Seasonal adjustment of quarterly consumer expenditure series

Quarterly data on consumer spending exhibit a high degree of seasonality; however, the use of statistical techniques permits the filtering-out of seasonal fluctuations, so that the underlying series trend can be more easily seen

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To provide more timely information on consumer expenditures, the Bureau of Labor Statistics began publishing estimates from the interview component of the Consumer Expenditure (CE) Survey on a quarterly basis in 1984.[1] With quarterly data, analysts can more easily and accurately track changes in overall consumer behavior, but the degree of seasonality present in quarterly expenditure series for individual expenditure groups will render these changes difficult to interpret. For this reason, seasonally adjusted expenditure data—data with the seasonality extracted—would be the preferred series to examine. This article presents results of seasonally adjusting data from the interview component of the CE Survey.[2] (For a more general analysis of seasonality, see the article by Ted Jaditz, pp. 17–22, this issue.)

The seasonal behavior of the CE interview data was first studied by Stuart Scott and James Buszuwski,[3] who analyzed differences in seasonality of selected expenditure series. Their analysis highlighted the importance of seasonal variation in the interview component data, and the tendency of seasonality to vary demographically—particularly with regard to region of residence and age of the reporting household's reference person. They concluded that "consumer expenditures are among the most highly seasonal series observed by BLS." For users of the quarterly data, Scott and Buszuwski's analysis is somewhat limited because the expenditure categories they analyzed were not based on published expenditure definitions, and because the study did not cover the total U.S. sample. Rather, their data spanned the period 1980–87, and included only urban consumer units.

This study revisits the issue of seasonality, but the analysis focuses on expenditure series as they are actually published in quarterly reports. The mean expenditures in these reports are based upon the total U.S. sample of households. Because the focus is exclusively on that total sample, seasonal differences that may arise across demographic groups are not addressed. The analysis covers the period 1984–92, and employs the X-11 ARIMA methodology, developed by Statistics Canada, to seasonally adjust the data.

What is seasonality?

Seasonality refers to the tendency of a time series to persistently repeat a yearly pattern or cycle. Often, the seasonality of an economic series reflects conventions associated with the weather—summer vacations and harvest periods are examples—or with cultural or social events, such as the winter holiday season. These types of seasonal influences may be seen in many consumer expenditure series. For example, gift purchases of apparel products tend to increase during the winter holiday season. This traditionally

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strong holiday purchasing behavior produces a distinct peak in the fourth quarter of the year for apparel expenditure series. Similarly, vacation-related expenditures for hotel and vacation rentals, purchases of food away from home, and transportation expenses for gasoline tend to increase during the summer—seasonal behavior clearly reflected by the third-quarter peaks observed in the associated expenditure series.[4]

Examining the seasonally unadjusted expenditure series can be important for analysts who are interested in the change in seasonal demand. However, for those interested in the underlying trend or cycle of the expenditure series, seasonally unadjusted data are of little help. To more clearly observe the underlying trend of a seasonal series, the seasonality, if it can be identified, must be filtered out. For most time series data, it is assumed that the original series (O) can be decomposed into three components: trend-cycle (C), seasonal (S), and irregular (I). It is further assumed that this decomposition can be expressed in either an additive form, $O_t = C_t + S_t + I_t$, or a multiplicative form, $O_t = C_t \cdot S_t \cdot I_t$.

To estimate the seasonal component of the expenditure series, Statistics Canada's X-11ARIMA seasonal adjustment method has been applied to 9 years of quarterly expenditure data,[5] spanning the first quarter of 1984 through the last quarter of 1992. The seasonal filter of the X-11ARIMA package is founded on the original X-11 seasonal adjustment methodology developed in the late 1960's by the U.S. Bureau of the Census. The X-11 procedure falls within the class of moving averages or linear smoothing filter estimators, in contrast to seasonal adjustment methods that use regression techniques. The X-11 methodology has been the standard BLS seasonal adjustment method for regularly published seasonally adjusted series since the late 1970's. These series include labor force and unemployment rate statistics, as well as consumer and producer price indexes.

Seasonal patterns of expenditures

The seasonality of consumer expenditures is easily seen in chart 1. Of the 16 charted series, all but 2 appear to have a regular seasonal pattern. (Expenditures on rented dwellings and total health care costs appear to have no noticeable seasonal pattern.) Of the 14 series that exhibit seasonality, 10 are shown at the lowest level of detail for which data are published quarterly. The remaining four expenditure classes—total expenditures, housing, shelter, and transportation—are composites of other expenditure series. For example, food expenditures are published in the quarterly report as total food—neither the "food at home" nor the "food away from home" series is published. On the other hand, shelter is a composite of expenditures on owned dwellings, rented dwellings, and other lodging.

Of the 10 lowest-level expenditure categories, 8 can be described by one of two generally distinct seasonal patterns. Owned dwellings, housefurnishings and operations, apparel, and entertainment follow a similar seasonal pattern in that each expenditure series increases through the year before reaching a peak in the fourth quarter. Each of these series then sharply declines to a trough in the first quarter of the subsequent year, whereupon the seasonal pattern repeats itself. Three of the four composite series—total expenditures, housing, and shelter—also follow this seasonal pattern. The possible causes of this particular pattern are discussed later.

The other four lowest-level expenditure components—food, other lodging, gasoline and motor oil, and other transportation expenses—follow a different seasonal pattern. Again, expenditures are the lowest in the first quarter, but they peak in the third quarter. Apart from the "other transportation expense" category, the particular seasonal pattern observed across these expenditures is most likely the result of summer vacation and travel habits. Commonly, American families vacation during the summer months—the third quarter of the year—during which they incur the largest portion of their annual expenditures on food away from home, lodging, and gasoline. A more descriptive analysis of each expense category is presented below.

Quality tests of seasonal adjustment

Graphically observing a seasonal pattern within a series does not in itself guarantee that the seasonality can be identified. The X-11ARIMA method estimates seasonal factors that are used to adjust the original series in order to derive the deseasonalized, or seasonally adjusted, series. If these factors cannot be accurately estimated, the seasonally adjusted series is not reliable. The X-11ARIMA package provides statistical tests for the presence of seasonality within the series and for the stability of the seasonality across years. A number of quality control statistics also are computed to evaluate the reliability of the seasonal factor estimates. Of these tests and quality control statistics, F_s, F_m, M_7, and Q are among the more important measures used to evaluate the X-11ARIMA estimates. A brief description of each of these statistics is given in turn.[6]

F_s tests for the presence of stable seasonality within the original series. This statistic is based on a one-way analysis of variance (ANOVA) and is computed as the ratio of the variance of the

estimated seasonal term to the residual variance.[7] If there is quarterly seasonality within the series, the seasonal term (S) will have a large within-year seasonal variation relative to the irregular term (I). An F_s greater than 7 is considered strong evidence to reject the null hypothesis that there is no seasonality.

F_m is based on a two-way ANOVA that tests for moving seasonality across years and is computed from the ratio of the between-years variance to the residual variance. In short, moving seasonality refers to a change in the amplitude of the seasonal pattern or a shift in the phase of the pattern. If there is significant variability in the seasonality across years, uniquely identifying the within-year seasonality will be difficult. A series should be seasonally adjusted only when the computed F_m is less than the critical value of 3.

There are 11 quality assessment statistics, referred to as M-statistics, used to gauge the quality of the seasonal adjustment. The most important of these, M_7, measures the amount of moving seasonality relative to the amount of stable seasonality and is computed from F_s and F_m.[8] If M_7 exceeds 1, the moving seasonality overwhelms the within-year seasonality and the case for seasonal adjustment is rejected. Although the seasonal adjustment is acceptable if M_7 is less than 1, a computed M_7 less than or equal to 0.8 is preferred.

A composite quality measure, the Q-statistic is computed from a weighted average of all 11 M-statistics. Each M-statistic is assigned a relative importance such that the computed Q-statistic is bounded by the values 0 and 3. Like M_7, a computed Q equal to or less than 0.8 is preferred, but a value less than 1 is conditionally acceptable. Computed values greater than 1 offer strong evidence to reject the seasonal adjustment. The four tests and quality statistics relating to each of the 16 expenditure series are presented in table 1.

Table 1. **Selected X-11ARIMA tests and quality control statistics for the seasonal adjustment of quarterly expenditure series**

Expenditure group	F_s	F_m	M_7	Q
Total expenditures[1]	405.254	1.348	0.117	0.30
Food	49.896	4.750	.461	.40
Housing[1]	154.979	1.744	.199	.41
Shelter[1]	133.926	2.772	.239	.40
Owned dwelling	40.157	2.889	.442	.50
Rented dwelling	2.260	.809	1.444	1.41
Other lodging	74.932	3.064	.329	.51
Utilities, fuels, and public services	154.421	3.556	.239	.45
Housefurnishings and operations	247.279	1.734	.149	.24
Apparel and services	1839.189	1.037	.052	.49
Transportation[1]	170.306	1.424	.182	.82
Gasoline and motor oil	139.134	1.114	.193	.23
Other transportation expenses	48.437	1.754	.356	.99
Health care	10.033	2.033	.808	1.22
Entertainment	207.357	1.384	.164	.48
All other expenses[2]	55.013	1.613	.328	.50

[1] Denotes composite expenditures, which have been seasonally adjusted using the indirect method.

[2] Includes alcoholic beverages, reading, education, tobacco, miscellaneous expenditures, personal care, cash contributions, and personal insurance and pensions.

Adjustment of composite series

A composite series is a series that results from the sum or weighted average of two or more series. As mentioned earlier, four expenditure categories—total expenditures, housing, shelter, and transportation—are composite series of the published data. Because of the infrequency of many expenditure reports, many of the noncomposite expenditures published quarterly are themselves composites of expenditure items published in the annual reports. For example, food expenditures are composed of food at home and food away from home, but this breakdown is not available on a quarterly basis because fewer reports are used in computing the quarterly estimates. With limited reports for many expenditure categories in each quarter, the statistical reliability of mean expenditure estimates is a concern. Hence, all composite definitions in this analysis adhere to publication criteria used for the quarterly estimates.

When seasonally adjusting composite series, direct or indirect seasonal adjustment can be applied. Direct seasonal adjustment consists of first constructing the composite series from the raw data and then applying the seasonal adjustment method directly to the composite series. Indirect seasonal adjustment entails directly adjusting each component of the composite series first and then constructing the seasonally adjusted composite series from the seasonally adjusted components. Constructing the indirect seasonally adjusted composite series usually involves adding or multiplying together the seasonally adjusted components. For the expenditure series presented here, indirectly adjusted composite series are the summation of the seasonally adjusted components.

Results of the two adjustment methods were compared for each of the composite series to assess the degree of roughness or lack of smoothness in the resulting series. The X-11ARIMA package computes the degree of roughness for each method from the sum of squares of the first differences of the seasonally adjusted series.[9] A comparison then can be made based on the percentage differences between the two measures of roughness.[10] On the basis of the roughness criterion, only the transportation expenditure series showed an improvement using the indirect method, but this improvement was marginal.

For all four composite series, the seasonally adjusted series and the seasonal factors are approximately equal between the two methods. The tentative conclusion is that no significant gain is made by selecting either method. However, if detailed expenditure reports, such as those at the annual report level, were statistically more reliable, indirect seasonal adjustment of the detailed expenditure components might have proved to be a superior adjustment method.

Analysis of seasonally adjusted data

The F_s and quality control statistics shown in table 1 confirm the strong seasonality of most of the consumer expenditure series. Health care fails the seasonality test, with a Q-statistic of 1.2. Rented dwellings has a failing F_s, equal to 2.3. The absence of seasonality in the series for rented dwellings is no surprise. Renters are customarily bound by a contract that stipulates equal monthly payments throughout their leases, and thus no seasonal pattern will emerge. A similar argument can be made for health care. Out-of-pocket health care costs include insurance premiums, medical services, medical supplies, and prescription drugs. The bulk of these expenditures represents insurance premiums and medical services, which account for approximately 42 percent and 35 percent of annual health care costs, respectively. Given that health insurance premiums commonly are paid in equal installments across the year, and that expenditures for medical services are not seasonal, no particular seasonal pattern will likely emerge here either.

The remaining expenditure series, including total expenditures, appear to have strong seasonal patterns. The extraordinarily large F_s of 405.3 for total expenditures makes this one of the most seasonal series. The quality control statistics overwhelmingly indicate this as well. The seasonally adjusted total expenditure series in chart 1 shows a relatively smooth and increasing trend through most of the 1984–91 period before a slight decline in 1992. The seasonal pattern follows a general cycle of increase in each of the last three quarters of the year, followed by a sharp dropoff in the first quarter of the subsequent year. This pattern is interrupted only in the last quarters of 1991 and 1992, during which annual expenditure growth declined markedly. This development might reflect the repercussions of the 1990–91 recession.

That there is seasonality in the food series is suggested by the F_s of 49.9. The seasonal pattern of food expenditures appears to be strongly driven by the summer vacation season, during which outlays for food away from home tend to increase. The food expenditure series departs from a normal seasonal pattern in the last quarter of 1987 and the first quarter of 1988 before resuming its usual behavior. This temporary departure results not from an economic disturbance, but from a survey questionnaire change. Prior to 1988, survey respondents were asked, "What has been your usual *monthly* expense at the grocery store or supermarket?" Starting in the first collection quarter of 1988, the survey began to request the weekly expenses at grocery stores and supermarkets. The change was made to improve food data collection from the interview component by reducing the period over which respondents were asked to recall expenditures. Compared with results from the diary component of the survey, the interview component's food reports were underreported before the change. The questionnaire modification appears to have provided a more accurate estimate as shown by the upward shift in the level of food expenditures.

The effect of the questionnaire modification on the seasonal adjustment is marginal. M_7 and Q remain acceptable, although F_m is greater than its critical value, 3. An attempt was made to model this shift in the series through intervention analysis.[11] At BLS, intervention analysis refers to the explicit modeling of identifiable changes within the original series prior to the seasonal adjustment. Here, dummy variables were used to model the shift in the original series that occurred in the last quarter of 1987 and the early quarters of 1988. In many circumstances, intervention analysis is quite fruitful when adjusting series that are plagued by irregular but identifiable disturbances. For the food series, however, the estimated seasonal factors from the standard X-11ARIMA and the intervention X-11ARIMA were not notably different.[12] Because there were no appreciable differences between the sets of seasonal factors, the standard X-11ARIMA results are presented here.

The housing series is seasonal with a pattern that closely resembles that of the total expenditure series, although the fourth-quarter peaks are sharper. The series itself is shown in chart 1, and the associated test and quality control statistics from table 1 are acceptable. Housing, as one of the composite series, is made up of shelter, utilities, fuels and public services, and house-furnishings and operations. Among the subcomponents, shelter accounts for slightly more than 50 percent of annual housing costs. Consequently, the seasonal pattern observed in the housing series closely resembles the seasonal pattern observed in the shelter series.

Shelter itself is composed of three components: owned dwellings, rented dwellings, and other lodging. As mentioned earlier, the series for rented dwellings is not seasonal, but the re-

Chart 1. Original and seasonally adjusted consumer expenditure series, 1984--first-quarter 1992

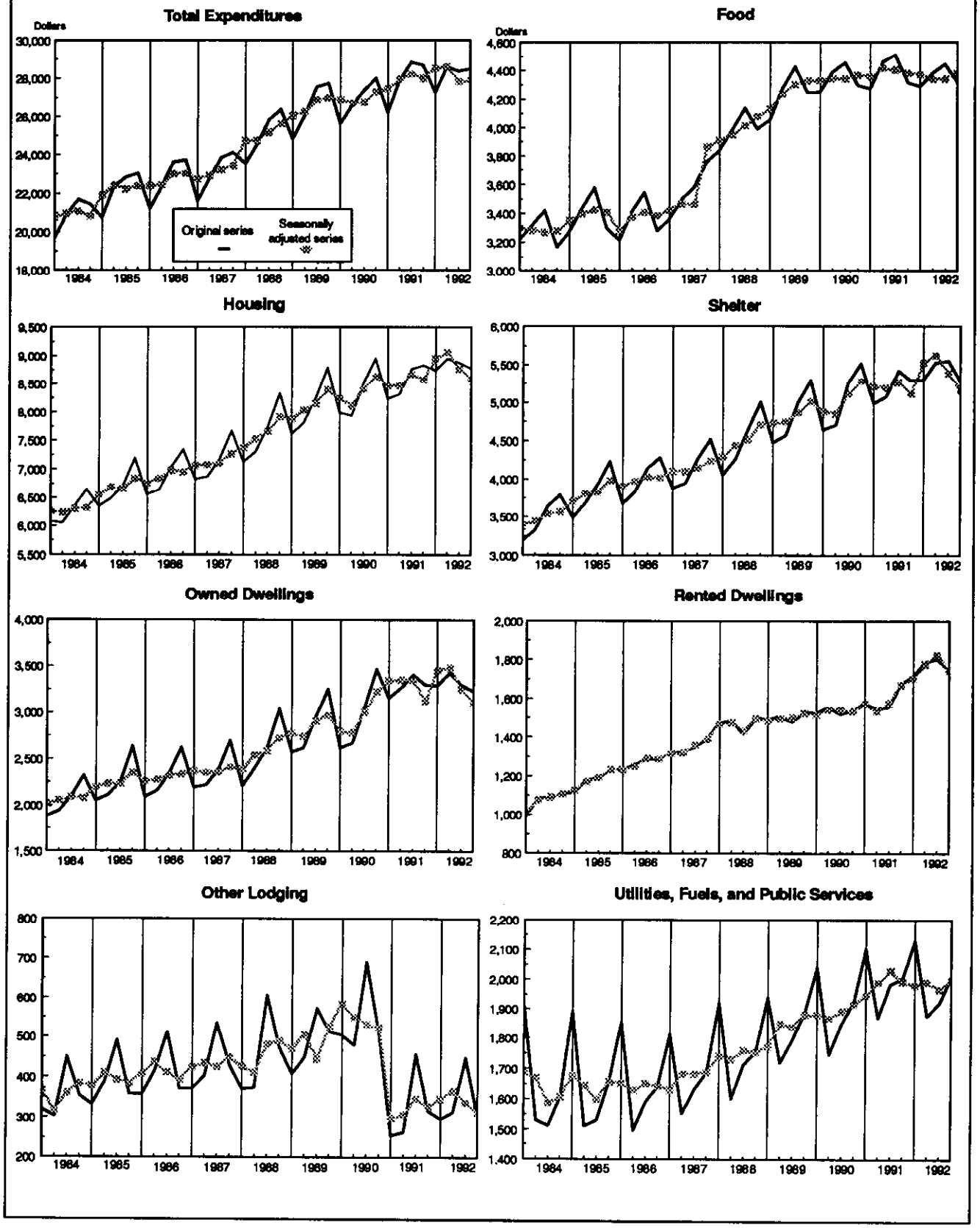
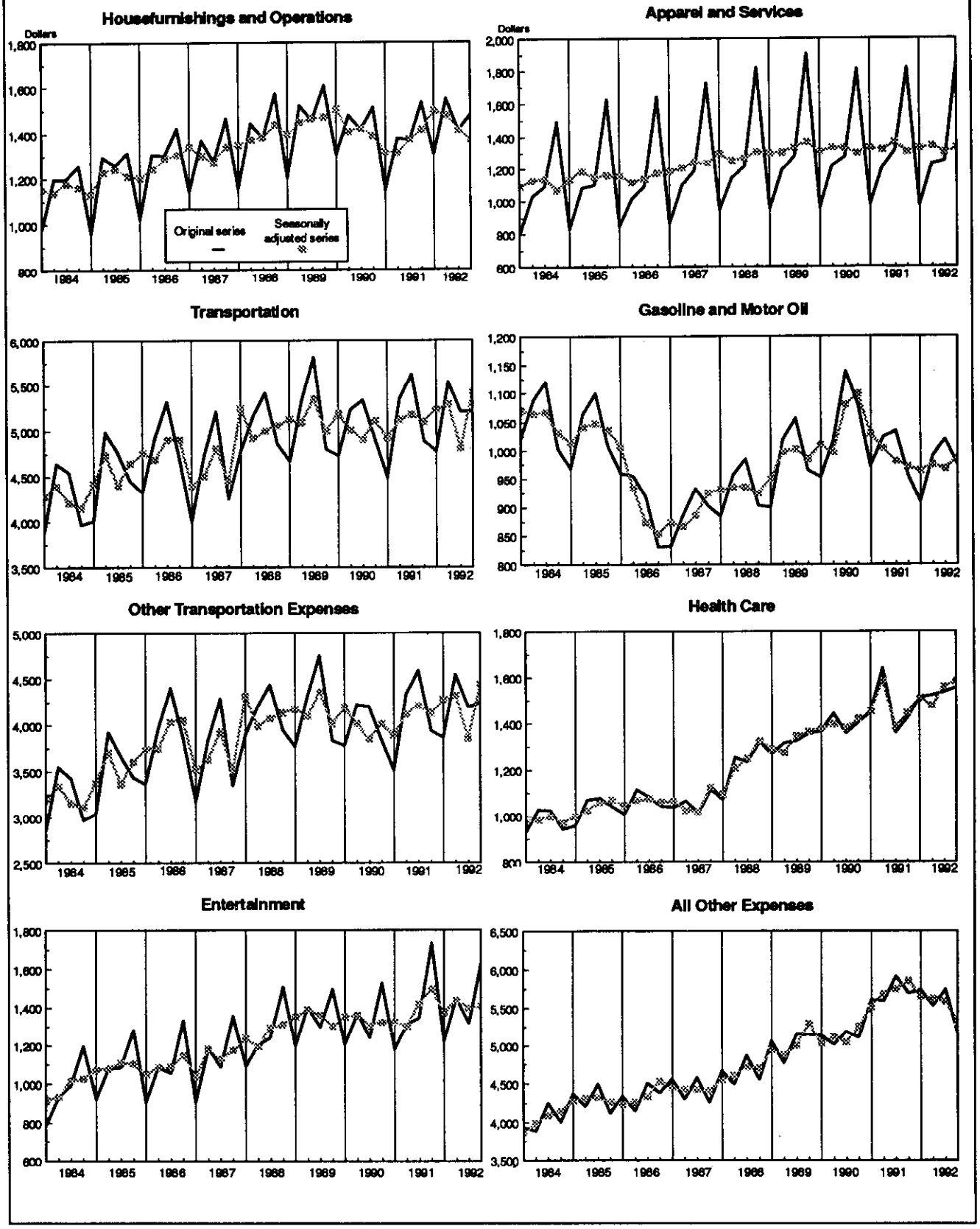


Chart 1--Continued. **Original and seasonally adjusted consumer expenditure series, 1984–first-quarter 1992**



maining two components have distinguishing patterns. The series for owned dwellings has a seasonal pattern that appears to dominate the seasonal pattern of shelter, and thus the housing pattern as well. Seasonality is present, as indicated by an F_s of 40.2. For the quarterly data through 1990, the expenditure series monotonically increases through three calendar quarters before peaking in the fourth quarter of each year.

The owned dwellings series primarily includes mortgage interest payments, property taxes and insurance, and maintenance and repair expenditures. Given that it is customary for homeowners to pay regular and equal monthly mortgage payments that often include property taxes and insurance (more than 60 percent of homeowners have mortgages), it would presumably follow that maintenance and repairs drive the seasonal pattern of owned dwellings. However, an established pattern of strong seasonality in the series suddenly dissipated after 1990. After disaggregating the owned dwellings series, analysts concluded that the particular pattern observed through 1990 was driven not by maintenance and repair expenses but by property taxes. The seasonal pattern was induced, unintentionally, by the reporting and publishing methods used by BLS.

Prior to the 1991 survey year, respondents were asked in each quarter if they had received a property tax bill. If they had, the full amount of the tax bill was associated with the current collection quarter, whether or not the full amount of the tax was actually paid in that quarter.[13] To better isolate the cause of the series' seasonality, frequency counts of property tax bills by calendar quarter were compiled. These frequency counts revealed that a disproportionate percentage of property tax bills were received in the last calendar quarter of the year. In 1989, for example, approximately 40 percent of all reported property tax bills were received in the fourth quarter. Because annual property taxes often are substantial, the pre-1991 data-processing practice brought about the fourth-quarter peak that is observed in the owned dwelling series.

Beginning in 1991, reported annual property taxes are mapped equally into each collection quarter. For example, a family that reported $1,200 in annual property taxes will have one-fourth, or $300, mapped into the collection quarter for which information is being sought. In no case is the annual bill mapped to a single quarter. This new mapping method has had a notable effect on the seasonal pattern of the owned dwelling series from 1991 forward. (See chart 1.) The series has become much smoother, and no longer peaks in the fourth quarter. Because the owned dwelling series makes up 60 percent and 35 percent of the shelter and the housing series, respectively, the new mapping method affects these expenditure estimates as well. Both shelter and housing show a much smoother path beginning in 1991. As additional time series data become available, the seasonality measured within the owned dwellings series, and those for shelter and housing as well, is likely to be dampened.

The series for other lodging, which encompasses expenditures for owned vacation homes and lodging on trips, peaks during the third quarter—the summer months—when families traditionally take vacations. All of the test measures except F_m indicate that the series seasonally adjusts well. Note from chart 1 the sharp decline in this expenditure series following 1989. This drop resulted from reallocating the item "expenses for other properties" from other lodging to all other expenses. Although this definitional change has affected the level in the former parent series, it has not disturbed the underlying seasonal pattern: other lodging has a continuum of third-quarter peaks before and after the change. Conceivably, the definitional change is the sole cause of the large F_m statistic that has been computed. Intervention analysis that models this shift in the level of expenditures would likely help in the overall seasonal adjustment of the series.

The series for utilities, fuels, and public services, which principally includes electricity, natural gas, and home fuel oil, has a substantial peak in the first quarter and a relatively deep trough in the second quarter. The seasonally adjusted series shown in chart 1 is a relatively smooth and increasing function. Although electricity expenditures can be substantial in the summer months as demand for cooling increases, the seasonal pattern reveals that they are relatively less important in comparison to the total utility and fuel bills in winter. Because of the volatility in energy prices between 1984 and 1986 resulting mostly from the OPEC cartel disputes, the unadjusted series shows a slight change in seasonal behavior over this timespan, which has likely contributed to the large F_m statistic of 3.6. From 1987 through 1990 the adjusted series shows a much smoother increase in seasonally adjusted expenditures, while the original series follows a stable seasonal pattern. In 1991 and 1992, however, the seasonally adjusted series levels off much as it did in the 1985–86 period. This leveling of expenditures may be a short-term change that reflects the repercussions of both the Gulf War and the 1990–91 recession.

The series for housefurnishings and operations, which consists of a number of consumer durable items, including furniture, textiles, and appliances, has two peaks, occurring in the second and fourth quarters. The second-quarter peak is less substantial, and is followed by a modest

third-quarter decline. The stronger fourth-quarter peak most likely reflects holiday purchases for both household improvements and gift giving. Because the series does contain many consumer durables, the decline in the adjusted series during the 1990–91 recession is quite evident.

The apparel and services series is a textbook example of seasonal behavior. The seasonally adjusted apparel series is by far the smoothest examined; it also has the largest F_s statistic, 1,839. The series rises moderately in the second and third quarter. However, the fourth-quarter surge in apparel expenditures dwarfs these moderate increases. It appears that the purchase of spring and summer fashions helps to increase expenditures from their first-quarter low, while late fall purchases and holiday gift giving substantially boost these expenditures in the fourth quarter. Note that fourth-quarter unadjusted expenditures are approximately 2 times the first-quarter expenditures.

The series for transportation expenditures and its two published components—gasoline and motor oil and other transportation expenses—are the most volatile of the 16 series examined. The seasonally adjusted gasoline and motor oil series, which accounts for about 20 percent of total transportation expenses, takes a rollercoaster-like appearance. There is a sharp decline in the adjusted series from the third quarter of 1985 to the fourth quarter of 1986. The series then begins to rebound through the fourth quarter of 1990, before falling off sharply through 1992. A number of events contributed to these underlying movements in the series, including the 1985–86 OPEC cartel disputes, the 1989 Exxon-Valdez oil spill, and the 1990–91 Gulf War. Even with these large movements in the original series, there remains an identifiable seasonal pattern. Apart from the sharp 1985–86 decline, the traditional pattern of high gasoline demand during the summer months and low demand during the winter months clearly emerges in the series. There are troughs in the first quarters and peaks in the third quarters of all other years. This seasonality is confirmed by a large F_s of 170.3.

The second transportation component—other transportation expenses—shows a rough seasonally adjusted estimate. The series itself is composed of vehicle purchases, finance charges, maintenance, insurance, rental and lease fees, and public transportation expenses. The observed roughness results predominately from the irregular purchasing behavior for vehicles. For this survey, vehicle purchases are approximately 40 percent, the largest share, of other transportation expenses. With the high outlays associated with vehicle purchases, the "other transportation expense" series can fluctuate as much as $1,100 between calendar quarters. The large quarterly deviations in vehicle purchases dominate the quarter-to-quarter changes, and render the other expense items of the parent series less significant in the seasonal analysis. Although the irregular component of the series is sizable, the seasonality is evident. Except for a few second-quarter peaks, expenditures are lowest in the first quarters and highest in the third quarters. The case for seasonal adjustment is accepted, with an F_s of 48.4.

Entertainment expenditures appear to have a relatively smooth increasing trend, with a moderate rise in expenditures in the second quarter and a substantial increase in the fourth quarter. The peak in the third quarter may reflect an increase in fees and admissions for springtime events, while the fourth-quarter peak reflects the many holiday purchases of toys and games. The series is seasonal, with an F_s equal to 207.4.

The all other expenses category does show a seasonal pattern, and the quality control statistics are well within the range to accept the seasonally adjusted series. However, the category includes expenditures for a hodgepodge of items, such as alcoholic beverages, tobacco, reading, education, and personal care products. Consequently, no substantial conclusion can be made about the seasonal pattern or its underlying trend. This quarterly series is not decomposed into more detailed expenditure categories, because no one category has a sufficient number of expenditure reports to ensure reliable estimates throughout the quarters.

FURTHER RESEARCH on the seasonality of CE Survey data would be fruitful. This would include more indepth intervention analysis of series that have distinct breaks in their patterns. Some series have recent changes in their patterns that are the result of survey changes. The seasonal pattern of these series will be known only after more data are made available, and an ongoing investigation thus is warranted.

Footnotes

[1] See Maureen Boyle, "BLS to publish quarterly data from Consumer Expenditure Survey," *Monthly Labor Review*, July 1988, pp. 27–31.

[2] The CE Survey consists of an interview component and a diary component. This article reports on the seasonality of quarterly data from the interview component alone. Data from the diary component are not published or processed on a quarterly basis, and seasonal analysis thus cannot be performed on these data. For a detailed description of the CE Survey, see *BLS Handbook of Methods*, Bulletin 2414 (Bureau of Labor Statistics, 1992), ch. 18.

[3] Stuart Scott and James Buszuwski, "Seasonal Pattern Assessment of Consumer Expenditures," Statistical Note no. 32 (Bureau of Labor Statistics, 1993).

[4] Food away from home is not shown as a separate series in the published quarterly reports, but examination of unpublished data revealed that this series drives the seasonal pattern of total food.

[5] The X-11ARIMA seasonal adjustment method is made available through the Time Series Research and Analysis Division of Statistics Canada, Ottawa, Canada.

[6] Readers interested in a more methodological description of the statistics should consult *The X-11ARIMA Seasonal Adjustment Method* (Statistics Canada, January 1983).

[7] For the X-11 procedure, several of the basic assumptions of the F-test are probably violated. Therefore, the value of the F-test used for rejecting the null hypothesis of no significant seasonality present is tested at the 1 per 1,000 probability level. See *The X-11ARIMA Seasonal Adjustment Method* for further details.

[8] Specifically,

$$M_7 = \sqrt{(7+3F_m)/2F_s}\,.$$

[9] These measures are shown as $R1$-mean square error and $R2$-mean square error in the X-11ARIMA output.

[10] In "Seasonal Pattern Assessment," Scott and Buszuwski used a sliding spans method with which to make their comparisons between direct and indirect estimation.

[11] The author thanks James Buszuwski for assisting with the intervention analysis.

[12] For a more detailed description of intervention analysis of Consumer Expenditure Survey data, see Scott and Buszuwski, "Seasonal Pattern Assessment."

[13] A collection quarter is the 3-month period for which respondents report their expenditures. For example, a respondent interviewed in January of the current year will report expenditures for the prior 3-month period: October, November, and December. This period, which coincidentally coincides with the previous year's fourth calendar quarter, is the respondent's collection quarter. In contrast, if a respondent is interviewed in February of the current year, his or her collection quarter is November and December of the previous year and January of the current year. Consequently, collection and calendar quarters do not necessarily coincide.

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