: M2/M7/M10/M11/Q1/Q2
111	1990.1	M	5	13	(0,1,2) (0,1,1)						91.9	0,0 / 0,1 / 2,7 / 0,8 / 0,8 / 0,9
11-14	1990.1	M	5	13	(0,1,2)(0,1,1)						91.9	0,0 / 0,1 / 2,7 / 0,8 / 0,8 / 0,9
111a	1990.1	A	9	11	(0,1,1)(0,1,1)	X	X	F	N+M+Z		94.5 / 94.9 / 94.12 / 95.12 / 01.5 / 01.12	0,2 / 0,6 / 1,5 / 1,1 / 0,6 / 0,6
111b	1990.1	M	5	13	(0,1,2)(0,1,1)						91.9	0,0 / 0,1 / 2,8 / 0,8 / 0,8 / 0,9
11-41	1990.1	A	5	13	(2,1,0)(0,1,1)	X	X	FB	Z		91.3 / 91.9 / 97.3	0,1 / 0,1 / 0,3 / 0,3 / 0,3 / 0,3
14	1990.1	M	5	13	(0,1,1)(0,1,1)	X			N+Z		91.2 / 94.2 / 94.9 / 94.12 / 95.8 / 99.1	0,2 / 0,3 / 1,1 / 0,9 / 0,4 / 0,4
15+16	1990.1	M	9	9	(2,1,2)(0,1,1)	X	X	F				0,1 / 0,1 / 0,2 / 0,2 / 0,2 / 0,3
1500	1990.1	M	5	13	(0,1,1)(0,1,1)	X	X					0,1 / 0,1 / 0,3 / 0,3 / 0,3 / 0,3
151+155	1990.1	M	9	13	(0,1,1)(0,1,1)	X	X	F	N+M		15 months	0,1 / 0,2 / 1,0 / 0,8 / 0,3 / 0,45
1510	1990.1	M	9	13	(0,1,2)(0,1,1)	X						0,4 / 0,6 / 0,6 / 0,4 / 0,5 / 0,6
151-158	1990.1	M	9	13	(2,1,2)(0,1,1)	X	X	F			93.12	0,1 / 0,1 / 0,2 / 0,1 / 0,3 / 0,3
1520	1990.1	A	5	13	(2,1,2)(0,1,1)	X			N+Z		94.2 / 94.11 / 99.8 / 01.12	0,3 / 0,5 / 1,5 / 1,5 / 0,7 / 0,7
152-158	1990.1	M	9	13	(2,1,2)(0,1,1)	X	X	F			91.9 / 91.12 / 93.12 / 99.2 / 00.10	0,1 / 0,1 / 0,3 / 0,3 / 0,3 / 0,3
1530	1990.1	M	V	13	(2,1,0)(0,1,1)	X	X	F			92.1 / 92.12 / 93.6 / 94.3 / 94.12 / 98.12 / 01.1 / 01.10	0,2 / 0,6 / 0,8 / 0,7 / 0,5 / 0,5
15-37	1990.1	M	3	13	(0,1,2)(0,1,1)	X	X	FB	N+Z		94.12 / 98.1 / 98.12 / 99.2	0,0 / 0,1 / 0,8 / 0,7 / 0,3 / 0,3
1540	1990.1	M	9	13	(0,1,2)(0,1,1)	X	X		N	95.1	22 months	0,1 / 0,4 / 1,6 / 1,6 / 0,7 / 0,7
1550	1990.1	A	3	13	(2,1,2)(0,1,1)	X	X		N		90.12 / 97.10 / 01.2	0,1 / 0,2 / 0,5 / 0,5 / 0,3 / 0,4
1560	1990.1	A	9	13	(0,1,2)(0,1,1)	X					13 months	0,1 / 0,3 / 0,5 / 0,5 / 0,6 / 0,7
1570	1990.1	M	9	13	(0,1,1)(0,1,1)	X					91.6 / 94.1 / 94.12 / 97.2 / 97.6 / 98.12 / 99.7 / 00.6 / 01.11	0,2 / 0,4 / 0,6 / 0,6 / 0,5 / 0,6
1580	1990.1	M	5	13	(0,1,2)(0,1,1)	X	X	F			90.9 / 90.12 / 92.9 / 93.9 / 93.12 / 95.10 / 95.12 / 96.9 / 00.10	0,0 / 0,1 / 0,2 / 0,2 / 0,3 / 0,3
1590	1990.1	M	9	13	(2,1,0)(0,1,1)	X					91.1 / 98.2	0,2 / 0,2 / 0,1 / 0,1 / 0,3 / 0,3
1600	1990.1	A	9	13	(0,1,1)(0,1,1)	X	X	FB	N+Z		17 months	0,1 / 0,2 / 1,5 / 1,0 / 0,5 / 0,5
17+18	1990.1	M	9	13	(2,1,2)(0,1,1)	X	X	F	N+Z		94.4 / 94.7	0,1 / 0,2 / 0,7 / 0,7 / 0,4 / 0,5
1700	1990.1	M	V	9	(0,1,1)(0,1,1)	X	X	F	N		91.10 / 92.1 / 93.8 / 94.5 / 94. 6 / 96.5 / 96.7 / 98.8 / 99.1	0,1 / 0,2 / 0,7 / 0,7 / 0,3 / 0,4
17-19	1990.1	M	3	13	(0,1,1)(0,1,1)	X	X	FB	N+Z		92.12 / 94.4 / 94.7	0,1 / 0,2 / 1,0 / 0,9 / 0,4 / 0,5
1800	1990.1	M	V	9	(0,1,1)(0,1,1)		X		Z		93.2 / 93.3 / 94.1 / 94.2 / 94.3 / 95.5 / 95.8 / 97.8	0,2 / 0,5 / 1,3 / 0,9 / 0,6 / 0,6
1900	1990.1	M	9	13	(0,1,2)(0,1,1)	X	X	FB	N+M+ Z		92.7 / 92.12	0,3 / 0,3 / 1,5 / 0,7 / 0,5 / 0,5
20+26	1990.1	M	5	13	(0,1,2)(0,1,1)	X	X	F	N+M+Z		13 months	0,0 / 0,1 / 0,6 / 0,5 / 0,2 / 0,3
20+26+36+37	1990.1	A	5	13	(0,1,2)(0,1,1)	X	X	F	N+M+Z		15 months	0,0 / 0,1 / 0,5 / 0,5 / 0,3 / 0,4
2000	1990.1	M	5	13	(2,1,0)(0,1,1)	X	X	F	N+M+Z		93.12 / 95.2 / 96.1 / 96.2 / 97.1 / 00.12 / 01.1	0,4 / 0,1 / 0,6 / 0,5 / 0,4 / 0,4
21+22	1990.1	M	3	13	(0,1,1)(0,1,1)	X		FB				0,9 / 0,3 / 0,6 / 0,6 / 0,7 / 0,7
2100	1990.1	M	5	13	(0,1,2)(0,1,1)	X	X	FB	N			1,2 / 0,2 / 0,5 / 0,4 / 0,7 / 0,6
2110	1990.1	M	9	9	(0,1,1)(0,1,1)	X		F	N			2,0 / 0,4 / 1,3 / 1,3 / 1,0 / 0,8

Code	Date	Type	C1	C2	Order	X1	X2	F	Comp	Period	Dates	Values
2120	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X	F	N+M+Z		92.5 / 93.11 / 95.7	0,8 / 0,2 / 0,7 / 0,5 / 0,6 / 0,5
2200	1990.1	M	5	13	(0,1,1)(0,1,1)	X		FB			94.1	0,7 / 0,3 / 0,5 / 0,4 / 0,7 / 0,7
2210	1990.1	M	9	23	(2,1,0)(0,1,1)	X		F			93.1 / 00.6	1,3 / 0,4 / 0,7 / 0,7 / 0,9 / 0,9
2223	1990.1	M	5	13	(0,1,2)(0,1,1)	X	X	F	N		93.2 / 94.1 / 94.12 / 95.12 / 96.7 / 98.6 / 99.4 / 00.1 / 00.11	0,9 / 0,3 / 0,6 / 0,6 / 0,8 / 0,8
2300	1990.1	M	V	13	(2,1,2)(0,1,1)	X	X			2 months	10 months	0,5 / 0,8 / 0,8 / 0,8 / 0,7 / 0,7
2310	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X			4 months	90.12 / 93.2 / 93.12 / 97.7 / 98.11 / 98.12 / 99.2 / 99.5 / 99.6	0,0 / 0,2 / 0,3 / 0,2 / 0,2 / 0,2
2320	1990.1	M	V	13	(0,1,2)(0,1,1)					97.1	90.2	0,3 / 0,9 / 0,9 / 0,9 / 0,7 / 0,8
23-25	1990.1	M	3	13	(2,1,2)(0,1,1)	X	X	F			94.7 / 95.11 / 97.4 / 98.12	0,1 / 0,3 / 0,6 / 0,5 / 0,3 / 0,4
2330	1995.1	M	5	9	(0,1,1)(0,1,1)	X			N		97.12 / 98.12 / 99.12 / 01.1	0,0 / 0,4 / 0,7 / 0,7 / 0,3 / 0,4
24+25	1990.1	M	3	9	(2,1,0)(0,1,1)	X	X	F			94.12	0,1 / 0,3 / 0,5 / 0,4 / 0,2 / 0,3
2400	1990.1	M	5	13	(0,1,2)(0,1,1)	X	X	F			95.11	0,1 / 0,3 / 0,6 / 0,6 / 0,4 / 0,4
241+247	1990.1	M	9	13	(2,1,0)(0,1,1)	X			N		95.11	0,2 / 0,5 / 1,2 / 1,2 / 0,5 / 0,5
2410	1990.1	M	9	13	(0,1,1)(0,1,1)	X					90.12 / 91.12 / 92.9 / 93.11 / 94.4 / 94.6 / 94.11 / 96.9	0,2 / 0,3 / 0,4 / 0,4 / 0,3 / 0,4
2411	1992.1	M	9	13	(0,1,1)(0,1,1)	X				97.1/98.1	93.5 / 93.7 / 93.9 / 94.5 / 96.7 / 97.11 / 98.10 / 99.10	0,1 / 0,6 / 0,8 / 0,8 / 0,4 / 0,5
2412	1990.1	M	9	13	(2,1,2)(0,1,1)	X		FB			91.11 / 92.8 / 94.12	0,8 / 0,5 / 0,4 / 0,4 / 0,7 / 0,6
2413	1990.1	M	9	9	(0,1,1)(0,1,1)	X					93.9 / 94.1 / 94.9 / 95.11 / 99.1	0,4 / 0,5 / 0,6 / 0,5 / 0,4 / 0,4
2414	1990.1	M	9	13	(0,1,1)(0,1,1)	X	X		N		93.11 / 94.9	0,4 / 0,4 / 1,0 / 1,0 / 0,6 / 0,6
2415	1995.1	M	9	13	(2,1,0)(0,1,1)	X	X		Z		14 months	0,6 / 0,7 / 1,7 / 0,7 / 0,8 / 0,8
2416	1990.1	M	9	13	(0,1,2)(0,1,1)				M		94.4 / 94.10 / 00.12	0,4 / 0,5 / 1,3 / 0,5 / 0,7 / 0,7
2417	1995.1	M	9	13	(2,1,0)(0,1,1)	X			M+Z			0,4 / 0,6 / 2,3 / 0,6 / 0,7 / 0,7
2420	1990.1	M	9	13	(0,1,1)(0,1,1)	X					93.12	0,5 / 0,3 / 0,4 / 0,4 / 0,4 / 0,4
242-246	1990.1	M	9	13	(0,1,1)(0,1,1)	X		F	N		94.2 / 98.12	0,2 / 0,3 / 0,5 / 0,5 / 0,5 / 0,6
2430	1990.1	A	5	13	(0,1,2)(0,1,1)	X		FB			93.2 / 94.2	0,1 / 0,2 / 0,4 / 0,4 / 0,4 / 0,4
2440	1996.1	M	5	13	(0,1,2)(0,1,1)	X					01.7 / 01.10	0,2 / 0,4 / 0,3 / 0,3 / 0,3 / 0,4
2450	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X	F			91.1 / 95.12	0,4 / 0,4 / 0,5 / 0,5 / 0,5 / 0,5
2460	1990.1	M	9	13	(0,1,1)(0,1,1)	X					91.1	0,4 / 0,4 / 0,6 / 0,6 / 0,6 / 0,6
2470	1992.1	M	9	9	(2,1,2)(0,1,1)	X					10 months	0,1 / 0,6 / 0,9 / 0,9 / 0,5 / 0,5
2500	1990.1	A	3	13	(0,1,2)(0,1,1)	X	X	F	Z		94.12 / 00.5	0,2 / 0,3 / 0,7 / 0,5 / 0,5 / 0,4
2510	1990.1	M	9	13	(2,1,2)(0,1,1)	X		FB	N+M+Z		10 months	0,1 / 0,4 / 1,6 / 1,0 / 0,5 / 0,6
2520	1990.1	A	3	13	(0,1,2)(0,1,1)	X		F	M+Z		94.12 / 00.5	0,2 / 0,4 / 1,0 / 0,5 / 0,5 / 0,6
2600	1990.1	M	3	13	(0,1,1)(0,1,1)	X	X	F	N+M+Z		13 months	0,0 / 0,1 / 0,7 / 0,5 / 0,3 / 0,3
2610	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X	F	N+Z		97.1 / 98.12	0,1 / 0,1 / 0,6 / 0,6 / 0,3 / 0,3
2620	1990.1	A	9	23	(0,1,1)(0,1,1)			F	N+M+Z		95.3 / 95.11 / 97.11 / 98.6 / 99.8 / 00.12	1,1 / 0,7 / 2,0 / 1,3 / 1,3 / 1,3
2630	1990.1	M	9	13	(0,1,1)(0,1,1)	X	X		N+Z		94.9 / 94.12 / 96.1 / 96.2 / 97.11 / 97.12 / 98.12 / 00.12	0,1 / 0,2 / 0,9 / 0,9 / 0,4 / 0,4
2640	1990.1	A	9	11	(0,1,2)(0,1,1)	X	X	F	Z		12 months	0,3 / 0,5 / 0,9 / 0,6 / 0,7 / 0,8
2650	1990.1	A	5	13	(0,1,1)(0,1,1)	X	X	FB	N+M+Z		12 months	0,1 / 0,1 / 0,8 / 0,6 / 0,4 / 0,4
2660	1990.1	A	5	13	(2,1,2)(0,1,1)	X	X	FB	N		91.2 / 94.12 / 96.2 / 97.1 / 99.1 / 00.12	0,1 / 0,2 / 0,5 / 0,5 / 0,7 / 0,7
2670	1990.1	M	9	13	(0,1,1)(0,1,1)	X			N		94.1 / 94.7 / 94.12 / 97.1 / 01.12	0,6 / 0,5 / 0,6 / 0,5 / 0,6 / 0,7
2680	1990.1	A	3	13	(0,1,1)(0,1,1)	X		FB	N+M		92.9 / 94.12 / 95.11 / 96.3 / 96.9 / 97.12 / 88.7 / 99.12 / 00.9	0,1 / 0,3 / 0,8 / 0,6 / 0,5 / 0,5
27+28	1990.1	M	3	9	(2,1,2)(0,1,1)			F	N+Z		94.1 / 94.12 / 97.1 / 98.12 / 00.1 / 01.1	0,0 / 0,2 / 1,0 / 0,9 / 0,3 / 0,3
2700	1990.1	A	5	13	(2,1,2)(0,1,1)	X			Z		91.4 / 94.12 / 98.12	0,3 / 0,3 / 1,1 / 0,7 / 0,4 / 0,5
2710	1990.1	M	9	13	(0,1,2)(0,1,1)	X		F		TC (7x)	98.12	2,0 / 0,5 / 0,8 / 0,8 / 0,8 / 0,6
2720	1990.1	M	5	13	(2,1,2)(0,1,1)	X		F	N+Z		92.8 / 98.8	0,2 / 0,3 / 1,3 / 0,5 / 0,5 / 0,6
2730	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X	F	M		93.7 / 95.5 / 96.1 / 96.12 / 97.7 / 98.12 / 99.10	0,1 / 0,4 / 0,7 / 0,7 / 0,4 / 0,5
27-35	1990.1	M	3	13	(2,1,2)(0,1,1)	X	X	FB	N+M+Z		98.12	0,0 / 0,2 / 1,0 / 0,7 / 0,4 / 0,4
2740	1990.1	M	5	13	(0,1,1)(0,1,1)	X					92.7 / 93.7 / 94.1 / 96.1 / 97.1 / 00.6	0,1 / 0,2 / 0,3 / 0,3 / 0,3 / 0,3

2750	1990.1	M	9	13	(2,1,2)(0,1,1)	X	X	FB			92.7 / 94.12 / 97.1 / 97.7	0,3 / 0,4 / 0,7 / 0,7 / 0,7 / 0,8
2800	1990.1	M	3	13	(0,1,2)(0,1,1)	X	X	F	N+M+Z		94.1 / 99.1 / 00.12	0,0 / 0,3 / 1,1 / 0,9 / 0,4 / 0,5
2810	1990.1	M	9	13	(0,1,1)(0,1,1)	X		FB	M+Z		91.4 / 94.1 / 94.3 / 94.4 / 94.8 / 94.11 / 94.12	0,4 / 0,4 / 0,8 / 0,5 / 0,6 / 0,6
2820	1990.1	A	5	13	(2,1,0)(0,1,1)	X			N		93.12 / 94.12 / 95.5 / 97.7	0,3 / 0,3 / 0,8 / 0,8 / 0,4 / 0,4
2830	1998.1	M	S	13	(0,1,1)(0,1,1)							0,3 / 0,4 / / / 0,4 / 0,4
28-35	1990.1	M	3	13	(2,1,2)(0,1,1)	X	X	F	N+M+Z		99.1	0,0 / 0,2 / 1,0 / 0,8 / 0,3 / 0,4
2840	1990.1	M	9	13	(2,1,2)(0,1,1)	X		FB	N+Z		92.12 / 94.3 / 94.7 / 98.12	0,2 / 0,2 / 0,9 / 0,9 / 0,4 / 0,4
2850	1990.1	M	3	9	(2,1,2)(0,1,1)	X	X	FB	N+Z		92.8 / 93.12 / 95.8 / 98.1	0,0 / 0,2 / 1,1 / 0,9 / 0,3 / 0,4
2860	1990.1	M	3	13	(0,1,1)(0,1,1)	X	X	FB				0,2 / 0,3 / 0,6 / 0,5 / 0,4 / 0,4
2870	1990.1	M	3	13	(0,1,2)(0,1,1)	X	X	F	N+M+Z		90.10 / 93.12 / 94.12 / 97.10 / 99.1 / 01.12	0,1 / 0,2 / 0,8 / 0,6 / 0,5 / 0,6
29	1990.1	A	9	13	(2,1,0)(0,1,1)	X	X	FB	Z		94.12 / 99.12 / 01.1 / 01.10	0,2 / 0,4 / 0,8 / 0,7 / 0,5 / 0,5
29+30	1990.1	A	9	13	(2,1,0)(0,1,1)	X	X	F	Z		94.12 / 01.1	0,2 / 0,4 / 0,9 / 0,7 / 0,5 / 0,5
2910	1990.1	M	V	13	(0,1,1)(0,1,1)	X		FB			15 months	0,2 / 0,5 / 1,0 / 1,0 / 0,5 / 0,5
2920	1990.1	A	9	13	(2,1,2)(0,1,1)	X		F	Z		94.12 / 99.8	0,3 / 0,6 / 1,2 / 0,9 / 0,7 / 0,7
2930	1995.1	M	9	9	(2,1,0)(0,1,1)	X				6 months	97.1 / 00.5 / 01.11 / 02.9	0,0 / 0,1 / 0,1 / 0,1 / 0,1 / 0,2
2940	1990.1	M	9	9	(0,1,1)(0,1,1)				Z		97.1 / 98.9	0,4 / 1,0 / 2,0 / 1,3 / 1,0 / 1,1
2950	1990.1	M	9	13	(0,1,1)(0,1,1)	X		FB			94.2 / 94.4 / 97.1 / 01.1 / 01.10	0,3 / 0,4 / 0,9 / 0,9 / 0,5 / 0,6
2960	1990.1	M	9	9	(0,1,1)(0,1,1)	X	X			98.1	92.12 / 94.7 / 94.8 / 94.11 / 94.12 / 95.3 / 00.1	0,3 / 0,5 / 0,8 / 0,8 / 0,5 / 0,5
2970	1990.1	A	5	13	(0,1,2)(0,1,1)	X	X		Z		91.8 / 94.6 / 00.2	0,1 / 0,2 / 0,5 / 0,4 / 0,4 / 0,4
3000	1990.1	M	9	9	(0,1,1)(0,1,1)	X			N+M+Z		93.1 / 94.3 / 96.1 / 0=97.1 / 97.8 / 97.12 / 98.10 / 01.1	0,2 / 0,7 / 2,8 / 1,7 / 0,6 / 0,7
30-33	1990.1	M	9	13	(2,1,2)(0,1,1)	X			Z		99.12	0,3 / 0,4 / 0,7 / 0,6 / 0,5 / 0,5
3100	1990.1	A	5	13	(0,1,2)(0,1,1)	X		FB			97.12	0,2 / 0,3 / 0,6 / 0,5 / 0,4 / 0,4
3200	1990.1	M	9	13	(2,1,2)(0,1,1)	X			Z			0,3 / 0,3 / 0,7 / 0,6 / 0,5 / 0,5
3300	1995.1	M	5	13	(0,1,1)(0,1,1)	X			N+Z		96.10 / 96.11 / 96.12 / 98.4 / 98.9 / 00.5 / 01.1 / 01.2 / 01.6	0,1 / 0,5 / 0,5 / 0,5 / 0,4 / 0,5
34+35	1990.1	M	3	13	(0,1,1)(0,1,1)	X		F	N+M+Z			0,0 / 0,4 / 1,5 / 1,0 / 0,5 / 0,5
3400	1990.1	M	5	13	(0,1,1)(0,1,1)	X		F	N+Z		98.8	0,1 / 0,2 / 1,2 / 0,9 / 0,4 / 0,5
3410	1990.1	M	5	13	(0,1,1)(0,1,1)	X		F	N+M+Z		90.7 / 97.8 / 98.8	0,1 / 0,3 / 1,5 / 1,1 / 0,4 / 0,5
3420	1990.1	M	5	13	(2,1,2)(0,1,1)	X			Z		92.8 / 94.11	0,2 / 0,2 / 0,6 / 0,5 / 0,4 / 0,4
3430	1990.1	M	5	13	(2,1,0)(0,1,1)	X		F				0,3 / 0,3 / 1,1 / 0,7 / 0,6 / 0,6
3500	1996.1	M	3	13	(2,1,2)(0,1,1)	X		F	N+Z		99.4	0,0 / 0,2 / 0,5 / 0,5 / 0,5 / 0,6
3510	1995.1	M	9	13	(0,1,1)(0,1,1)	X		F			95.9 / 95.12 / 96.3 / 96.7 / 98.4 / 99.1 / 99.4 / 00.12	0,3 / 0,5 / 0,4 / 0,4 / 0,8 / 0,8
3520	1996.1	M	3	9	(0,1,1)(0,1,1)	X					96.3 / 96.12 / 97.3 / 97.11	0,0 / 0,3 / 0,3 / 0,3 / 0,2 / 0,3
3530	1990.1	A	9	13	(2,1,2)(0,1,1)	X	X	F			12 months	0,4 / 0,5 / 0,7 / 0,6 / 0,6 / 0,6
3540	1990.1	M	5	13	(2,1,2)(0,1,1)	X		F	N+M+Z		98.8 / 98.11	0,1 / 0,3 / 0,8 / 0,4 / 0,5 / 0,5
3550	1990.1	M	9	9	(0,1,1)(0,1,1)	X		F	N+M		41 months	0,1 / 0,4 / 0,9 / 0,6 / 0,4 / 0,4
36+37	1990.1	M	5	13	(2,1,2)(0,1,1)	X		F	Z		93.8 / 93.12 / 94.8	0,1 / 0,2 / 0,6 / 0,4 / 0,4 / 0,5
3600	1995.1	M	5	13	(2,1,2)(0,1,1)	X	X	F	N+Z		99.4 / 00.3	0,1 / 0,2 / 0,4 / 0,3 / 0,4 / 0,5
3610	1990.1	M	5	13	(2,1,2)(0,1,1)	X	X	FB	N+M+Z		01.9	0,1 / 0,1 / 0,7 / 0,6 / 0,3 / 0,3
3620	1990.1	M	9	9	(0,1,1)(0,1,1)						18 months	0,4 / 0,7 / 0,7 / 0,7 / 0,5 / 0,5
3630	1995.1	M	9	9	(2,1,0)(0,1,1)							0,3 / 0,7 / 0,4 / 0,4 / 0,4 / 0,4
3640	1996.1	M	9	13	(0,1,1)(0,1,1)	X					96.2	0,2 / 0,6 / 0,1 / 0,1 / 0,7 / 0,7
3650	1990.1	M	9	13	(0,1,1)(0,1,1)	X					95.4 / 95.7 / 96.7 / 97.2 / 98.6 / 98.12 / 99.9	0,6 / 0,8 / 1,3 / 1,3 / 0,7 / 0,8
3660	1990.1	M	9	13	(0,1,2)(0,1,1)	X					93.8 / 93.12 / 94.7 / 94.8 / 94.11 / 94.12 / 00.6	0,2 / 0,5 / 0,7 / 0,7 / 0,5 / 0,6
3700	1995.1	M	5	13	(2,1,2)(0,1,1)	X	X	F	N+Z		99.4 / 00.3	0,3 / 0,5 / 0,5 / 0,5 / 0,5 / 0,5
40+41	1990.1	M	3	13	(0,1,1)(0,1,1)	X	X				10 months	0,0 / 0,1 / 2,4 / 0,8 / 0,5 / 0,6
4010	1990.1	M	5	13	(0,1,1)(0,1,1)	X	X	FB	N+M		91.2 / 94.12 / 96.11 / 96.12 / 97.3 / 97.8 / 99.1 / 00.12	0,0 / 0,1 / 0,5 / 0,4 / 0,3 / 0,4

4020	1990.1	M	9	23	(0,1,1)(0,1,1)						91.5 / 91.6 / 96.5	0,0 / 0,0 / 3,0 / 0,9 / 0,8 / 1,0
4100	1990.1	M	5	13	(2,1,0)(0,1,1)	X	X	FB	N+M+Z		17 months	0,2 / 0,4 / 2,4 / 0,8 / 0,7 / 0,7
ES25	1990.1	M	3	9	(2,1,0)(0,1,1)	X	X	F	N+M+Z		92.3 / 94.12 / 95.12 / 98.1 / 99.1 / 01.10 / 02.12	0,0 / 0,1 / 0,4 / 0,3 / 0,2 / 0,2
ES30	1990.1	A	5	23	(2,1,0)(0,1,1)	X	X	FB	Z		91.9	0,5 / 0,2 / 0,5 / 0,5 / 0,8 / 0,8
ES40	1990.1	M	5	13	(0,1,1)(0,1,1)	X	X	F	Z		94.12 / 96.2 / 97.1 / 98.12	0,1 / 0,2 / 0,4 / 0,3 / 0,2 / 0,2
ES50	1990.1	M	9	13	(0,1,2)(0,1,1)	X	X	F	N+M+Z		01.1	0,1 / 0,2 / 1,0 / 0,7 / 0,4 / 0,5
ES60	1990.1	M	5	13	(2,1,0)(0,1,1)	X			N+Z		95.12 / 99.12 / 01.10	0,1 / 0,2 / 1,0 / 0,9 / 0,4 / 0,5
ES70	1990.1	M	5	13	(0,1,1)(0,1,1)	X	X	F	N		93.12 / 95.12 / 00.1	0,1 / 0,1 / 0,5 / 0,5 / 0,3 / 0,3
ES80	1990.1	M	5	13	(0,1,1)(0,1,1)	X	X	F	N+Z		93.12 / 95.12 / 00.1 / 01.10	0,1 / 0,1 / 0,6 / 0,6 / 0,3 / 0,4
ES90	1990.1	M	5	13	(0,1,2)(0,1,1)							0,0 / 0,1 / 2,6 / 0,8 / 0,6 / 0,7
ES91	1990.1	M	3	13	(2,1,2)(0,1,1)	X	X				97.3	0,0 / 0,2 / 0,3 / 0,2 / 0,3 / 0,3