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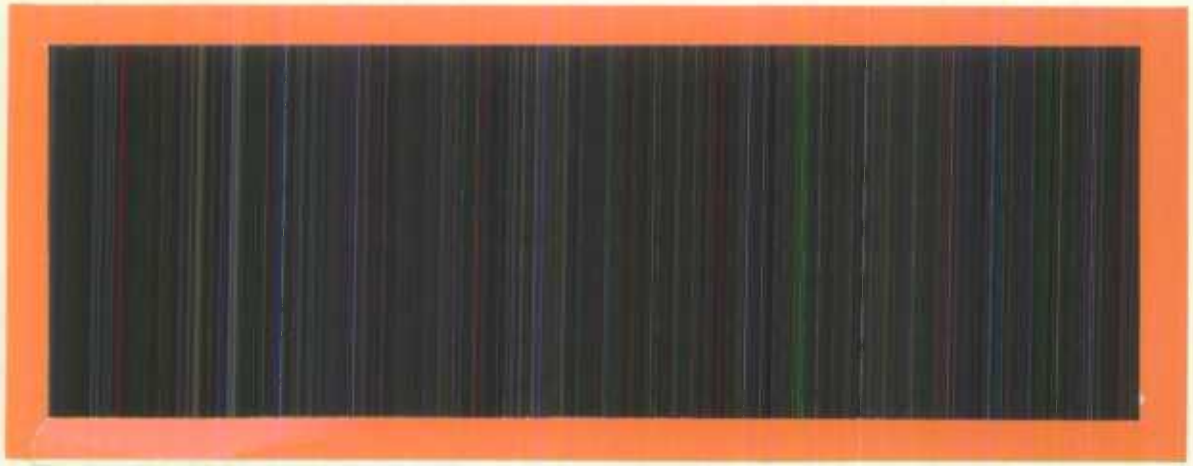

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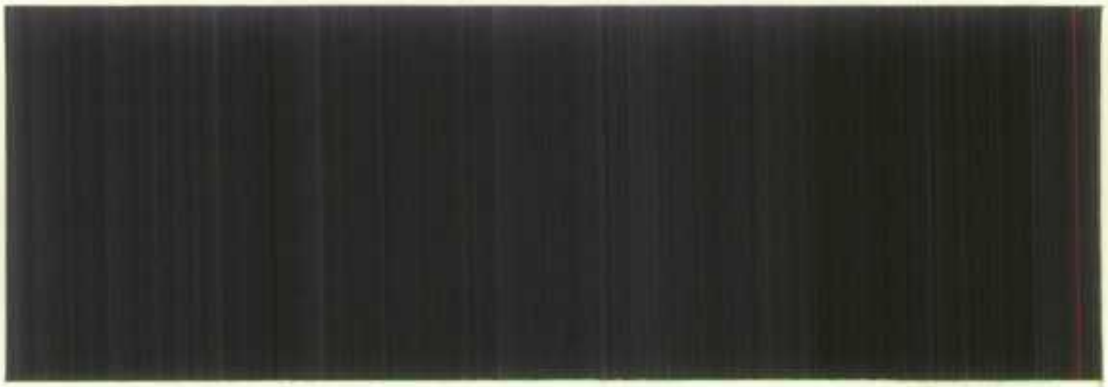

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USERS MANUAL OF PROGRAM CALENDR for the Calendarization of Socio-economic Time Series Data

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-RÉSUMÉ-

Ce programme, écrit en SAS/IML, peut servir à l'annualisation de chiffres d'années financières; à la trimestrialization de chiffres de trimestres financiers; de même qu'à la mensualisation de chiffres couvrant des périods de 4 ou 5 semaines. La méthode sous-jacente consiste à interpoler des valeurs trimestrielles, mensuelles ou quotidiennes (selon le cas traité) et à les réagréger en valeurs annuelles, trimestrielles ou mensuelles.

1. INTRODUCTION

In many cases, socio-economic data do not reflect the periods they are supposed to cover. They must therefore be accordingly corrected; that correction is called "calendarization". The most common example is that of fiscal year data covering from April of one year to March of the next, instead of from January to December. Other such common situations include financial quarter data which cover February to April, May to July, August to October and November to January, instead of "calendar" quarters; and data reported in weekly bundles (e.g. 4 weeks, 4 weeks, 5 weeks, 4 weeks, etc.) instead of monthly values.

In order to perform calendarization, the program CALENDR was written in the SAS language (1985) which is available to many statistical agencies. This manual explains CALENDR's basic terminology of calendarization, the inputs required to run the program and the resulting output.

The calendarization method underlying the program CALENDR works by estimating the unknown quarterly, monthly or daily values from the financial data and from a predetermined "seasonal" pattern. Then, these estimates are aggregated into the desired yearly, quarterly or monthly values. For instance, the fiscal year data in the former example are separated into quarterly estimates. These estimates are then recombined into calendar year values. The interpolation principle consists of keeping the interpolated values as proportional as possible to the seasonal pattern supplied by the user. If no seasonal pattern is supplied then the interpolated values are as smooth as possible. The interpolations must also comply with the financial data[1]. For more details about the underlying methodology, refer to Cholette (1987, 1988).

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[1]. The more common method of calendarizing fiscal year data is a particular case of the method described in this paper. In this instance, the calendar estimate is equal to 3/4ths of one fiscal year (April to December) plus 1/4th of the previous fiscal year (January to March).

2. TERMINOLOGY

Before entering details of the program, the concepts used in the calendarization process are clarified: specifically the concepts of financial data, of seasonal pattern, of "annual" and "sub-annual" values, of calendarization and of interpolation are discussed in terms this method.

2.1 Financial Data

The available data to be calendarized are known in this paper as the "financial" or "fiscal" data. The most common case of financial data is that of fiscal as opposed to the calendar year. In Canada, the government fiscal year spans from April to March of the following year; in the United States, from July to June. Another example is that of financial quarter data referring to three months beginning in February, May, August and November. Financial data may also be weekly bundles of data referring to 4 weeks, 4 weeks, 5 weeks, etc.

Financial data may in fact refer to any span of years, quarters, months, or days. The reference periods of each data point may also vary from occasion to occasion. The latter example of weekly bundles of data illustrates this point.

2.2 Sub-Annual versus Annual

As explained in the introduction, calendarization consists of separating financial data into more frequent values and then recombining those values to reflect desired time periods. In this document, these more frequent time periods are known as sub-annual; and the less frequent periods, as annual. Consequently, quarterly data are then called annual with respect to monthly values, labelled as sub-annual and quinquennial data are called annual with respect to yearly data, labelled as sub-annual. The words quinquennial, yearly, quarterly, monthly, weekly and daily, however, will continue to be used when it is intended to specifically mean as such. The sub-annual periods are generally the time periods for which a seasonal pattern is defined.

2.3 Seasonal pattern

Generally, a seasonal pattern reflects the seasons of the year. This is often a monthly pattern or a quarterly pattern. Each value of the seasonal pattern is a weight which indicates the relative importance of the corresponding sub-annual period.

For example, in a quarterly seasonal pattern with a value of 150 means that the quarter is 50% higher than an average quarter; a value equal to 60, that the quarter is 40% lower than average. Only the relative values of the seasonal pattern matter, therefore the average of the seasonal pattern may not be 100. The seasonal pattern may actually be provided by some sub-annual measurements of the socio-economic variable considered, which for some reason do not comply with the financial data. Such approximate sub-annual values for the variable of interest are an ideal seasonal pattern since they also capture non-seasonal movements like the business cycle, trading-day and irregular fluctuations.

The seasonal pattern may also be a weekly trading pattern, a pattern indicating daily activity throughout the week. In Table 2.1, the pattern shows that there is no activity on Sunday (the 7th column), and that the highest activity is on Saturday.

TABLE 2.1

An example of 21 days of a Weekly Trading Pattern

M	T	W	T	F	S	S
40	60	80	125	135	160	.001
40	60	80	125	135	160	.001
40	60	80	125	135	160	.001

The seasonal pattern may also be a monthly trading-day pattern. This pattern results from the fact that months - even those of equal length - may have a different distribution for each of the days; and, from the fact that different days may have different importance. For instance Canadians tend to buy twice as much gasoline on Thursdays compared to the "average" of the week. More gasoline will then be sold in a month containing 5 of the important days (e.g. Thursday) than in a month containing 4 of those days. In most of these cases, series subject to trading-day variations would also be subject to seasonality. The seasonal pattern supplied should then be the product of a month's seasonal pattern and of a months trading-day pattern. For more details see Cholette (1988, p.9).

For the purposes of this document, a seasonal pattern proper, a weekly pattern and a monthly trading-day pattern will all be referred to as seasonal patterns.

2.4 Interpolation

The process of estimating the sub-annual values from the financial data and from the seasonal pattern is called interpolation. An interpolated value is a sub-annual value that has been derived through this process. When calendarizing fiscal year data, the interpolated sub-annual values may be monthly or quarterly estimates. When calendarizing weekly bundles of data, the interpolated sub-annual values would be daily estimates.

2.5 Calendarization

The process of recombining the interpolated sub-annual values into the desired annual values is the actual calendarization. For example, monthly or quarterly estimates interpolated from fiscal year data are recombined to produce calendar year estimates; likewise, daily estimates are recombined into monthly and/or weekly estimates. Yearly estimates may also be recombined into quinquennial values.

2.6 Flow series, Stock series and Index series

There are three basic types of time series data. Conceptually, flow series are such that annual values are the sum of sub-annual values (e.g. monthly values are the sum of daily values; quarterly values the sum of monthly values). For instance, the amount of gasoline sold in Canada in 1986 is the sum of gasoline sold in each month of 1986. The reference periods of yearly flow series consequently refer to January to December, for each data point.

Stock series, on the other hand, reflect the level of a variable at one particular date. Population series, employment and unemployment series, inventory series (e.g. oil reserves) are conceptually stock series. For the purpose of this paper, stock series will be those whose annual value refers to only one sub-annual period of the year. Thus, the annual values of inventories often correspond to the December 31 value. The reference periods of yearly stock series, therefore, pertain to only one sub-annual period per year.

For the purpose of this document, index series are those for which the annual values are the average of the sub-annual values. For example, unemployment which is conceptually a stock series, will be considered an index series because the annual value of unemployment is the average of the corresponding monthly values. Index series are most often expressed as percentages, for instance the consumer Price Index (1971=100%) and the Index of industrial production. The reference period of yearly index series refer to January to December.

3. INPUTS TO THE PROGRAM

In order to execute, program CALENDR requires both SAS datasets and variables supplied in-stream (embedded in the SAS statements; example in Appendix B). There are three datasets, FINANCL, CORRECT and SEASON; and three in-stream variables, NSeason, FirstS and Index. Following is an explanation of each of these inputs and variables. The variables are also summarized in Appendix C for quick reference.

3.1 Dataset FINANCL: The financial data

The first dataset in program CALENDR is the dataset FINANCL (example in Appendix B). FINANCL contains the information on the financial data in three variables, FinDat, Per1f and Per2f. The financial data to be calendarized are contained in the variable FinDat. The variables Per1f and Per2f contain the reference periods of each financial data point.

Table 3.1 provides an example of dataset FINANCL in a case of fiscal year data. Each data point refers to the fiscal year, ranging from April to March of the following year.

TABLE 3.1

Example of Dataset FINANCL in a case of Fiscal Year Data

FinDat	Per1f	Per2f
127500	4	15
135000	16	27
140500	28	39
150250	40	51

The financial data does not necessarily refer to equal periods of time, as in Table 3.1. This is typically the case for data reported in weekly bundles. Table 3.2 displays a case where the data refer to days 11 to 38, 39 to 73, 74 to 101 and 102 to 129, instead of months.

TABLE 3.2

Example of Dataset FINANCL in the case of Weekly Bundles of Data

FinDat	Per1f	Per2f
800	11	38
750	39	73
900	74	101
700	102	129

The financial data may also have gaps in the reference periods. Table 3.3 displays a case where periods 8 to 10 and 17 to 19 are not referred to by any time periods. Program CALENDR would still work under this rather un-typical situation.

TABLE 3.3

Example of Dataset FINANCL
in a case of Fiscal Quarter Data

FinDat	Per1f	Per2f
8000	2	4
7700	5	7
5750	11	13
8500	14	16
9000	20	22
6500	23	25

3.2 Dataset CORRECT: The reference periods of the calendarized values

Once the sub-annual values have been interpolated from the financial data, they are recombined into annual values for the periods desired. The reference periods for the desired calendarized values are contained in dataset CORRECT, in variables Per1c and Per2c. These variables are similar in nature to Per1f and Per2f, except that they reflect the reference periods of the desired results as opposed to the reference periods of the available data. Table 3.4 shows the contents of CORRECT for calendarized values reflecting calendar quarters.

TABLE 3.4

Example of dataset CORRECT
in the case of Calendar Quarters

PER1C	PER2C
1	3
4	6
7	9
10	12
13	15

3.3 Dataset SEASON: The sub-annual seasonal pattern

The seasonal pattern is contained in the variable SeasPat in the dataset SEASON. Table 3.5 shows the contents of dataset Season for a seasonal pattern which is in fact a weekly trading pattern. Only two weeks of values are contained in this example. Values of zero must be avoided. If zero values are intended, values close to zero (e.g. 0.001) should be used, as illustrated in the table.

TABLE 3.5

Example of Dataset SEASON
in a case of daily interpolation

SeasPat						
125	150	100	75	50	100	0.1
125	150	100	75	50	100	0.1
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.

Since only the relative values of SeasPat value matters, the average value of the annual seasonal pattern does not have to be 100. Table 3.6 displays such an example, where two years of quarterly estimates are used as the seasonal pattern. This is an example of how sub-annual measurements of a socio-economic variable, although possibly inconsistent with financial annual data, may also be used as a seasonal pattern.

TABLE 3.6

Example of Dataset SEASON
in a case of quarterly interpolation

SeasPat			
3000	2400	2700	3600
3300	2100	3900	3000
.	.	.	.
.	.	.	.
.	.	.	.

The seasonal pattern may be stable, that is repeat every 12 months, every 4 quarters, or every 7 days. The pattern may also be evolving (non-repetitive) as illustrated in Table 3.7. In this example, a weekly trading pattern for January shows the non-repetitive effect of New Years Day which falls on Monday. The weight of the first two periods are chosen by the user to reflect that the normal Monday activity is shifted to Tuesday.

TABLE 3.7

An example of Dataset SEASONAL in a Case of a Weekly Pattern
SeasPat
.001 110 70 120 130 170 .001
60 50 70 120 130 170 .001
60 50 70 120 130 170 .001
60 50 70 120 130 170 .001
60 50 70 . . . .
. . . .
. . . .

The number of observations included in the seasonal pattern must be sufficient to imbed all the reference periods of the financial data and of the calendarized values. If, for instance, the reference periods are as in Table 3.8, SeasPat must contain at least 19 values. The beginning reference period of SeasPat is always assumed to be equal to 1.

Table 3.8 depicts a case where the financial data pertain to financial quarters covering February to April, May to July, etc. Note that the seasonal pattern is defined for a 12 month - not a 3 month - time frame.

TABLE 3.8

Dataset FINANCL, CORRECT and SEASON				
Per1f	Per2f	Per1c	Per2c	SeasPat
2	4	1	3	1.5
5	7	4	6	1.0
8	10	7	9	0.6
11	13	10	12	1.4
14	16	13	15	.
17	19	16	18	.
				.
The reference period variables span months 1 to 19				19 data points

This concludes the discussion of SAS dataset inputs. In-stream inputs to the program CALENDR are now presented.

3.4 NSEASON: The number of seasons

The variable NSeason is the periodicity of the seasonal pattern and of the interpolated values. For a monthly seasonal pattern, NSeason is set equal to 12; for a quarterly pattern, to 4; and for a weekly pattern, to 7. Variable NSeason is input in-stream, that is directly in the SAS/IML program (example in Appendix B).

3.5 FIRSTS: The first season referred to by SeasPat

The variable FirstS, also included in-stream, indicates the first season referred to by the seasonal pattern. FirstS is such that program CALENDR graphically displays all Mondays' interpolated values with the label "1"; all Tuesdays' with "2"; etc. Similarly, all first quarters are identified by "1"; all second quarters, by "2"; etc. If, for example, the SeasPat values begin on a Tuesday and the user wishes Mondays to be labelled day 1, then FirstS is set equal to 2.

3.6 INDEX: Indication of an index series

If the series being calendarized is an index series, INDEX is set equal to 1; if not, to 0. This variable indicates to the program whether the annual financial data correspond to the annual sums or the annual averages of the corresponding sub-annual interpolated values.

The user of the program CALENDR is invited to tailor the manner in which the inputs are supplied to his/her own operational (as opposed to experimental) environment. More specifically, the user should develop a practical interface between CALENDR and his/her normal operational environment.

4. OUTPUT OF PROGRAM CALENDR

Program CALENDR generates three types of output: tabular output, graphical output and file output.

4.1 Tabular output

The first part of the tabular output displays the original financial data (FinDat) with the reference periods (Per1f and Per2f) along with the calendarized values with their reference periods (Per1c and Per2c). That table provides the final results of calendarization. Note that the table displays all the inputs to the program except the seasonal pattern. Examples of that output are found in Appendix A.

The second part of the tabular output displays the seasonal pattern (SeasPat) supplied by the user (the other input to the program), the interpolated sub-annual values (Intsubv) calculated by the program, the financial and the calendarized values (Fidatsub and Calvasub) expressed sub-annually, that is, divided by the number of reference periods they cover. That table also displays the corrections (Corrfac) made to the seasonal pattern to arrive at the interpolated values: the latter are indeed the product of the correction factors and of the seasonal values. Also included in the table are the annual proportional discrepancies (DiscSub) between the provided financial data and the annual values of the seasonal pattern.

Examples of tabular output are displayed in Appendix A.

4.2 Graphical output

The second part of the tabular output is also displayed graphically. The first plot depicts the interpolated sub-annual values along with the seasonal pattern and the financial data expressed sub-annually. The interpolated values are as proportional as possible to the seasonal pattern and comply with the financial data. That compliance can be seen in plot 1 of Example 1 of Appendix A, where the calendarized yearly stock values are equal to the appropriate interpolated values; and in Plot 1 of Example 2, where the financial data expressed sub-annually covers the same surface as the interpolated values over the reference period of the financial data.

The second plot depicts the corrections made to the seasonal factors. As shown in Examples 1 and 2 of Appendix A they are as smooth as made possible by the annual average discrepancies. Indeed interpolated sub-annual values, which are to be as proportional as possible to seasonal values, entails corrections as flat as possible.

4.3 File output

Program CALENDR produces another type of output. The file output enables further processing of the values calculated by the program, possibly by programs other than SAS. File CALEND contains the calendarized values in a formatted manner.

File SUBANN contains the interpolated values, the seasonal pattern values, the correction factors, the annual discrepancies expressed sub-annually, and the calendarized values expressed sub-annually. This file may be useful when the interpolated values are needed for a secondary purpose, e.g. recombining daily interpolations into both weekly and monthly values, recombining monthly interpolated values into both quarterly and yearly values.

Users of the SAS program are invited to tailor the CALENDR output to their own needs. For operational (as opposed to experimental) purposes, some or all of the tabular and graphical output may be suppressed, the file output may be altered to harmoniously interface with the users' operational environment.

APPENDIX A: Printout samples of program CALENDR

This appendix displays printout samples of the CALENDR calendarization program. Three examples of the most commonly encountered calendarization situations are presented and commented. The first example pertains to fiscal year data converted into calendar year values; the second, to financial quarter data converted into conventional quarter values; and the third, to bundles of weekly data converted into monthly values.

Example 1: Calendarizing fiscal year stock data

Example 1 pertains to a case of fiscal year stock series. The fiscal year data (Findat) in the first table of Exhibit 1 refer to the second quarter of years 2, 3 and 4; their reference periods (Per1f and Per2f) are 6, 10 and 14. The fiscal year data are separated into quarterly interpolated values (Intsubv), contained in the second table, on the basis of a constant seasonal pattern (Seaspat) also displayed. The calendarized estimates (Calval) in the first table refer to the fourth quarters of each year; their reference periods (Per1c and Per2c) are 4,8,12 and 16.

Fiscal year flow series is an even more common occurrence. In the example corresponding to that just described, the fiscal year data would then refer to the periods ranging from third quarter of a year to the second of the following year. The reference periods (Per1f and Per2f) would be 3 to 6, 7 to 10 and 11 to 14 (instead of 6, 10 and 14). The reference periods of the calendarized values (Per1c and Per2c) would be 1 to 4, 5 to 8, 9 to 12 and 13 to 16 (instead of 4,8 and 12).

Exhibit 1: Calendarizing fiscal year stock data - Sample printout of program CALENDR

Original Financial Data				Calendarized Values			
A	FinDat	per1f	per2f	B	Calval	Per1c	Per2c
ROW1	400.0	6.0	6.0	ROW1	327.3	4.0	4.0
ROW2	600.0	10.0	10.0	ROW2	409.1	8.0	8.0
ROW3	800.0	14.0	14.0	ROW3	572.7	12.0	12.0
				ROW4	654.5	16.0	16.0

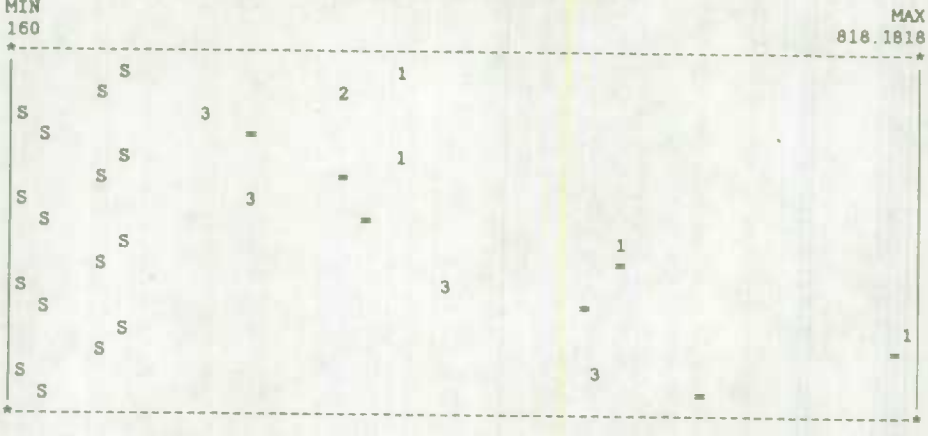
LEGEND Interpolated Sub-Annual Values

SYM: symbol to identify interpolated values
Intsubv: benchmarked or interpolated values
SeasPat: supplied seasonal or weekly pattern
Fidatsub: financial data expressed sub-annually
CalVaSub: calendarized values expressed sub-annually
Corrfac: corrections factors
DiscSub: discrepancies between Fidatsub and SeasPat

PLTVAR	SYM	Intsubv	SeasPat	Fidatsub	CalVaSub	Corrfac	DiscSub
ROW1	1.0	436.4	120.0	.	.	363.6	.
ROW2	2.0	400.0	110.0	.	.	363.6	.
ROW3	3.0	290.9	80.0	.	.	363.6	.
ROW4	4.0	327.3	90.0	.	327.3	363.6	.
ROW5	1.0	436.4	120.0	.	.	363.6	.
ROW6	2.0	400.0	110.0	400.0	.	363.6	363.6
ROW7	3.0	327.3	80.0	.	.	409.1	.
ROW8	4.0	409.1	90.0	.	409.1	454.5	.
ROW9	1.0	600.0	120.0	.	.	500.0	.
ROW10	2.0	600.0	110.0	600.0	.	545.5	545.5
ROW11	3.0	472.7	80.0	.	.	590.9	.
ROW12	4.0	572.7	90.0	.	572.7	636.4	.
ROW13	1.0	818.2	120.0	.	.	681.8	.
ROW14	2.0	800.0	110.0	800.0	.	727.3	727.3
ROW15	3.0	581.8	80.0	.	.	727.3	.
ROW16	4.0	654.5	90.0	.	654.5	727.3	.

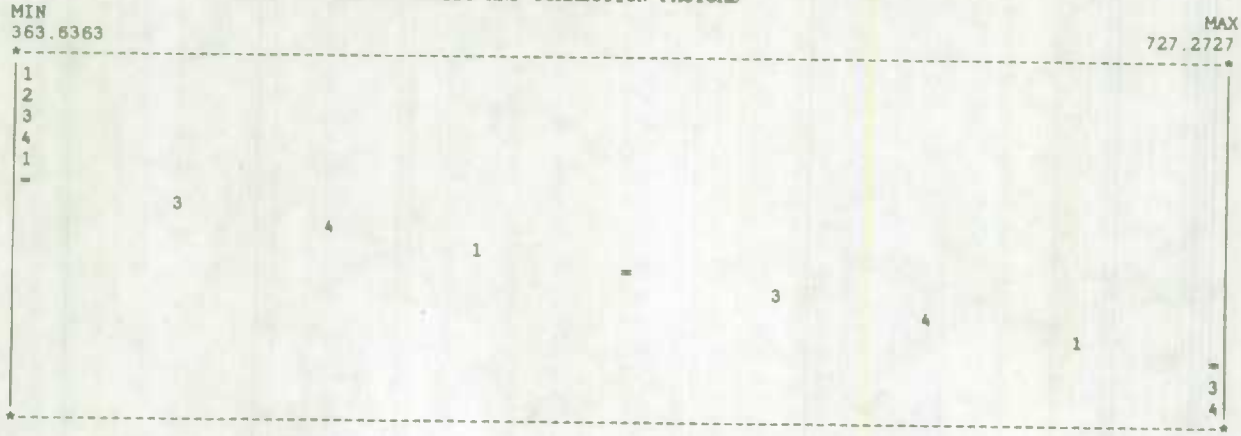
PLOT 1: Interpolated Sub-Annual Values

INTSUBV	SEASPAT	FIDATSUB	CALVASUB
436.36	240	.	.
400.00	220	.	.
290.91	160	.	.
327.27	180	.	327.27
436.36	240	.	.
400.00	220	400	.
327.27	160	.	.
409.09	180	.	409.09
600.00	240	.	.
600.00	220	800	.
472.73	160	.	.
572.73	180	.	572.73
818.18	240	.	.
800.00	220	800	.
581.82	160	.	.
654.55	180	.	654.55



PLOT 2: DISCREPANCIES AND CORRECTION FACTORS

CORRFAC	DISCSUB
383.64	.
363.64	.
363.64	.
363.64	.
363.64	.
363.64	363.64
409.09	.
.55	.
.00	.
.45	545.45
590.91	.
636.36	.
681.82	.
727.27	727.27
727.27	.
727.27	.



Example 2: Calendarizing financial quarter flow data

Example 2 pertains to a case of financial quarter flow series. The three years of financial quarter data (FinDat) in the first table of Exhibit 2 refer to the months of February to April, May to July, etc. Their reference periods (Per1f and Per2f) are 2 to 4, 5 to 7, etc. The data are separated into monthly values (Intsubv), contained in the second table, on the basis of a constant seasonal pattern (SeasPat) also displayed. The calendarized estimates (Calval) in the first table refer to the months of January to March, April to June, etc., of each year; their reference periods are consequently 1 to 3, 4 to 6, etc. Note that the first -and especially the last- calendarized quarters involve extrapolated (as opposed to interpolated) daily values, which are not embedded in the reference periods of the financial data. These daily values are less reliable than the interpolated values, so that the first and last quarter estimates are also less reliable.

Exhibit 2: Calendarizing financial quarter flow data - Sample printout of program CALENDR

RESULTS

Original Financial Data

A	FinDat	per1f	per2f
ROW1	632.9	2.0	4.0
ROW2	572.6	5.0	7.0
ROW3	750.3	8.0	10.0
ROW4	769.1	11.0	13.0
ROW5	873.1	14.0	16.0
ROW6	579.0	17.0	19.0
ROW7	748.5	20.0	22.0
ROW8	797.0	23.0	25.0
ROW9	721.7	26.0	28.0
ROW10	589.3	29.0	31.0
ROW11	751.1	32.0	34.0

Calendarized Values

B	Calval	Per1c	Per2c
ROW1	680.2	1.0	3.0
ROW2	570.4	4.0	6.0
ROW3	696.8	7.0	9.0
ROW4	761.0	10.0	12.0
ROW5	726.8	13.0	15.0
ROW6	587.2	16.0	18.0
ROW7	693.9	19.0	21.0
ROW8	775.4	22.0	24.0
ROW9	776.4	25.0	27.0
ROW10	809.8	28.0	30.0
ROW11	697.5	31.0	33.0
ROW12	768.4	34.0	36.0

LEGEND Interpolated Sub-Annual Values

SYM: symbol to identify interpolated values
Intsubv: benchmarked or interpolated values
SeasPat: supplied seasonal or weekly pattern
Fidatsub: financial data expressed sub-annually
CalVaSub: calendarized values expressed sub-annually
Corrfac: corrections factors
DiscSub: discrepancies between Fidatsub and SeasPat

PLTVAR	SYM	Intsubv	SeasPat	Fidatsub	CalVaSub	Corrfac	DiscSub
ROW1	1.0	247.4	115.1	.	226.7	214.9	.
ROW2	2.0	236.2	109.9	211.0	226.7	214.9	217.2
ROW3	3.0	198.7	90.7	211.0	226.7	218.9	217.2
ROW4	4.0	200.0	90.7	211.0	190.1	220.4	217.2
ROW5	5.0	182.6	80.9	190.9	190.1	225.6	229.0
ROW6	6.0	187.7	81.8	190.9	190.1	229.4	229.0
ROW7	7.0	202.3	87.3	190.9	232.3	231.7	229.0
ROW8	8.0	239.0	102.8	250.1	232.3	232.4	232.1
ROW9	9.0	255.5	109.9	250.1	232.3	232.4	232.1
ROW10	0.0	255.7	110.4	250.1	253.7	231.5	232.1
ROW11	1.0	248.9	108.3	256.4	253.7	229.8	229.3
ROW12	2.0	256.4	111.9	256.4	253.7	229.0	229.3
ROW13	1.0	263.9	115.1	256.4	242.3	229.2	229.3
ROW14	2.0	253.3	109.9	224.4	242.3	230.5	231.1
ROW15	3.0	209.7	90.7	224.4	242.3	231.2	231.1
ROW16	4.0	210.2	90.7	224.4	195.7	231.6	231.1
ROW17	5.0	187.5	80.9	193.0	195.7	231.6	231.5
ROW18	6.0	189.5	81.8	193.0	195.7	231.5	231.5
ROW19	7.0	202.0	87.3	193.0	231.3	231.3	231.5
ROW20	8.0	237.6	102.8	249.5	231.3	231.0	231.6
ROW21	9.0	254.3	109.9	249.5	231.3	231.3	231.6
ROW22	0.0	256.6	110.4	249.5	258.5	232.3	231.6
ROW23	1.0	253.4	108.3	265.7	258.5	234.0	237.6
ROW24	2.0	265.4	111.9	265.7	258.5	237.1	237.6
ROW25	1.0	278.2	115.1	265.7	258.8	241.7	237.6
ROW26	2.0	272.3	109.9	240.8	258.8	247.8	247.8
ROW27	3.0	225.9	90.7	240.6	258.8	249.1	247.8
ROW28	4.0	223.5	90.7	240.8	203.3	246.3	247.8
ROW29	5.0	193.9	80.9	196.4	203.3	239.6	235.6
ROW30	6.0	192.3	81.8	196.4	203.3	235.0	235.6
ROW31	7.0	203.0	87.3	196.4	232.5	232.5	235.6
ROW32	8.0	239.0	102.8	250.4	232.5	232.4	232.4
ROW33	9.0	255.4	109.9	250.4	232.5	232.4	232.4
ROW34	0.0	256.6	110.4	250.4	258.1	232.3	232.4
ROW35	1.0	251.7	108.3	.	256.1	232.3	.
ROW36	2.0	260.1	111.9	.	256.1	232.3	.

Exhibit 2: Calendarizing financial quarter flow data - continuation

PLOT 1: Interpolated Sub-Annual Values

SUBV	SEASPAT	FIDATSUB	CALVASUB
247.39	115.11	.	226.74
236.18	109.89	210.95	226.74
196.66	90.68	210.95	226.74
200.02	90.74	210.95	190.12
182.61	80.94	190.87	190.12
187.73	81.85	190.87	190.12
202.27	87.31	190.87	232.27
239.05	102.84	250.09	232.27
255.50	109.93	250.09	232.27
255.73	110.45	250.09	253.67
248.91	108.32	256.38	253.67
256.38	111.95	256.38	253.67
263.86	115.11	256.38	242.28
253.27	109.89	224.38	242.28
209.70	90.68	224.38	242.28
210.19	90.74	224.38	195.73
187.49	80.94	193.00	195.73
189.52	81.85	193.00	195.73
201.99	87.31	193.00	231.30
237.60	102.84	249.50	231.30
254.32	109.93	249.50	231.30
256.60	110.45	249.50	258.47
253.42	108.32	265.66	258.47
265.38	111.95	265.86	258.47
278.17	115.11	265.66	258.79
272.32	109.89	240.58	258.79
225.87	90.68	240.58	258.79
223.54	90.74	240.58	203.26
193.92	80.94	196.43	203.26
192.33	81.85	196.43	203.26
203.04	87.31	196.43	232.51
239.04	102.84	250.37	232.51
255.44	109.93	250.37	232.51
256.61	110.45	250.37	256.12
251.66	108.32	.	256.12
0.10	111.95	.	256.12

PLOT 2: DISCREPANCIES AND CORRECTION FACTORS

CORRFAC	DISCSUB
214.92	.
214.92	217.25
216.87	217.25
220.44	217.25
225.61	228.96
229.36	228.96
231.67	228.96
232.45	232.13
232.42	232.13
231.54	232.13
229.79	229.34
229.01	229.34
229.23	229.34
230.47	231.08
231.25	231.08
231.84	231.08
231.64	231.51
231.55	231.51
231.35	231.51
231.04	231.58
231.35	231.58
232.32	231.58
233.96	237.63
237.06	237.63
241.66	237.63
247.81	247.75
249.09	247.75
247.35	247.75
235.59	235.62
234.98	235.62
232.55	235.62
232.44	232.38
232.37	232.38
232.33	232.38
232.33	.
232.33	.

Example 3: Converting bundles of weekly data into monthly values

Example 3 pertains to a case of weekly bundles of data. As shown by the first table, these refer to days 8 to 42 (5 weeks), days 43 to 70 (4 weeks), days 71 to 98 (4 weeks) and days 99 to 133 (5 weeks). The bundles are separated into daily values (Intsubv) contained in the second table, on the basis of the weekly trading pattern (SeasPat) also displayed. The calendarized monthly values in the first table refer to the days 1 to 31, 32 to 59, 60 to 90 and 91 to 120.

Exhibit 3: Converting bundles of weekly data into monthly values - Sample of the CALENDR printout

RESULTS

	Original Financial Data				Calendarized Values		
A	FinDat	per1f	per2f	B	Calval	Per1c	Per2c
ROW1	4000.0	8.0	42.0	ROW1	3008.7	1.0	31.0
ROW2	5000.0	43.0	70.0	ROW2	4541.1	32.0	59.0
ROW3	4000.0	71.0	98.0	ROW3	5059.4	60.0	90.0
ROW4	7000.0	99.0	133.0	ROW4	5102.0	91.0	120.0

LEGEND Interpolated Sub-Annual Values

SYM: symbol to identify interpolated values
Intsubv: benchmarked or interpolated values
SeasPat: supplied seasonal or weekly pattern
Fidatsub: financial data expressed sub-annually
CalVaSub: calendarized values expressed sub-annually
Corrfac: corrections factors
DiscSub: discrepancies between Fidatsub and SeasPat

PLTVAR	SYM	Intsubv	SeasPat	Fidatsub	CalVaSub	Corrfac	DiscSub
ROW1	1.0	0.0	0.0	.	97.0	92.1	.
ROW2	2.0	101.3	110.0	.	97.0	92.1	.
ROW3	3.0	101.3	110.0	.	97.0	92.1	.
ROW4	4.0	119.7	130.0	.	97.0	92.1	.
ROW5	5.0	138.1	150.0	.	97.0	92.1	.
ROW6	6.0	184.1	200.0	.	97.0	92.1	.
ROW7	7.0	0.0	0.0	.	97.0	92.1	.
ROW8	1.0	46.0	50.0	114.3	97.0	92.1	114.3
ROW9	2.0	64.5	70.0	114.3	97.0	92.1	114.3
ROW10	3.0	92.3	100.0	114.3	97.0	92.3	114.3
ROW11	4.0	120.3	130.0	114.3	97.0	92.5	114.3
ROW12	5.0	139.3	150.0	114.3	97.0	92.9	114.3
ROW13	6.0	186.9	200.0	114.3	97.0	93.4	114.3
ROW14	7.0	0.0	0.0	114.3	97.0	94.2	114.3
ROW15	1.0	47.5	50.0	114.3	97.0	95.0	114.3
ROW16	2.0	67.1	70.0	114.3	97.0	95.8	114.3
ROW17	3.0	96.7	100.0	114.3	97.0	96.7	114.3
ROW18	4.0	127.0	130.0	114.3	97.0	97.7	114.3
ROW19	5.0	148.3	150.0	114.3	97.0	98.9	114.3
ROW20	6.0	200.4	200.0	114.3	97.0	100.2	114.3
ROW21	7.0	0.0	0.0	114.3	97.0	101.7	114.3
ROW22	1.0	51.6	50.0	114.3	97.0	103.3	114.3
ROW23	2.0	73.4	70.0	114.3	97.0	104.9	114.3
ROW24	3.0	106.5	100.0	114.3	97.0	106.5	114.3
ROW25	4.0	140.8	130.0	114.3	97.0	108.3	114.3
ROW26	5.0	165.3	150.0	114.3	97.0	110.2	114.3
ROW27	6.0	224.6	200.0	114.3	97.0	112.3	114.3
ROW28	7.0	0.0	0.0	114.3	97.0	114.6	114.3
ROW29	1.0	58.5	50.0	114.3	97.0	116.9	114.3
ROW30	2.0	83.5	70.0	114.3	97.0	119.3	114.3
ROW31	3.0	121.7	100.0	114.3	97.0	121.7	114.3
ROW32	4.0	161.8	130.0	114.3	162.2	124.3	114.3
ROW33	5.0	190.5	150.0	114.3	162.2	127.0	114.3
ROW34	6.0	259.7	200.0	114.3	162.2	129.8	114.3
ROW35	7.0	0.0	0.0	114.3	162.2	132.8	114.3
ROW36	1.0	68.0	50.0	114.3	162.2	136.0	114.3
ROW37	2.0	97.4	70.0	114.3	162.2	139.1	114.3
ROW38	3.0	142.3	100.0	114.3	162.2	142.3	114.3
ROW39	4.0	189.3	130.0	114.3	162.2	145.6	114.3
ROW40	5.0	223.7	150.0	114.3	162.2	149.1	114.3
ROW41	6.0	305.5	200.0	114.3	162.2	152.7	114.3
ROW42	7.0	0.0	0.0	114.3	162.2	156.6	114.3
ROW43	1.0	80.2	50.0	178.6	162.2	160.4	178.6
ROW44	2.0	114.9	70.0	178.6	162.2	164.1	178.6
ROW45	3.0	167.7	100.0	178.6	162.2	167.7	178.6
ROW46	4.0	222.2	130.0	178.6	162.2	170.9	178.6
ROW47	5.0	260.7	150.0	178.6	162.2	173.8	178.6
ROW48	8.0	352.6	200.0	178.6	162.2	176.3	178.6
ROW49	7.0	0.0	0.0	178.6	162.2	178.3	178.6
ROW50	1.0	90.1	50.0	178.6	162.2	180.2	178.6
ROW51	2.0	127.4	70.0	178.6	162.2	182.1	178.8
ROW52	3.0	183.7	100.0	178.6	162.2	183.7	178.6
ROW53	4.0	240.6	130.0	178.6	162.2	185.1	178.6
ROW54	5.0	279.1	150.0	178.8	162.2	186.1	178.6
ROW55	8.0	373.4	200.0	178.6	162.2	186.7	178.6
ROW56	7.0	0.0	0.0	178.6	162.2	186.8	178.8
ROW57	1.0	93.4	50.0	178.6	162.2	186.8	178.6
ROW58	2.0	130.7	70.0	178.6	162.2	186.8	178.6
ROW59	3.0	186.5	100.0	178.6	162.2	186.5	178.6
ROW60	4.0	241.8	130.0	178.6	163.2	186.0	178.6
ROW61	5.0	277.7	150.0	178.6	163.2	185.2	178.6

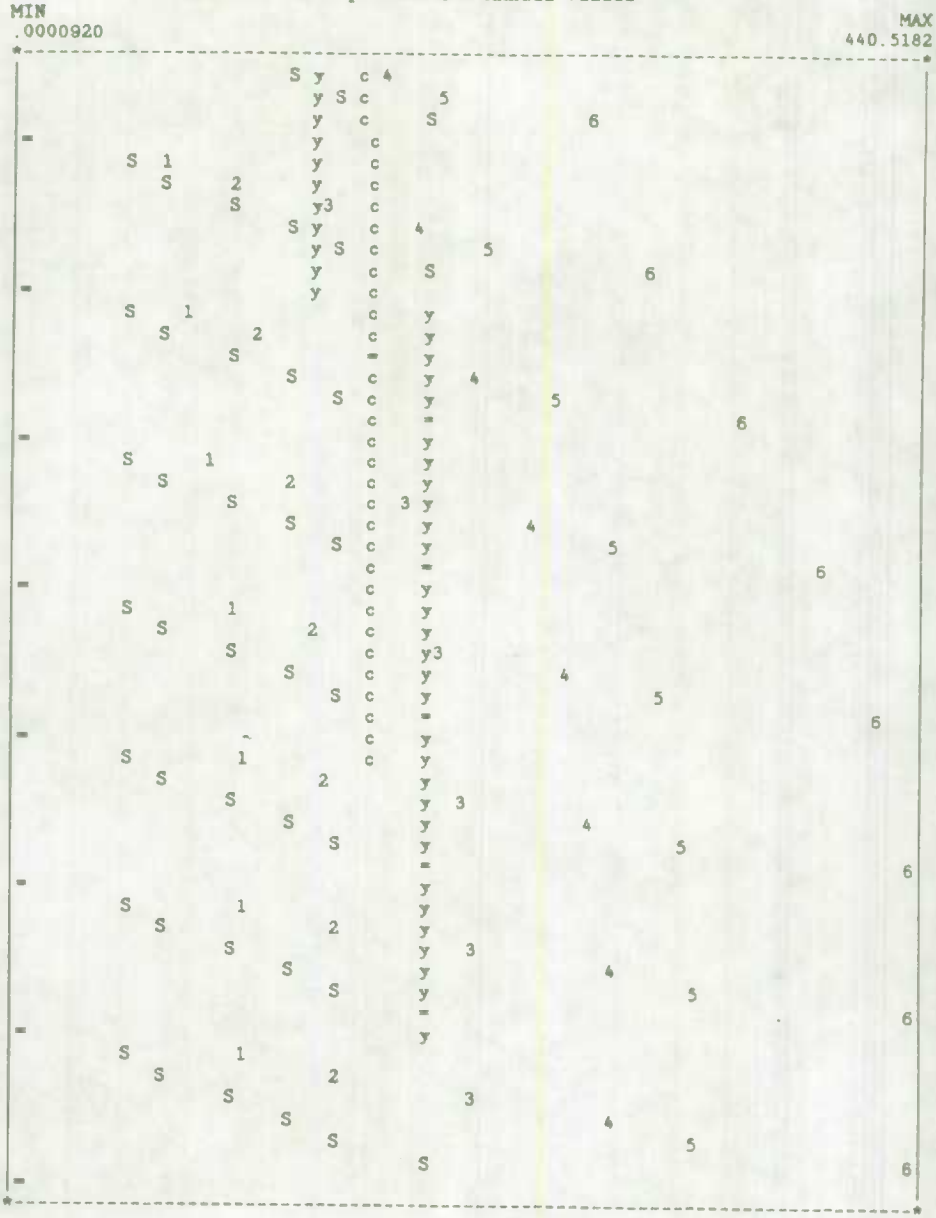
Exhibit 3: Converting bundles of weekly data into monthly values - continuation 1

ROW62	6.0	387.8	200.0	178.6	163.2	183.9	178.8
ROW63	7.0	0.0	0.0	178.8	163.2	182.1	178.6
ROW64	1.0	90.1	50.0	178.8	163.2	180.3	178.6
ROW65	2.0	124.8	70.0	178.6	163.2	178.3	178.6
ROW66	3.0	176.2	100.0	178.6	163.2	176.2	178.6
ROW67	4.0	225.9	130.0	178.6	163.2	173.8	178.6
ROW68	5.0	256.5	150.0	178.6	163.2	171.0	178.6
ROW69	6.0	335.8	200.0	178.6	163.2	167.9	178.6
ROW70	7.0	0.0	0.0	178.6	163.2	164.2	178.6
ROW71	1.0	80.2	50.0	142.9	163.2	160.5	142.9
ROW72	2.0	109.8	70.0	142.9	163.2	156.9	142.9
ROW73	3.0	153.5	100.0	142.9	163.2	153.5	142.9
ROW74	4.0	195.5	130.0	142.9	163.2	150.4	142.9
ROW75	5.0	221.4	150.0	142.9	163.2	147.6	142.9
ROW76	6.0	290.4	200.0	142.9	163.2	145.2	142.9
ROW77	7.0	0.0	0.0	142.9	163.2	143.3	142.9
ROW78	1.0	70.7	50.0	142.9	163.2	141.4	142.9
ROW79	2.0	97.8	70.0	142.9	163.2	139.7	142.9
ROW80	3.0	138.1	100.0	142.9	163.2	138.1	142.9
ROW81	4.0	177.8	130.0	142.9	163.2	136.7	142.9
ROW82	5.0	203.6	150.0	142.9	163.2	135.7	142.9
ROW83	6.0	270.3	200.0	142.9	163.2	135.1	142.9
ROW84	7.0	0.0	0.0	142.9	163.2	135.0	142.9
ROW85	1.0	67.5	50.0	142.9	163.2	134.8	142.9
ROW86	2.0	94.5	70.0	142.9	163.2	135.0	142.9
ROW87	3.0	135.2	100.0	142.9	163.2	135.2	142.9
ROW88	4.0	176.4	130.0	142.9	163.2	135.7	142.9
ROW89	5.0	204.7	150.0	142.9	163.2	136.5	142.9
ROW90	6.0	275.3	200.0	142.9	163.2	137.7	142.9
ROW91	7.0	0.0	0.0	142.9	170.1	139.4	142.9
ROW92	1.0	70.5	50.0	142.9	170.1	141.1	142.9
ROW93	2.0	100.0	70.0	142.9	170.1	142.9	142.9
ROW94	3.0	144.9	100.0	142.9	170.1	144.9	142.9
ROW95	4.0	191.4	130.0	142.9	170.1	147.2	142.9
ROW96	5.0	224.7	150.0	142.9	170.1	149.8	142.9
ROW97	6.0	305.6	200.0	142.9	170.1	152.8	142.9
ROW98	7.0	0.0	0.0	142.9	170.1	156.3	142.9
ROW99	1.0	79.9	50.0	200.0	170.1	159.8	200.0
ROW100	2.0	114.3	70.0	200.0	170.1	163.3	200.0
ROW101	3.0	166.7	100.0	200.0	170.1	166.7	200.0
ROW102	4.0	220.9	130.0	200.0	170.1	170.0	200.0
ROW103	5.0	259.7	150.0	200.0	170.1	173.1	200.0
ROW104	6.0	352.2	200.0	200.0	170.1	176.1	200.0
ROW105	7.0	0.0	0.0	200.0	170.1	178.9	200.0
ROW106	1.0	90.9	50.0	200.0	170.1	181.7	200.0
ROW107	2.0	129.1	70.0	200.0	170.1	184.5	200.0
ROW108	3.0	187.2	100.0	200.0	170.1	187.2	200.0
ROW109	4.0	246.7	130.0	200.0	170.1	189.8	200.0
ROW110	5.0	268.3	150.0	200.0	170.1	192.2	200.0
ROW111	6.0	389.0	200.0	200.0	170.1	194.5	200.0
ROW112	7.0	0.0	0.0	200.0	170.1	196.6	200.0
ROW113	1.0	99.4	50.0	200.0	170.1	198.7	200.0
ROW114	2.0	140.6	70.0	200.0	170.1	200.8	200.0
ROW115	3.0	202.8	100.0	200.0	170.1	202.8	200.0
ROW116	4.0	266.1	130.0	200.0	170.1	204.7	200.0
ROW117	5.0	309.6	150.0	200.0	170.1	206.4	200.0
ROW118	8.0	416.0	200.0	200.0	170.1	208.0	200.0
ROW119	7.0	0.0	0.0	200.0	170.1	209.4	200.0
ROW120	1.0	105.4	50.0	200.0	170.1	210.8	200.0
ROW121	2.0	148.5	70.0	200.0	.	212.2	200.0
ROW122	3.0	213.5	100.0	200.0	.	213.5	200.0
ROW123	4.0	279.0	130.0	200.0	.	214.6	200.0
ROW124	5.0	323.5	150.0	200.0	.	215.7	200.0
ROW125	6.0	433.2	200.0	200.0	.	216.6	200.0
ROW126	7.0	0.0	0.0	200.0	.	217.3	200.0
ROW127	1.0	109.0	50.0	200.0	.	218.0	200.0
ROW128	2.0	153.1	70.0	200.0	.	218.6	200.0
ROW129	3.0	219.2	100.0	200.0	.	219.2	200.0
ROW130	4.0	285.6	130.0	200.0	.	219.7	200.0
ROW131	5.0	330.1	150.0	200.0	.	220.1	200.0
ROW132	6.0	440.5	200.0	200.0	.	220.3	200.0
ROW133	7.0	0.0	0.0	200.0	.	220.3	200.0
ROW134	1.0	110.1	50.0	.	.	220.3	.
ROW135	2.0	154.2	70.0	.	.	220.3	.
ROW136	3.0	220.3	100.0	.	.	220.3	.
ROW137	4.0	286.3	130.0	.	.	220.3	.
ROW138	5.0	330.4	150.0	.	.	220.3	.
ROW139	6.0	440.5	200.0	.	.	220.3	.
ROW140	7.0	0.0	0.0	.	.	220.3	.

Exhibit 3: Converting bundles of weekly data into monthly values - continuation 2

INTSUBV	SEASPAT	FIDATSUB	CALVASUB
176.37	130.00	142.86	163.21
204.72	150.00	142.86	163.21
275.34	200.00	142.86	163.21
0.00	0.00	142.86	170.07
70.54	50.00	142.86	170.07
100.04	70.00	142.86	170.07
144.94	100.00	142.86	170.07
191.37	130.00	142.86	170.07
224.73	150.00	142.86	170.07
305.62	200.00	142.86	170.07
0.00	0.00	142.86	170.07
79.91	50.00	200.00	170.07
114.30	70.00	200.00	170.07
166.67	100.00	200.00	170.07
220.95	130.00	200.00	170.07
259.67	150.00	200.00	170.07
352.24	200.00	200.00	170.07
0.00	0.00	200.00	170.07
90.87	50.00	200.00	170.07
129.14	70.00	200.00	170.07
187.18	100.00	200.00	170.07
246.69	130.00	200.00	170.07
288.33	150.00	200.00	170.07
389.04	200.00	200.00	170.07
0.00	0.00	200.00	170.07
99.37	50.00	200.00	170.07
140.55	70.00	200.00	170.07
202.77	100.00	200.00	170.07
266.05	130.00	200.00	170.07
309.61	150.00	200.00	170.07
416.02	200.00	200.00	170.07
0.00	0.00	200.00	170.07
105.41	50.00	200.00	170.07
[illegible].52	70.00	200.00	.
[illegible].45	100.00	200.00	.
279.03	130.00	200.00	.
323.53	150.00	200.00	.
433.18	200.00	200.00	.
0.00	0.00	200.00	.
109.00	50.00	200.00	.
153.05	70.00	200.00	.
219.23	100.00	200.00	.
285.62	130.00	200.00	.
330.09	150.00	200.00	.
440.52	200.00	200.00	.
0.00	0.00	200.00	.
110.13	50.00	.	.
154.18	70.00	.	.
220.26	100.00	.	.
286.34	130.00	.	.
330.39	150.00	.	.
440.52	200.00	.	.
0.00	0.00	.	.

PLOT 1: Interpolated Sub-Annual Values



APPENDIX B: Listing of the program CALENDR SAS statements

This appendix presents the SAS statements which yielded the printout displayed in Exhibit 1 of Appendix A. The statements tabulated in Exhibit 4 exemplifies the inputs and outputs of program CALENDR. The three input datasets FINANCL, CORRECT and SEASON are supplied here in lines 27 to 42, 46 to 61 and 65 to 82, respectively. The in-stream inputs NSeason, FirstS and Index are located in lines 113, 124 and 101. The tabular output is generated in lines 240 to 250; and the file output in lines 225 to 239. The two physical output files, SUBANN and CALEND, are supplied by the IBM Job Control Language statements in lines 253, 254 and 255, 256. The JCL in lines 1 to 6 provides program CALENDR with the required hardware and software (i.e. SAS program).

The part of the program that performs the calculations is not displayed. It is included on execution by the SAS statement on line 88, from the disk referred to by the JCL statement on line 5.

Statistics Canada users can retrieve program CALENDR (i.e. the statements in Exhibit 4) by accessing disk 'TISE.CHOLETT.PUBREAD(CALENDR)' on the main computer. Users outside Statistics Canada can obtain the program on diskette by writing to the Time Series Research and Analysis Division (address on front page of this document).

Exhibit 4: SAS statements which produced Exhibit 1 of Appendix A

```
00001 //CALENDR  JOB  (0801,C023,,4),XXXXXXX,MSGLEVEL=(1,1),
00002 //         TIME=(0,05),CLASS=A,MSGCLASS=T
00003 //PROCLIB  DD   DSN=STC2.SAS.PROC,DISP=SHR
00004 //STEP2    EXEC SAS,RGN=6000K
00005 //SAS  DD  DSN=TISE.CHOLETT.PUBREAD.DISP=SHR
00006 //SYSIN DD *
00007
00008 options linesize=100;
00009


00014
00015  /* In order to transfer this program to micro computers:
00016
00017 1) Replace "Proc IML" with "Proc IML worksize=150"
00018 2) Replace "(|" and "|)" with "(?" and "?)"; once on the micro, change
00019    them again to left and right square brackets respectively. Reverse
00020    this procedure to migrate back to the mainframe.
00021


00025
00026
00027 DATA FINANCL;
00028  /* This dataset contains the financial data to be calendarized, and
00029  the periods they cover, that is their reference periods. The three
00030  variables in this dataset are:
00031      1) FinDat: the financial data points, referred to as "annual" data
00032      2) Per1f:  the starting "sub-annual" reference period
00033                 of each FinDat data point
00034      3) Per2f:  the ending sub-annual reference period
00035                 of each FinDat data point */;
00036
00037    input FinDat per1f per2f;
00038   cards;
00039   400 6 6
00040   600 10 10
00041   800 14 14
00042   ;
```

APPENDIX B Exhibit 4 - continuation

```
00043
00044
00045
00046 DATA CORRECT;
00047  /* This dataset contains the desired reference periods of the calen-
00048  darized values.  The two variables in this dataset are:
00049
00050     1) Per1c: the starting sub-annual reference period of
00051               each calendarized value
00052     2) Per2c: the ending sub-annual reference period of
00053               each calendarized value */;
00054
00055    input per1c per2c;
00056    cards;
00057   4   4
00058   8   8
00059   12  12
00060   16  16
00061   ;
00062
00063
00064
00065 DATA SEASON;
00066  /* This dataset contains the sub-annual seasonal pattern (e.g.:
00067  monthly or quarterly seasonal pattern, a monthly trading-day pattern,
00068  or a weekly trading pattern) to be adopted by the interpolated
00069  values. That information is contained in variable SeasPat. The time periods
00070  covered by the dataset SEASON must not be shorter than the time period
00071  covered by variables Per1f, Per2f, Per1c, and Per2c.
00072      NOTE: variable SeasPat must contain no zero values.  If interpolated
00073      values of zero are intended, supply values very close to zero
00074      (e.g. 0.001).                                                    */;
00075
00076    input SeasPat @@;
00077    cards;
00078 120  110  80  90
00079 120  110  80  90
00080 120  110  80  90
00081 120  110  80  90
00082 ;
00083
00084
00085
00086 PROC IML;
00087
00088  %include sas(cal); * This statement includes the module to perform    ;
00089                     * the calculations                                  ;
00090 use season;
00091 read all;
00092 use FINANCL;
00093 read all; * These statements read the data                            ;
00094 use correct;
00095 read all;
00096
00097  /*
00098 Index is a value to indicate whether or not the financial data series
00099 is an index series. */;
00100
00101 Index=0;
00102
00103 run index (findat,per1f,per2f,index);
00104
00105                                                                  /*
00106  NSeason is the number of different "seasons" per year, month, week, etc.,
00107  depending on the time frame being used).
00108
00119  Eg.: NSeason=12 monthly seasons per year
00110       NSeason= 4 quarterly seasons per year
00111       NSeason= 7 daily seasons per week, etc.                     */;
00112
00113 NSeason=12;
00114
00115  /*
00116 FirstS is the first season referred to by the seasonal pattern.
00117
00118  Eg.: FirstS=1 means the (yearly) seasonal pattern starts
```

APPENDIX B Exhibit 4 - continuation

```
00119                 with January
00120        FirstS=2 means the seasonal pattern starts with February
00121        FirstS=2 means the (weekly) seasonal pattern starts
00122                 with Tuesday                                        */;
00123
00124 FirstS=1;
00125
00126 * --- processing data ------------------------------------------------;
00127 TotObs=nrow(SeasPat);
00128     run chowlin(FinDat,SeasPat,Intsubv,per1f,per2f,Corrfac,Fidatsub,
00129       DiscSub,Sym,Temps,FirstS,NSeason,TotObs,0,0);
00130
00131
00132 run ansum(per1c,per2c,Intsubv,Calval,1);
00133 run infan(per1c,per2c,TotObs,Calval,CalVaSub,0,1);
00134 run indexb(findat,per1f,per2f,index);
00135 run indexb(calval,per1c,per2c,index);
00136
00137
00138  /*
00139  OUTPUT: The variables produced by this process are the following:
00141
00142 Intsubv: The interpolated seasonal values; seasonal values calculated
00143    by following the movement of the seasonal pattern while insur-
00144    ing that financial annual sums of these seasonal values are
00145    equal to the financial annual data supplied (FinDat).
00146
00147 SeasPat: Supplied seasonel indices.
00148
00149 Fidatsub: The financial values expressed sub-annually; E.g.: If FinDat
00150    for FEB to APR year 1 is 600, then Fidatsub for obs 2,3 & 4 is 200.
00151
00152 CalVaSub: The calendarized values expressed sub-annually.  Analogous
00153    to FiDatSub.
00154
00155 Corrfac: Proportional correction made to the seasonal pattern to
00156    arrive at the interpolated sub-annual values.
00157
00158 DiscSub: Discrepancies between the financial data and the supplied
00159    seasonal pattern; expressed sub-annually.
00160
00161 Calval: Calendarized values.                                         */;
00162
00163
00164 * --- compiling data ------------------------------------------------;
00165
00166 Nall={ '       SYM' '   Intsubv' '   SeasPat' '  Fidatsub'
00167        ' CalVaSub' '   Corrfac' '   DiscSub'};
00168 pltvar=sym||Intsubv||SeasPat||Fidatsub||CalVaSub||Corrfac||DiscSub;
00169
00170 legcol={'        Interpoleted Sub-Annual Values'};
00171 legrow={' ',' ',' ',' ',' ',' ',' '};
00172
00173 LEGEND = {
00174           '     SYM: symbol to identify interpolated values',
00175           ' Intsubv: benchmarked or interpolated values',
00176           ' SeasPat: supplied seasonal or weekly pattern',
00177           'Fidatsub: financial data expressed sub-annually',
00178           'CalVaSub: calendarized values expressed sub-annually',
00179           ' Corrfac: corrections factors',
00180           ' DiscSub: discrepancies between Fidatsub and SeasPat'};
00181
00182 A=FinDat||per1f||per2f;
00183 namA={'FinDat' 'per1f' 'per2f'};
00184 B=Calval||per1c||per2c;
00185 namB={'Calval' 'Per1c' 'Per2c'};
00186
00187
00188 * --- printing results ---------------------------------------------;
00189
00190 RESULTS={'Original Financial Data' ' Calendarized Values'};
00191 print ,,,,,RESULTS (|colname={' ' ' '} rowname=' ' format=40.1|);
00192 print A (|colname=namA format=11.1|)
00193       B (|colname=namB format=11.1|);
00194
00195 print LEGEND (|colname=legcol rowname=legrow|);;
00196 print pltvar(|colname=Nall format=11.1|);
00197
```

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```
00198
00199 * --- creating datasets ------------------------------------------;
00200
00201 * for plotting purposes, the scale of the seasonal pattern is adjusted;
00202
00203      MagSeas= sum(SeasPat)/ToTobs;
00204      Perf= Per2f-Perlf+1;
00205      NPerf= sum(Perf);
00206
00207      MagFin=sum(FinDat)/Nperf;
00208      RatioMag= MagFin/MagSeas;
00209
00210      SeasPat2=Seaspat;
00211      if ratiomag>3 then seaspat2=seaspat*ratiomag/3;
00212
00213      pltvar (|,3|)= Seaspat2;
00214
00215
00216 Nall={'SYM' 'Intsubv' 'SeasPat' 'Fidatsub' 'CalVaSub' 'Corrfac' 'DiscSub'};
00217 create toplot from pltvar (|colname=Nall|);
00218 append from pltvar;
00219
00220 create calend from Calval (|colname={'Calval'}|);
00221 append from Calval;
00222
00223 QUIT;
00224
00225 * --- Creation of output files ----------------------------------;
00226 * File SubAnn consists of the sub-annual values plotted in Plot 1;
00227 * File Calendr consists of the desired calendarized annual values;
00228
00229  data _null_;
00230     set toplot;
00231     file SubAnn;
00232     put (Intsubv      SeasPat      Corrfac
00233          DiscSub      Fidatsub     CalVaSub) (11.1); -
00234
00235  data _null_;
00236     set calend;
00237     file calendr;
00238     put @1 Calval 11.2 ;
00239
00240 * *** PLOT ***********************************************************;
00241
00242    option linesize=130;
00243     proc timeplot data=toplot;
00244        plot Intsubv=sym SeasPat='S' Fidatsub='y' CalVaSub='c' /overlay;
00245        title ' PLOT 1:   Interpolated Sub-Annual Values';
00246
00247     proc timeplot data=toplot;
00248        plot Corrfac=sym DiscSub='y' /overlay;
00249        title ' PLOT 2: DISCREPANCIES AND CORRECTION FACTORS';
00250     run;
00251 * ********************************************************************;
00252
00253 //SUBANN  DD  DSN=TISE.RHEAROB.SUBANN.RESULTS,
00254 //    DISP=OLD
00255 //CALEND  DD  DSN=TISE.RHEAROB.CALENDR.RESULTS,
00256 //    DISP=OLD
```

APPENDIX C: SUMMARY OF THE VARIABLES

Input Data

The following variables must be supplied to the program:

INPUT VARIABLES

FinDat:	original financial data
Per1f:	the starting sub-annual reference period of each FinDat data point
Per2f:	the ending sub-annual reference period of each FinDat data point
Per1c:	the starting sub-annual reference period of each calendarized data point
Per2c	the ending sub-annual reference period of each calendarized data point
SeasPat:	Sub-Annual seasonal pattern
NSeason:	the number of time periods in one completion of seasons
FirstS:	first sub-annual period covered by SeasPat
Index:	Index series indicator

Output Values

The following variables are produced by CALENDR:

SUB-ANNUAL VALUES

SYM	symbol to identify interpolated values
IntSubv	interpolated sub-annual values
FiDatSub	financial data expressed sub-annually
CalVaSub	calendarized value expressed sub-annually
CorrFac	correction factors
DiscSub	discrepancies between FinDat and SeasPat

ANNUAL VALUES

CalVal	calendarized values

KEY TO VARIABLE NAMES

Int	-	interpolated
Cal	-	calendarized
Fin	-	financial
Va	-	estimated value
Val	-	estimated value
Dat	-	data
Sub	-	sub-annual

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