Seasonal Adjustment of the Industrial Production Index for Romania – An Innovative Approach Using JDemetra+ 2.1

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ABSTRACT

Accurate and precise data are essential for decision makers. Moreover, when statistical data revisions are taken into account, data stability is very important. This paper proposes an innovative procedure that can be used to seasonally adjust the Industrial Production Index of Romania in order to obtain a good overall quality and low revisions. In this context, different seasonal adjustment methods, the Julian Easter, the series length and different seasonal and Henderson filters were taken into account.

Keywords: *seasonal adjustment, revisions, JDemetra+, Industrial Production Index*

JEL Classification: *L16*

1. INTRODUCTION

According to the press releases No. 38/12 Feb 2018, No. 63/14 Mar 2018, No. 90/12 Apr 2018, No. 117/ 11 May 2018, No.149/12 Jun 2018, No. 181/12 Jul 2018 the National Institute of Statistics Romania uses the TRAMO-SEATS package implemented in JDemetra+ v.2.0 for the seasonal adjustment of the Industrial Production Index for Romania. Table 1 presents these data as they appear in these press releases. As one can observe, there is a high revision for December 2017 from the Press Release No. 38/12 Feb 2018 to the Press Release No. 63/14 Mar 2018. This revision is explained by the fact

that starting January 2018, the Industrial Production Index is computed using 2015 instead of 2010 as basis (Press Release No. 63/14 Mar 2018). Moreover, there are two moderate revisions (greater than 0.2 pp) for the values in January and April. Data stability between revisions is one of the main criticism of the seasonally adjusted Industrial Production Index for the Euro Area (Mazzi and Moauro, 2016). Other issues raised by the scientific literature with regard to the industrial production are: over-adjustment (Bruno, 2001) and the use of statistical packages as a black box (Bhattacharya et al., 2016).

Industrial Production Index (%) – seasonally adjusted data, as they appear within the press releases of the National Institute of Statistics Romania

Table 1

	Press Release No. 38 / 12 Feb 2018	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018	Press Release No. 149/ 12 Jun 2018	Press Release No. 181/ 12 Jul 2018
Nov 2017	148.5	115.5	115.5	115.5	115.5	115.5
Dec 2017	154.1	120.5	120.5	120.5	120.5	120.5
Jan 2018		117	116.4	116.4	116.4	116.4
Feb 2018			115.6	115.6	115.6	115.6
Mar 2018				116.2	116.4	116.4
Apr 2018					118.8	119.1
May 2018						118.6

2. METHODOLOGY

In this section we will suggest a new procedure that can be used in the seasonal adjustment process of the Industrial Production Index. With regard to the software used in the seasonal adjustment process, we suggest moving to JDemetra+ v2.1 as there are significant improvements compared to JDemetra+ v2.0 namely: new diagnostics settings, the possibility of setting multiple pre-specified outliers for the same period, ready-available Julian Easter and related holidays, new options in X12 (Palate, 2016). Using this software, we propose a procedure for ensuring low revisions from a press release to another. The goal of any revision policy should be ensuring stability especially at the end of the series (Mirica et al., 2016). As starting from January 2018 (Press Release No. 63/14 Mar 2018) a significant change in the methodology of the discussed index occurred, only the raw data within these press releases will be considered. The analysis is performed taking into account all the legal holidays in Romania including the Julian Easter and related holidays.

Firstly, the automatic procedure within the TRAMO-SEATS and X13 seasonal adjustment packages are run on the raw data. The automatic procedure

is very easy to use, even by non-statisticians, and is suitable for large scale time series production (Toma and Mirica, 2018). Several time spans were tested: the entire series starting January 2010 as it appears in the press releases, series starting January 2013 and series starting January 2015. One should note that in order to perform seasonal adjustment on monthly data, a 3 years long time series is absolutely necessary, but a more adequate length is 5 years (UNSD, 2010).

3. RESULTS

Table 2 presents the results for every case where good overall quality was obtained. As one can observe there are major revisions occurring through the entire period at the end of the series.

The seasonally adjusted Industrial Production Index (%) as a result of applying the automatic procedure implemented within the TRAMO-SEATS and X13 seasonal adjustment packages available in JDemetra+ 2.1.

Table 2

	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018	Press Release No. 149/12 Jun 2018	Press Release No. 181/ 12 Jul 2018
2018	Estimations using TRAMO-SEATS automatic procedure on the series starting January 2010				
Jan	115.2	114.0	114.0	113.8	113.9
Feb		114.1	114.2	114.1	114.2
Mar			114.9	114.7	114.8
Apr				112.1	112.7
May					116.2
	Estimations using TRAMO-SEATS automatic procedure on the series starting January 2013				
Jan	115.8	113.8	113.9	113.6	114.0
Feb		113.9	114.1	113.6	113.7
Mar			115.0	114.2	115.2
Apr				111.8	113.8
May					116.1
	Estimations using TRAMO-SEATS automatic procedure on the series starting January 2015				
Jan	117.2	116.4	114.6	114.2	114.5
Feb		116.7	114.8	114.0	114.4
Mar			115.6	114.0	114.4
Apr				113.5	114.2
May					115.6
	Estimations using X13 automatic procedure on the series starting January 2013				
Jan	114.1	114.1	114.2	112.8	114.5
Feb		114.2	114.4	113.0	114.7
Mar			116.5	115.7	115.2
Apr				113.3	112.4
May					114.6
	Estimations using X13 automatic procedure on the series starting January 2015				
Jan	115.9	113.5	113.5	113.7	114.7
Feb		115.2	115.0	114.5	114.9
Mar			114.8	114.1	114.5
Apr				113.3	113.8
May					115.1

As the automatic procedure didn't produce satisfying results, we will proceed to manually selecting the ARIMA model. Figure 1 displays the raw time series as it appears in the Press Release No. 181/12 Jul 2018. As one can observe there are variations in the seasonal component that increase slightly with the trend especially in the second part of the series. In such cases, a multiplicative model is suitable (Pennsylvania State University, 2018).

Industrial Production Index – Raw series, source of data: Press Release No. 181/ 12 Jul 2018 of the National Institute of Statistics Romania

Figure 1

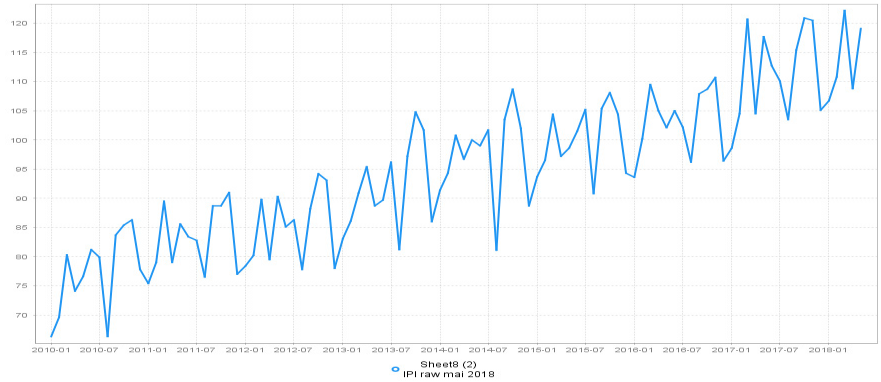

Figure 2 displays the Partial Autocorrelation function for the log-transformed series of the Industrial Production Index, as computed using the differencing tool in JDemetra+ 2.1. The Partial Autocorrelation function provides the autoregressive order – AR (p) (Andrei and Bourbonnais, 2017). As one can observe the autoregressive order should be 2. Moreover, the differencing window shows that the differencing orders (entire series and seasonally) should be 1.

Partial Autocorrelation function for the log-transformed series of the Industrial Production Index as provided in the Press Release No. 181/ 12 Jul 2018 of the National Institute of Statistics Romania

Figure 2

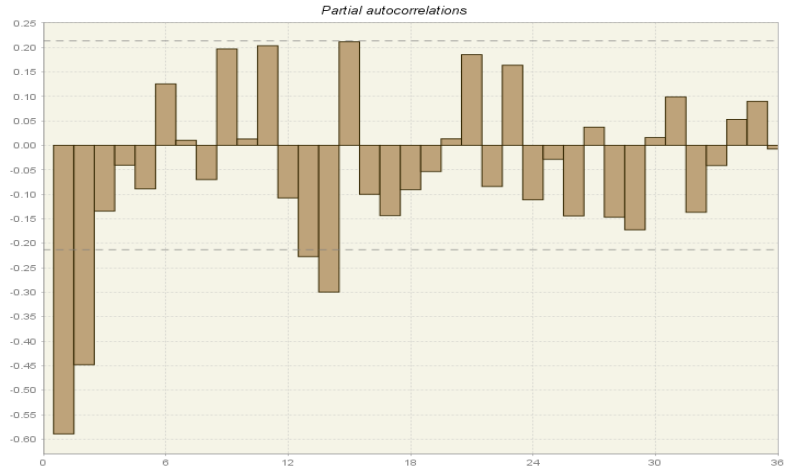

Table 3 shows the ARIMA models that were computed within the TRAMO SEATS and X13 packages. These models were tested for the three series length stated above. The seasonally adjusted values for the Industrial Production Index in the cases where good quality results were obtained are displayed in appendix 1. As one can observe, only one model implemented within the X13 package produced satisfying results in terms of revision. Therefore, Model ARIMA (211010) applied for raw series in each press release, didn't provide revisions higher than 0.2 pp. One should note that this model was determined after all the data were produced. In order to be able to determine it in advance, statistical producers must compute a series of simulations as described by Mirica et al. (2016).

ARIMA model combinations computed on the Industrial Production Index Raw series

Table 3

P	D	Q	BP	BD	BQ
2	1	1	0	1	0
2	1	1	1	1	0
2	1	1	1	1	1
2	1	1	0	1	1
2	1	0	0	1	0
2	1	0	1	1	0
2	1	0	1	1	1
2	1	0	0	1	1

As making simulations in advance requires a lot of resources we next provide an easier approach. As the results above showed, X13 seems to be the optimum package for this time series. Moreover, the optimum length is 5 years. The ESS Guidelines on Seasonal Adjustment (Eurostat, 2015 p.35) states that "*the assumption that the number of past periods, in which conditions causing seasonal behaviour are sufficiently homogenous, is equal for all months/ quarters [...] does not always hold"* therefore, one can use different filters for different periods. Next we will apply this principle not within the same time series, but when adding a new value for a new month to an existing time series.

One can easily adjust the X13 specification in JDemetra+ 2.1 with regard to the seasonal and Henderson filters. JDemetra+ offers several choices with regard to seasonal filters: S3*1, S3*3, S3*5, S3*9, S3*15, X11 Stable (a single seasonal factor for each calendar period is generated by computing the mean of all the values for each period), MSR (chooses the seasonal filter automatically), X11 Default (the initial seasonal factors are calculated using a 3×3 moving average while the final seasonal factor is calculated using a 3×5 moving average) (Grudkowska, 2016). Moreover, the program allows the user to set the value of the Henderson filter manually using numbers from 1 to 101. According to (Grudkowska, 2016), the choice between filters is made using the Moving Seasonality Ratio while the choice of the Henderson filter is based on the I/C ratio (for both indicators, a small value indicates that a smaller filter should be used). However, one should note that there is no certain method for seasonal adjustment and any recommendation should be tested to see if it produces reasonable results (Harhoff, 2005).

Table 4 presents the seasonally adjusted indexes as they resulted after applying the automatic X13 procedure for choosing the ARIMA model implemented within JDemetra+ 2.1 with different filters. The filters were chosen so that the revisions are kept to minimum from one press release to another, then quality issues were considered. For example using the raw data from Press Release No. 90/12 Apr 2018, the seasonally adjusted Industrial Production Index is 114.2% for February 2018. Using the data from Press Release No. 117/ 11 May 2018, this value is kept applying two different Henderson filters for S3*5 seasonal filter: 5 and 3. However, applying Henderson filter 3 conducted to severe quality results. This is why the Henderson filter 5 was chosen. If there are several candidate models displaying good results, one can use M and Q-statistics (Hungarian Central Statistical Office, 2007).

The results of applying the automatic X13 procedure for choosing the ARIMA model implemented within JDemetra+ 2.1 with different filters, series starting January 2013 until press release

Table 4

	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018		Press Release No. 149/ 12 Jun 2018	Press Release No. 181/ 12 Jul 2018
Procedure	x13 automatic procedure MSR with automatic Henderson filter	x13 automatic procedure MSR with Automatic Henderson filter	x13 automatic procedure with S3*5 seasonal filter Henderson filter 5	x13 automatic procedure with S3*5 seasonal filter, Henderson filter 3	x13 automatic procedure with S3*3 seasonal filter, Henderson filter 7	x13 automatic procedure with S3*1 seasonal filter, Henderson filter 5
Overall quality results	good	good	good	Severe	good	good
Jan	114.1	114.1				
Feb		114.2	114.2	114.2		
Mar			115.7	116.3	115.6	
Apr					113.5	113.4
May						115.0

As one can observe from table 5, the Easter effect is significant when the ARIMA model is manually chosen. Similar results were obtained when the Automatic X13 procedure for choosing the ARIMA model with different filters was applied. One should note that Easter has a significant effect on the Industrial Production Index even if other seasonal adjustment methods are chosen. In this respect, appendix 2 should be consulted as it displays the coefficients and t-statistics for all the models that conducted to good quality results.

Easter effect coefficients (t-stat in brackets) for IPI series in each press release using different seasonal adjustment procedures and series lengths

Table 5

	Series length	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018	Press Release No. 149/ 12 Jun 2018	Press Release No. 181/ 12 Jul 2018
Manual ARIMA Model (211010) X13	January 2013 until press release	-7.0896* (-2.84)	-3.8908* (-2.47)	-7.7947* (-2.73)	-4.6322* (-5.10)	-4.6763* (-5.25)
Automatic X13 procedure for choosing the ARIMA model with different filters	January 2013 until press release	-3.7719* (-2.80)	-7.5229* (-2.78)	-7.4972 * (-2.83)	-4.4732* (-3.93)	-4.4732* (-3.93)

4. CONCLUSIONS

The Industrial Production Index is a highly important monthly time series for business decision makers. As satisfying users' needs at highest possible standards is one of the main purpose of the European Statistical System (Eurostat, 2014), producing good quality seasonally adjusted data for this series with low revisions should be a priority for all national statistical authorities.

This article proposed a procedure for improving seasonally adjusted data of the Industrial Production Index in the case of Romania: migrating from JDemetra+ 2.0 to JDemetra 2.1; taking into account the Julian Easter; setting the series length to 5 complete years; using the X13 automatic procedure for choosing the ARIMA model; selecting different seasonal and Henderson filters for different periods. Moreover, the article proved that the Julian Easter has a significant effect on this series. The approach used in this article is innovative as we propose assessing the seasonal and Henderson filters from one press release to another instead of applying different filters for different periods.

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The results of applying manually selected models, with good quality results using TRAMO-SEATS and X13 seasonal adjustment packages available in JDemetra+ 2.1 on data from several press releases

Appendix 1

	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018	Press Release No. 149/ 12 Jun 2018	Press Release No. 181/ 12 Jul 2018
	Estimations using TRAMO-SEATS procedure with 211011 ARIMA Model on the series starting January 2010				
Jan	114.4	114.1	114.1	113.8	114.0
Feb		114.0	114.2	114.0	114.2
Mar			114.7	114.5	114.7
Apr				111.9	112.5
May					116.1
	Estimations using TRAMO-SEATS procedure with 211011 ARIMA Model on the series starting January 2015				
Jan	118.0	116.7	114.3	114.2	114.7
Feb		117.1	114.5	113.9	114.2
Mar			115.4	114.0	114.4
Apr				112.5	113.4
May					115.6
	Estimations using X13 procedure with 211011 ARIMA Model on the series starting January 2015				
Jan	115.2	114.6	114.5	114.3	114.5
Feb		114.9	114.9	114.6	114.9
Mar			115.4	113.8	114.9
Apr				113.1	112.5
May					115.5
	Estimations using TRAMO-SEATS procedure with 211111 ARIMA Model on the series starting January 2010				
Jan	116.8	114.5	114.4	114.1	114.3
Feb		114.8	114.6	114.4	114.6
Mar			114.8	114.1	114.3
Apr				113.2	113.9
May					115.3
	Estimations using TRAMO-SEATS procedure with 211111 ARIMA Model on the series starting January 2013				
Jan	114.7	114.2	114.2	113.7	113.9
Feb		114.2	114.3	113.9	114.2
Mar			115.0	114.3	114.5
Apr				112.6	113.4
May					115.5
	Estimations using TRAMO-SEATS procedure with 210011 ARIMA Model on the series starting January 2010				
Jan	115.7	114.0	114.0	113.8	114
Feb		114.1	114.3	114.2	114.3
Mar			114.7	113.9	114.2
Apr				112.8	113.6
May					115
	Estimations using TRAMO-SEATS procedure with 210011 ARIMA Model on the series starting January 2013				
Jan	117.0	114.0	114.0	113.5	113.7
Feb		114.0	114.1	113.6	113.9
Mar			114.9	114.6	114.8
Apr				111.7	112.4
May					116.1
	Estimations using TRAMO-SEATS procedure with 210011 ARIMA Model on the series starting January 2015				
Jan	118.0	116.1	114.4	114.2	114.5
Feb		116.2	114.4	113.9	114.3
Mar			115.1	114.0	114.3

Apr				112.4	113.3
May					115.6
	Estimations using X13 procedure with 210011 ARIMA Model on the series starting January 2015				
Jan	115.2	115.0	113.7	114.5	114.7
Feb		115.3	115.4	114.7	114.9
Mar			115.2	113.8	114.4
Apr				113.1	113.8
May					115.0
	Estimations using TRAMO-SEATS procedure with 210110 ARIMA Model on the series starting January 2010				
Jan	116.6	114.8	114.7	114.1	113.6
Feb		114.5	114.4	113.7	113.2
Mar			114.2	113.2	114.4
Apr				112.3	113.7
May					115.0
	Estimations using TRAMO-SEATS procedure with 210110 ARIMA Model on the series starting January 2015				
Jan	118.6	116.1	115.2	114.4	114.7
Feb		116.2	114.8	114.0	114.4
Mar			114.6	113.7	114.1
Apr				113.3	114.1
May					115.1
	Estimations using X13 procedure with 210110 ARIMA Model on the series starting January 2015				
Jan	115.0	115.2	114.8	114.5	114.7
Feb		115.2	115.0	114.6	114.9
Mar			115.2	114.3	114.6
Apr				112.7	113.4
May					115.2
	Estimations using TRAMO-SEATS procedure with 210111 ARIMA Model on the series starting January 2010				
Jan	116.9	114.5	114.4	114.1	114.3
Feb		114.8	114.6	114.4	114.6
Mar			114.8	114.0	114.2
Apr				113.3	113.9
May					115.2
	Estimations using X13 procedure with 210111 ARIMA Model on the series starting January 2013				
Jan	114.3	113.0	113.4	113.1	113.3
Feb		113.7	114.1	113.6	113.9
Mar			115.7	115.9	114.9
Apr				111.9	112.2
May					115.3
	Estimations using TRAMO-SEATS procedure with 210010 ARIMA Model on the series starting January 2010				
Jan	117.5	116.0	115.3	114.6	114.8
Feb		116.1	114.9	114.3	114.4
Mar			115.1	114.1	114.3
Apr				114.1	114.4
May					115.0
	Estimations using TRAMO-SEATS procedure with 210010 ARIMA Model on the series starting January 2013				
Jan	117.7	116.0	114.7	114.5	114.6
Feb		116.1	114.7	114.2	114.5
Mar			114.8	114.1	114.4
Apr				114.0	114.5
May					115.1
	Estimations using TRAMO-SEATS procedure with 210010 ARIMA Model on the series starting January 2015				
Jan	118.4	116.4	115.4	114.3	114.6
Feb		116.7	115.1	114.0	114.4
Mar			115.4	113.9	114.4
Apr				113.9	114.6
May					115.2

	Estimations using X13 procedure with 210010 ARIMA Model on the series starting January 2013				
Jan	114.5	114.4	114.3	113.7	113.9
Feb		114.0	114.3	113.8	114.1
Mar			115.9	114.4	114.9
Apr				112.7	113.5
May					114.8
	Estimations using X13 procedure with 210010 ARIMA Model on the series starting January 2015				
Jan	115.4	115.2	115.7	114.4	114.0
Feb		115.9	116.0	114.6	113.3
Mar			120.2	114.2	114.3
Apr				113.1	113.0
May					114.9
	Estimations using TRAMO-SEATS procedure with 211010 ARIMA Model on the series starting January 2010				
Jan	117.5	116.0	115.2	114.6	114.2
Feb		116.1	114.9	114.3	114.7
Mar			115.1	114.1	114.6
Apr				114.1	114.5
May					115.1
	Estimations using TRAMO-SEATS procedure with 211010 ARIMA Model on the series starting January 2013				
Jan	117.6	115.8	114.9	113.6	113.6
Feb		115.9	115.0	113.3	113.5
Mar			115.0	114.1	114.1
Apr				113.9	114.1
May					114.6
	Estimations using TRAMO-SEATS procedure with 211010 ARIMA Model on the series starting January 2015				
Jan	118.1	117.0	115.2	114.7	114.6
Feb		117.7	115.7	114.6	114.5
Mar			116.2	114.6	114.5
Apr				114.8	114.7
May					115.3
	Estimations using X13 procedure with 211010 ARIMA Model on the series starting January 2013				
Jan	105.7	105.9	105.8	105.3	105.4
Feb		107.5	107.6	107.7	107.8
Mar			111.0	110.8	111.2
Apr				111.5	111.6
May					111.6
	Estimations using X13 procedure with 211010 ARIMA Model on the series starting January 2015				
Jan	115.5	115.2	114.8	114.5	114.0
Feb		116.0	115.2	114.7	113.4
Mar			115.4	114.6	114.4
Apr				113.1	113.0
May					115.0
	Estimations using TRAMO-SEATS procedure with 211110 ARIMA Model on the series starting January 2010				
Jan	116.6	115.5	115.2	114.5	114.4
Feb		115.1	114.8	114.0	114.1
Mar			114.5	113.5	113.7
Apr				112.8	113.1
May					114.6
	Estimations using X13 procedure with 211110 ARIMA Model on the series starting January 2015				
Jan	115.5	115.1	114.9	114.5	114.7
Feb		115.2	115.1	114.6	114.9
Mar			115.3	114.3	114.7
Apr				112.7	113.5
May					115.3

Easter effect coefficients (t-stat in brackets) for IPI series in each press release using different seasonal adjustment procedures and series lengths

Appendix 2

	Series length	Press Release No. 63 / 14 Mar 2018	Press Release No. 90 / 12 Apr 2018	Press Release No. 117/ 11 May 2018	Press Release No. 149/ 12 Jun 2018	Press Release No. 181/ 12 Jul 2018
Automatic procedure TRAMO SEATS	January 2010 until press release	-0.0544* (-3.73)	-0.0495* (-3.64)	-0.0494* (-3.66)	-0.0487* (-3.54)	-0.0489 * (-3.56)
	January 2013 until press release	-0.0633* (-3.03)	-0.0564* (-3.19)	-0.0564* (-3.22)	-0.0563* (-3.15)	-0.0636* (-3.04)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Automatic procedure X13	January 2013 until press release	-3.7719* (-2.80)	-7.5229* (-2.78)	-7.4972* (-2.83)	-4.5775* (-5.27)	-4.4732 * (-3.93)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (211011) TRAMO SEATS	January 2010 until press release	-0.0484* (-3.75)	-0.0478* (-3.72)	-0.0477 * (-3.74)	-0.0469 * (-3.60)	-0.0471* (-3.61)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (211011) procedure X13	January 2015 until press release	0.1439* (2.20)	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (211111) TRAMO SEATS	January 2010 until press release	-0.0555* (-4.09)	-0.0488* (-3.83)	-0.0480* (-3.77)	-0.0492* (-3.86)	-0.0497* (-3.91)
	January 2013 until press release	-0.0550* (-2.86)	-0.0547* (-2.88)	-0.0547* (-2.92)	-0.0573* (-3.02)	-0.0592* (-3.14)
Manual ARIMA Model (210011) TRAMO SEATS	January 2010 until press release	-0.0526* (-3.89)	-0.0468* (-3.69)	-0.0468* (-3.72)	-0.0460* (-3.58)	-0.0461* (-3.58)
	January 2013 until press release	-0.0631* (-3.24)	-0.0552* (-2.98)	-0.0553* (-3.02)	-0.05454* (-2.95)	-0.05554* (-2.97)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect

Manual ARIMA Model (210011) procedure X13	January 2015 until press release	0.1434* (2.25)	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (210110) TRAMO SEATS	January 2010 until press release	-0.0572* (-4.45)	-0.0551* (-4.57)	-0.0548* (-4.59)	-0.0559* (-4.57)	-0.0534* (-4.45)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (210110) X13	January 2015 until press release	0.1548* (2.50)	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (210111) TRAMO SEATS	January 2010 until press release	-0.0552* (-4.12)	-0.0485* (-3.85)	-0.0475* (-3.77)	-0.0489* (-3.88)	-0.0493* (-3.93)
Manual ARIMA Model (210111) X13	January 2013 until press release	-6.8495* (-2.40)	-3.2281* (-2.70)	-6.2795* (-2.59)	-3.4522* (-2.75)	-3.5209* (-2.82)
Manual ARIMA Model (210010) TRAMO SEATS	January 2010 until press release	-0.0658* (-5.29)	-0.0667* (-5.20)	-0.0668* (-5.29)	-0.0677* (-5.40)	-0.0676* (-5.42)
	January 2013 until press release	-0.0642* (-3.29)	-0.0651* (-3.15)	-0.0616* (-3.38)	-0.0685* (-3.49)	-0.0706* (-4.52)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (210010) X13	January 2013 until press release	-7.5420* (-2.50)	-3.9462* (-2.55)	-8.2468* (-2.76)	-4.2841* (-4.38)	-4.2865* (-4.38)
	January 2015 until press release	0.1217* (1.93)	0.1316* (2.15)	-0.4654* (-1.99)	No Easter effect	No Easter effect
Manual ARIMA Model (211010) TRAMO SEATS	January 2010 until press release	-0.0660* (-5.26)	-0.0673* (-5.17)	-0.0674* (-5.41)	-0.0678* (-5.37)	-0.0668* (-5.38)
	January 2013 until press release	-0.0650* (-3.28)	-0.0696* (-4.17)	-0.0694* (-4.25)	-0.0670* (-4.23)	-0.0660* (-4.81)
	January 2015 until press release	No Easter effect	No Easter effect	No Easter effect	No Easter effect	No Easter effect
	January 2015 until press release	No Easter effect	0.1312* (2.08)	No Easter effect	No Easter effect	No Easter effect
Manual ARIMA Model (211110) TRAMO SEATS	January 2010 until press release	-0.0578* (-4.45)	-0.0590* (-4.43)	-0.0585* (-4.47)	-0.0588* (-4.46)	-0.0565* (-4.54)
Manual ARIMA Model (211110) X13	January 2013 until press release	No Easter effect	0.1312* (2.08)	No Easter effect	No Easter effect	No Easter effect