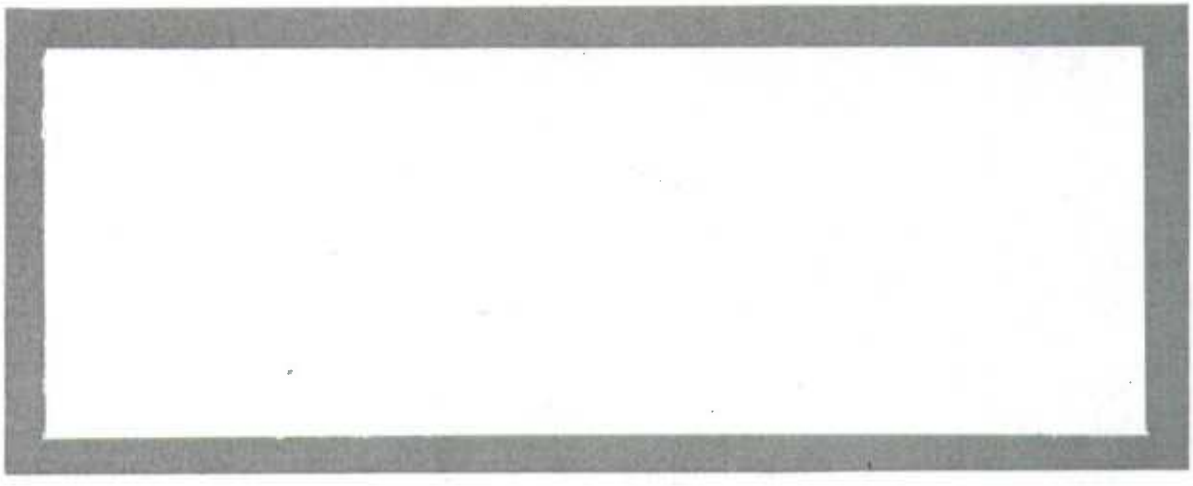

Methodology Branch

Time Series Research and Analysis Division

Direction de la méthodologie

Division de la recherche et de l'analyse des chroniques

Canada

WORKING PAPER TSRA-86-005E

TIME SERIES RESEARCH & ANALYSIS DIVISION
METHODOLOGY BRANCH

A REVIEW OF THE SEASONAL ADJUSTMENT METHODOLOGY OF RETAIL TRADE SERIES

by

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1. Introduction

During the last few years there has been a growing concern at Statistics Canada over the discrepancies among the seasonally adjusted Retail Sales figures as produced by three different divisions (Industry Division, Industry Measures and Analysis Division and GNP Division). After having accounted for conceptual differences in the three sets of data, it became evident that the choice of seasonal adjustment options applied by the three divisions was the source of this divergence in retail figures. The first attempt to correct this problem was made in the spring of 1983 when Industry Division replaced the use of seasonal factor forecasts by end-point adjustment, the method applied by the other divisions. In addition, the seasonally adjusted Canada Total was no longer obtained directly, rather it was calculated as the sum of the seasonally adjusted kind-of-business sales to coincide with the approach used by Industry Measures and Analysis Division.

These measures, however, did not prove to be sufficient to stop the occurrence of sizeable differences in the seasonally adjusted data from time to time. The especially large discrepancy in the June-July movement in 1985 prompted a new investigation into the seasonal adjustment methodologies applied by the divisions concerned. It was found that the dissimilar treatment of trading day variation was a major contributing factor to the divergence of figures. Spectral analysis techniques revealed that it was preferable to let the X-11-ARIMA program estimate trading day weights (as done in Industry Measures and Analysis Division) rather than to use weights partially based on subject matter knowledge of weekly shopping patterns, as was the practice in Industry Division. The latter technique

left some of the trading day variation in the series, as attested by the presence of substantial power in the spectrum at frequencies associated with trading day. Based on this evidence, Industry Division adopted the use of weights estimated by the program and, as an interim measure, agreed to apply exactly the same seasonal adjustment options as the ones applied by Industry Product Division, to guarantee consistency among the retail figures.

At that time it was also decided that Time Series Research and Analysis Division would provide assistance by investigating the appropriateness of the newly adopted seasonal adjustment options and recommend changes where necessary. It was also the understanding that all parties involved would implement the final recommendations at the time of annual revisions thus ensuring that any future deviations in the three sets of seasonally adjusted statistics is strictly due to conceptual differences.

This study presents the findings of the investigation carried out by TSRA Division. Section 2 is devoted to examining the current seasonal adjustment procedure; the use of ARIMA extrapolation, the selection of seasonal moving averages, the treatment of trading day variation, the adequacy of end-point adjustment. Furthermore, the issue of revision policy and the problem of aggregation to produce the seasonally adjusted Canada total is also discussed.

Section 3 concludes the study by summarizing the recommendations based on the analysis presented in Section 2.

2. Analysis of the present seasonal adjustment methodology of the Retail Sales series.

Industry Division publishes 28 kind-of-business (K.O.B.) sales series, their Canada total and retail sales in 10 provinces, and the Territories in seasonally adjusted form. The Canada total is obtained as the sum of the seasonally adjusted K.O.B. series. This method (referred to as the indirect adjustment) is preferable to the alternative of directly adjusting the total because it guarantees that movements in the components will add up to movements in the total thus facilitating analysis.

The retail series are adjusted using the X-11-ARIMA program with ARIMA forecasts and backcasts produced by a model automatically selected by the program; flexible (3x3) seasonal moving averages; trading day weights estimated by the program and kept fixed for a year. The seasonal adjustment is carried out each time a new data point is available (this method is called end-point or concurrent adjustment). Let us now analyze the impact of using these options and see if they need to be changed.

2.1. The ARIMA extrapolation option

It has been proven theoretically (Dagum (1982.a and 1982.b) and demonstrated empirically by many authors (Dagum(1978), Kuiper (1978), Dagum and Morry (1982), Otto (1985)) that extending the raw series with one year of forecasted values obtained using ARIMA models improves the reliability of the current seasonally adjusted estimate. In Morry (1983) it was shown that this also held true for ten selected retail trade series, i.e. ARIMA extrapolations reduced the size of revisions of the seasonally adjusted series in question.

The X-11-ARIMA program offers eight ARIMA extrapolation options. The option applied in the present seasonal adjustment allows for both backcasting and forecasting using an ARIMA model that is automatically selected by the program, in addition the original data is modified whenever an extreme is identified (an extreme being an unusually high or low value that does not fit the structure of the model).

Backcasting is normally recommended for short series (five to eight years). Since the retail series are over 14 years long, there is no benefit to be gained from backcasting, in effect it unnecessarily raises the cost of processing and therefore its practice should be discontinued.

The program has three built-in ARIMA models that perform well on a large variety of series to allow users without expertise in ARIMA modelling to take advantage of the extrapolation option. If the automatic model selection option is chosen, the program fits the three models to the series and uses the best one to produce forecasts, as long as it satisfies certain criteria on forecast error and goodness of fit. Because of the rigid nature of these built in criteria it is quite possible that a model that passes the guidelines in one month does not meet the criteria the next month and a new model is chosen or, what is worse, no model is found. This will introduce unwanted fluctuations in the seasonally adjusted estimates. It is much better, from the point of view of stability, to retain the same model for at least a year even if it fails to meet the built-in criteria some of the months (the cut-off points are somewhat arbitrary and do not need to be applied so rigidly). Ideally, users should identify the model for their series through proper model identification techniques and use that model as a user supplied model or alternatively they can choose the best of the automatic models and provide that as a user supplied model for

a year. This approach, apart from increasing the stability of the estimates, has the added advantage of being less expensive operationally (only one model is fitted instead of the three).

The extreme modification option is designed to be applied to very well behaved series and preferably in connection with user supplied models where one is confident that the chosen model describes well the true structure of the series. The retail series do not fall into this category. Thus using this option there is a danger that an extreme is identified and modified when it is not truly an extreme, only appears to be an extreme of a not-so-perfect model. This is undesirable because the modified value can adversely affect the quality of seasonal adjustment.

On the basis of this analysis, it is recommended that the series be adjusted using a fixed model (the list of appropriate models is given in Appendix A) producing only forecasts without the extreme identification option.

2.2. Seasonal moving average option

The X-11-ARIMA program was designed to be suitable for the seasonal adjustment of a great variety of time series. One of the many features built into the program is the applicability of five different seasonal moving averages to suit various seasonal patterns ranging from very flexible rapidly changing seasonality to almost rigid stable seasonal behaviour. Rapidly changing seasonality is best picked up by a very short moving average (the shortest being a simple three term moving average followed by a weighted five term (3x3) moving average). Seasonality that does not change at all is best estimated by applying the longest possible moving

average (a simple N term average, if the series is N years long). The default option uses the 3x5 moving average which is suitable for the estimation of seasonality present in the majority of series - i.e. seasonality that changes only moderately from year to year.

In order to get a reliable estimate of the year-to-year movement in the seasonal component, it is important that it not be obscured by the movement in the irregular component. The X-11-ARIMA program calculates a statistic called the $\bar{I}/\bar{S}$ ratio that measures the average absolute year-to-year movement in the irregular relative to the average absolute year-to-year movement in the seasonal component. If the $\bar{I}/\bar{S}$ ratio is low it indicates that seasonality is moving fast and the irregular is small (and consequently a short moving average would be appropriate). High $\bar{I}/\bar{S}$ values, on the other hand, would point in the direction of little movement in the seasonal component and of the need for a long seasonal moving average to estimate it. Through a simulation exercise, Lothian (1984) demonstrated how the optimal seasonal average can be selected for a series based on the value of the calculated $\bar{I}/\bar{S}$ ratio. He determined ranges of $\bar{I}/\bar{S}$ ratios corresponding to the five different moving averages.

Since the $\bar{I}/\bar{S}$ ratios for the retail series range between 3.01 (Pharmaceutical, Patent medicine, etc.) and 5.44 (Family Shoe Stores) only the middle ranges will be quoted here in Table I.

Table I - Moving Averages Corresponding to I/S Ranges

I/S Range	Moving Average
2.1 - 3.8	3 x 3
3.8 - 5.0	3 x 5
5.0 - 6.9	3 x 9

The first column of Appendix B lists the $\bar{I}/\bar{S}$ ratios corresponding to each retail trade series. Using the figures in Table I, it is evident that for the majority of the series, the present practice of applying the 3x3 moving average is not justified.

3x3 moving averages tend to produce smoother seasonally adjusted series than longer moving averages. For example, the indirectly adjusted Canada total month-to-month movements had a standard deviation of 1.6 when using 3x3 averages for the components versus 1.8 when the appropriate longer moving averages were applied. However, the disadvantage is that some of the irregulars are passed into the seasonal component making it very unstable and prone to higher revisions. Tables II and III present the total revisions in the seasonally adjusted month-to-month movement, Canada Retail Trade for the years 1982, 1983 and 1984 using 3x3 moving averages and 3x5 moving averages respectively.

TABLE II - Total revision in the month-to-month movement using 3x3 seasonal moving averages Canada Retail Sales adjusted indirectly (1982-1984)

	J	F	M	A	M	J	J	A	S	O	N	D	$\Sigma\|rev.\|$
82	.5	.6	1.0	- .4	- .9	1.5	-1.2	.7	-.4	- .6	.7	.2	8.7
83	-.3	.4	.9	-1.6	1.3	-.2	-1.2	1.3	-1.6	1.2	.7	-2.0	12.7
84	.7	-.9	-.8	.5	-.5	-1.6	.7	.9	-2.1	1.5	.3	- .9	11.4

TABLE III Total revision in the month-to-month movement using 3x5 seasonal moving averages
Canada Retail Sales Adjusted indirectly
(1982-1984)

	J	F	M	A	M	J	J	A	S	O	N	D	$\Sigma\|$ Rev$\|$
82	.4	.1	.8	-.4	.6	.9	-.6	.1	-.6	-.2	1.0	-.2	5.0
83	-.3	-.2	.6	-.4	.4	-.8	-.2	.2	0	.4	.7	-1.4	5.6
84	.6	-.5	.6	0	-.1	-.8	.3	.3	-.1	.1	.1	- .5	4.0

The revisions are consistently higher in Table II implying that the 3x3 moving averages produce less reliable estimates than the longer 3x5 moving averages.

Thus, it is recommended that the 3x3 moving averages be used for only those series that have an $\bar{I}/\bar{S}$ ratio less than 3.8 and the rest adjusted with the default 3x5 moving average. (The second column of Appendix B shows the recommended moving average for each series.)

2.3 The treatment of trading day variation

As was mentioned earlier, spectral analysis techniques indicated that applying the trading day weights estimated in the X-11-ARIMA program removes trading day variation better than the weights based on subject matter knowledge (in particular assigning zero weight to Sunday sales activities). Thus Industry Division switched to using program estimated trading day weights.

The present practice is to let the X-11-ARIMA program estimate trading day weights once a year and use these fixed weights to remove trading day variation in the successive months. An alternative procedure would be to let the program reestimate the trading day weights each month during the seasonal adjustment of the series. From the point of view of the spectrum neither procedure leaves residual trading day variation in the series, thus the selection has to be based on different criteria such as the stability of the seasonally adjusted estimates. Table IV shows how the Canada total month-to-month movement estimates change in 1982 (ignoring revisions to the raw data) adding one month of data at a time and using fixed trading day weights calculated in December 1981. Table V is a similar table except the estimates were obtained with trading day weights recalculated every month.

The entries in the two tables give inconclusive results. Half of the times one method gives smaller revisions while in the remaining months, the other method is preferable, with the two yearly totals of absolute revisions being very close. In a situation like this, cost considerations can be used as the criteria for selecting the method. It is less expensive to calculate trading day weight only once a year, as it is done in the present procedure, thus from that point of view it is the preferable treatment for removing trading day variation from the series.

This suggests that there is no need to change the present practice of fixing the trading day weights for a year.

TABLE IV - Month-to month movements in the seasonally adjusted Canada Total calculated from the series ending in January, February,..., December of 1982
Fixed trading day weights

Mon.	Series ends in Jan	Feb	Mar	Apr	May	June	July	Aug.	Sept	Oct	Nov	Dec.	Σ|revision|
Jan.	-2.51												
Feb.	-2.44	1.53											
Mar.	-2.60	1.39	.69										
Apr.	-2.33	.96	.52	-.03									
May	-2.18	1.02	.50	.08	2.13								
June	-1.86	.89	.35	-.12	2.52	-1.56							
July	-2.03	.92	.40	-.10	2.50	-1.47	.66						
Aug.	-2.19	.94	.45	-.06	2.53	-1.43	.68	.58					
Sept.	-2.17	.93	.44	-.07	2.51	-1.42	.68	.57	.39				
Oct.	-1.91	1.10	.45	-.09	2.36	-1.40	.64	.50	.31	-.91			
Nov.	-2.01	1.25	.44	-.10	2.38	-1.46	.65	.50	.30	-.90	1.22		
Dec.	-1.35	1.33	.33	-.09	2.53	-1.43	.70	.54	.33	-.89	1.52	1.32	
Revision	1.16	.20	.36	-.06	.40	.13	.16	-.04	-.06	.02	.30	-	2.89

TABLE V - Month-to-month movements in the seasonally adjusted Canada total calculated from the series ending in Jan, Feb,..., Dec of 1982
Trading day weights reestimated in each run

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Σ|revision|
Jan.	-2.59												
Feb.	-2.41	1.63											
Mar.	-2.21	1.33	.31										
Apr.	-2.88	1.50	.56	.12									
May	-2.71	1.51	.47	.12	2.09								
June	-2.41	1.27	.40	.02	2.28	-1.26							
July	-2.46	1.17	.42	.01	2.08	-1.04	.39						
Aug.	-2.77	1.35	.48	.07	2.11	-1.14	.67	.58					
Sept.	-2.56	1.20	.43	.06	2.04	-1.07	.62	.50	.48				
Oct.	-2.09	1.18	.37	.05	2.01	-1.10	.64	.49	.10	-.72			
Nov.	-2.03	.99	.42	-.08	2.29	-1.29	.50	.55	.15	-.60	1.05		
Dec.	-1.98	1.84	.56	-.21	2.38	-1.24	.54	.60	.10	-.64	1.54	1.41	
Revision	.61	.21	.25	-.33	.29	.02	.15	.02	-.38	.08	.49	-	2.81

2.4 End-point adjustment versus the use of forecasted seasonal factors

By now there is a concensus among experts of seasonal adjustment that it is preferable to use all available recent data point of a series when removing seasonality. Concerning the retail trade series in particular, it was shown by Morry (1983) that end-point (or concurrent) adjustment reduced the size of revisions. The only question that remains to be answered is whether concurrent adjustment is preferable to the use of seasonal forecast factors when the raw data itself undergoes revisions.

It is not within the scope of this study to address this issue in detail. Suffice it to say that Pierce and McKenzie (1985) found that 'even with preliminary-data error a substantial gain from concurrent adjustment is realizable, especially for the latter months of the year.' Thus even in the presence of revisions in the raw data concurrent adjustment produces better seasonally adjusted estimates, therefore, its practice should be continued for the retail sales series.

2.5 How often should the seasonally adjusted retail series be revised

A study by Dagum (1985) addressed the problem of optimal frequency of revision from the point of view of the X-11-ARIMA filters. The author found that monthly revisions of the concurrent filter do not approach monotonically neither to the year-end nor to the final filters. There are significant decreases in the size of the first three consecutive revisions due to an improvement of the trend-cycle Henderson's moving average. There is furthermore, a reversal of direction in the filter revisions at lag 12 and 24 (i.e. one and two years later)

due to an improvement in the seasonal weights which become less asymmetric from year to year until three full years are added to the series. Based on these findings, Dagum recommends that 'the best combination of frequency of revision of the concurrent filter would be to revise when a new month appears, keep the estimate constant for the remainder of the year and then revise annually when the first month of the next year is available'.

This is the practice followed by Industry Division concerning revision of the seasonally adjusted series. It should be added that in situations where the unadjusted series itself is subject to revisions, the seasonally adjusted series needs to be revised at least as often as the raw data. Thus revision of the seasonaly adjusted estimate one month later would be necessary in the retail series on that basis alone (the first published unadjusted figures are preliminary estimates only).

There is also the question of how far back the series should be revised at the year end. Where ARIMA extrapolation is used, it is normally sufficient to revise only the last two years of data. The issue is somewhat complicated if the series contains trading day variation. Unlike the seasonal factors the trading day estimates do not converge to a final value. At the same time, it must be rather disconcerting for users of the data to accept revisions on a regular basis to 12-14 year-old figures. A good rule-of-thumb adopted by Industry Division throughout the years was to revise only those years that contained points where the combined seasonal and trading day factor changed more than .5. This policy usually guaranteed that revisions would not occur too far back (trading day factors rarely fluctuate in the range of .5 and seasonal factors never do beyond 2-3 years).

Thus the revision policy of Industry Division is certainly acceptable, however, it is up to the three divisions concerned to agree on a common policy taking into account their traditional revision practices and the need of their respective clients.

2.6 The aggregation problem

The X-11=ARIMA method is basically a linear smoothing technique, however, it contains certain non-linearities, such as the identification of extremes, the multiplicative decomposition and automatic changing of the trend-cycle moving averages. In the absence of these constraints, it would not matter whether the K.O.B. series are first adjusted and then added to form the Canada total adjusted series, or if the unadjusted series are added up first and then adjusted to produce the total seasonally adjusted series. For that matter, obtaining the total from any breakdown (for example provincial sales) would give identical adjusted values.

Because of the non-linear features of the program, the seasonally adjusted components are not expected to add up to the seasonally adjusted total making it sometimes difficult for analysts to explain the movement in the total through what was happening in the component series. One way around this problem is to define the seasonally adjusted total as the sum of the seasonally adjusted K.O.B. sales (indirect adjustment). The adjusted series thus formed has practically identical spectral properties with the directly adjusted total, thus either approach is acceptable. To help form an idea about the magnitude of discrepancies using the two approaches, Table VI presents the month-to-month movements for the years 1983 to 1985 from the total Retail Trade series adjusted directly and indirectly using data up to December 1985.

TABLE VI - Comparison of the month-to-month movements in the Retail Trade totals adjusted directly and indirectly
Present procedure

	J	F	M	A	M	J	J	A	S	O	N	D	Total Diff.
1983													
Direct	-.2	.3	3.6	-4.5	4.3	3.5	-.6	.7	0.0	1.2	.1	1.8	
Indirect	-.6	1.1	3.3	-4.3	4.2	4.4	-1.4	.4	.5	1.4	-.2*	1.4	
Difference	.4	-.8	.3	-.2	.1	-.9	.8	.3	-.5	-.2	.3	.4	5.2
1984													
Direct	1.3	.2	.1	1.2	.4	.7	-.3	0	1.3	1.7	.1	.2	
Indirect	1.6	.1	-.5*	2.6	-.6*	1.3	-.3	0	1.2	2.0	.0	-.4*	
Difference	-.3	.1	.6	-1.4	1.0	-.6	0	0	.1	-.3	.1	.6	5.1
1985													
Direct	2.0	1.3	2.4	.3	.8	-1.7	2.2	1.7	.1	.5	2.1	-.1	
Indirect	2.1	.8	2.2	.3	1.0	-.6	1.3	2.1	.5	.4	1.7	.6*	
Difference	-.1	.5	.2	0	-.2	-1.1	.9	-.4	-.4	.1	.4	-.7	5.1
Averagemonthly absolute difference												.43	

*indicates reversal of direction

The average discrepancy per month between the two series is .43. It should be noted that there are five instances when the two series indicate opposite movement (the starred entries).

Table VII compiles the corresponding statistics from a seasonal adjustment where the present procedure options were changed along the lines

suggested in the previous sections.

TABLE VII- Comparison of the month-to-month movements in the Retail Trade totals adjusted directly and indirectly Proposed procedure

	J	F	M	A	M	J	J	A	S	O	N	D	Total diff
1983													
Direct	-.4	1.4	3.1	-4.1	4.4	3.5	-.2	.5	-.1	1.6	-.2	1.9	
Indirect	-1.0	1.4	3.4	-4.4	4.3	4.3	-1.1	.2	.3*	1.4	0	1.3	
Difference	.6	-1.3	-.1	.3	.1	-.8	.9	.3	-.4	.2	-.2	.6	5.8
1984													
Direct	1.7	-.2	-.6	2.3	-.1	.6	.2	-.2	1.2	2.0	-.1	0	
Indirect	1.5	.2*	-.6	2.8	-.6	1.1	.1	-.2	.9	2.3	0	-.7	
Difference	.2	-.4	0	-.5	.5	-.5	.1	0	.3	-.3	-.1	.7	3.6
1985													
Direct	2.5	.9	1.9	1.0	.6	-1.6	1.9	1.8	.1	.8	2.1	-.7	
Indirect	2.5	.7	2.1	.9	.6	-.9	1.8	2.0	.3	.9	1.6	.4*	
Difference	0	-.2	-.2	.1	0	-.7	.1	-.2	-.2	-.1	.5	-1.1	3.4
Average monthly absolute difference													.35

*reversal of direction

It is evident that both the size of differences (.35) and the frequency of reversals (3) is reduced compared to Table VI, suggesting that even from the point of view of aggregation the proposed changes would be beneficial.

While indirect adjustment solves the problem of consistency among the K.O.B. movements and the total movements, if the total is calculated by summing up the provincial seasonally adjusted figures, discrepancies and reversals in the movement can still occur - although it is expected that they will be reduced as well using the proposed options.

If such discrepancies are undesirable, it is always possible to benchmark the provincial figures to the total of K.O.B. series by redistributing the differences between the two types of totals each month. This again is a decision that is left up to the divisions concerned.

3. Conclusions

The present seasonal adjustment procedure of the Retail Trade series has been investigated and based on the analysis presented in Section 2, the following changes are recommended:

1. Use a fixed ARIMA model (as given in Appendix A) for a year. At the time of the annual revision these models can be reviewed to determine if they are still describing adequately the structure of the series and changed if necessary.

2. Use these ARIMA models only for forecasting (no backcasting) an additional year or unadjusted data.

3. Do not modify the unadjusted series on the basis of extremes identified from the ARIMA model.

4. Retain the 3x3 seasonal moving averages for only 11 of the 40 series analyzed (Appendix B) and adjust the rest of the series using the default 3x5 moving average.

The practice of concurrent adjustment and the application of fixed trading day weights for a year to remove trading day variation still proves to be the recommended approach.

Concerning the issue of revision policy and the problem of aggregation input is required from the three divisions concerned before a consensus can be reached.

APPENDIX 'A'

Series Ident.	Description	ARIMA Model
650059	Combination	(011)(011)log
650060	Confectionery	(011)(011)log
650061	Other food	(011)(011)log
650062	Department	(011)(011)log
650063	General Merchandise	(012)(011)log
650064	General stores	(011)(011)log
650065	Variety	(011)(011)log
650066	New cars	(011)(011)log
650067	Used cars	(212)(011)
650068	Service stations	(011)(011)log
650069	Garages	(011)(011)log
650070	Auto accessories	(011)(011)log
650071	Men's clothing	(012)(011)log
650072	Women's clothing	(011)(011)log
650073	Family clothing	(011)(011)log
650074	Specialty shoes	(011)(011)log
650076	Hardware	(011)(011)log
650077	Household furniture	(011)(011)log
650078	Household appliances	(012)(011)log
650079	Furniture, TV, Radio,appl.	(011)(022)log
650080	Pharmacies	(011)(011)log
650081	Books	(011)(011)log
650082	Florists	(011)(011)log
650083	Jewellery	(011)(011)log
650084	Sporting goods	(011)(011)log

650085	Personal accessories	(011)(011)log
650086	Miscellaneous	(212)(011)
650058	Total	(212)(011)
650174	Nfld.	(011)(011)log
650262	PEI	(011)(011)
650350	NS	(011)(011)log
650438	NB	(011)(011)log
650526	PQ	(011)(011)log
650702	Ont.	(011)(011)log
650878	Man.	(011)(011)log
651054	Sask.	(011)(011)log
651142	Alta.	(011)(011)log
651318	BC	(011)(011)log
651494	Territories	(011)(011)log

APPENDIX B

Series	IS ratio	Recommended Seasonal Moving Average
Combination	5.20	3x5
Confectionery	3.87	3x5
Other food	3.31	3x3
Department	4.70	3x5
General merch.	4.45	3x5
General stores	3.97	3x5
Variety	5.26	3x5
New cars	4.59	3x5
Used cars	3.67	3x3
Service stations	3.01	3x3
Garages	5.39	3x5
Auto accessories	4.10	3x5
Men's clothing	3.58	3x3
Women's clothing	4.88	3x5
Family clothing	4.04	3x5
Specialty shoe	4.32	3x5
Family shoes	5.44	3x5
Hardware	4.89	3x5
Household furniture	4.50	3x5
Household appliances	4.29	3x5
Furniture, TV, Radio	3.60	3x3
Pharmacies	3.01	3x3
Books	3.32	3x3

Series	I/S ratio	Recommended Seasonal Moving Average
Florists	3.33	3x3
Jewellery	3.16	3x3
Sporting goods	3.38	3x3
Personal accessories	3.41	3x3
Miscellaneous	5.35	3x5
Total	5.17	3x5
Nfld.	4.82	3x5
PEI	4.39	3x5
NS	4.39	3x5
NB	5.67	3x5
Que.	5.39	3x5
Ont.	5.27	3x5
Man.	4.90	3x5
Sask.	4.85	3x5
Alta.	5.24	3x5
B.C.	3.88	3x5
Yukon & NWT	4.58	3x5

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