Seasonal employment falls over past three decades

Seasonal employment declined markedly from 1960 to 1990, a trend that was widespread throughout private industry and demographic groups; some of the reasons for a less seasonal workplace are changing technologies, employers' expanded use of part-time workers, and workers' growing preferences for year-round work

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Over the course of a year, employment levels undergo sharp fluctuations due to seasonal changes in weather, reduced or expanded production, harvests, major holidays, and the opening and closing of schools. These swings follow a more or less regular pattern each year. The purpose of most labor market analyses, however, is to identify the underlying trends in the data, apart from the normal seasonal movements. For this reason, employment data are *seasonally adjusted*, a process that smooths out the normal seasonal shifts that can obscure underlying economic trends.

Because of this focus on seasonally adjusted data, the seasonal nature of employment is sometimes forgotten. Yet, in some months, millions of jobs are filled or vacated in a pattern that is largely repeated each year. These movements are so fundamental to the normal operation of labor markets, and are so large, that any marked change in seasonal employment would represent an important labor market development. In this article, we show that there has in fact been a dramatic decline in seasonal employment over the last several decades.

This decline in the amount of seasonal employment is partly reflected in a trend toward year-round employment. In 1960, 60 percent of those who worked during the year worked at least 50 weeks. By 1990, the proportion of workers employed year round had risen to 69 percent. For many workers, fewer disruptions in employment translate into steadier incomes and greater security, as well as a better potential for advancement.

Women accounted for most of the rise in year-round work: the proportion of employed women who worked at least 50 weeks during the year rose from 47 percent in 1960 to 64 percent in 1990, with the increase occurring among both part- and full-time employees. There are two major interrelated reasons for this trend. First, since the early 1960's, birth rates have declined substantially, leading to more families with fewer or no children. In these families, mothers who prefer to be home with their small children during school vacations need do so for fewer years. Second, professional child care has become more available, allowing these same women to work during periods such as school vacations, when they formerly might have left the labor force.

For some of the same reasons, women have also entered the labor force at increasing rates. In 1960, 38 percent of women participated in the labor force. By 1990, the number had grown to 58 percent. Not only are more women working than ever before, but also, they are increasingly working year round.

The decline in the birth rate in the 1960's and 1970's has had yet other implications for the seasonal nature of employment. With the passing of

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time, this demographic trend has greatly reduced the proportion of the working-age population made up of youths in their teens and early twenties who, because of school commitments, are often available for work only at certain times of the year. Thus, even if the highly seasonal work patterns for these youths did not change at all, the fact that their proportion of the population and labor force is now much smaller than it was a couple of decades ago has also contributed to the overall decline in seasonal fluctuations in employment.

From an employer's point of view, there are a number of benefits to having a less seasonal work force. First, if, over time, workers have developed a preference for year-round work, then attracting employees to more seasonal jobs might become problematic. Also, the decreased turnover ensuing from more year-round work may reduce administrative expenses. And the reduced use of temporary layoffs during off-peak seasons can produce savings through fewer claims for unemployment compensation and correspondingly lower taxes. Productivity could also be expected to rise as fewer inexperienced workers are hired to replace those who inevitably are no longer available to rehire when business picks up.

Further, by smoothing out the seasonal fluctuations in production and employment, a firm can improve the utilization of its facilities (plant and equipment) and thus lower its costs of operation. Indeed, a trend toward more steady activity throughout the year has been visible in many industries and is discussed subsequently.

Falling seasonal employment swings and the trend toward more year-round work have probably reduced the amount of "frictional unemployment"—short-term unemployment involving people who are between jobs—although that effect may have been offset by other influences on unemployment. On the other hand, as we discuss later, declines in seasonal employment may be associated with decreased requirements for production workers, which could increase the level of structural unemployment as some seasonal workers are permanently displaced from their jobs. While it is impossible to measure the relative changes in these different types of unemployment (and their relationships to declining seasonal employment patterns), they illustrate the complex implications of changes in those patterns in the economy.

The fall in seasonal employment over the last 30 years has been large and broadly based. In 1960, the seasonal adjustment process—the statistical procedure used to smooth out seasonal fluctuations—raised or lowered actual private industry employment counts an average of 1.6 percent per month to adjust for seasonal fluctuations. By 1990, that correction had fallen to about 1.0 percent per month. When considered individually, each private industry division also showed declines in seasonality. Construction, the most seasonal industry, had the greatest influence on the overall decline, but nondurable goods manufacturing, services, retail trade, and wholesale trade also became substantially less seasonal.

How seasonality is quantified

A time series can be viewed as a combination of four components: a long-term trend, a cyclical movement, a seasonal movement, and an irregular movement (the last including unusual occurrences, as well as the normal variability inherent in sampling and nonsampling errors). By isolating the seasonal movement from the other time series components, the seasonal adjustment process creates seasonal factors that represent the amount of adjustment required to remove the normal seasonal swings from a series. These seasonal factors are then applied to the original data to produce a seasonally adjusted series.

This analysis of seasonal employment trends requires the calculation of *total seasonality* for various industry and demographic groups. As used in this article, total seasonality is the total amount by which the actual (unadjusted) estimates from a time series are either increased or decreased to filter out seasonal fluctuations for that series over the course of a year.

An *implicit seasonal factor* can be derived by dividing the unadjusted employment level for each month by the seasonally adjusted level. For example, if an industry's unadjusted employment level for a month was 10.0 million, and the seasonally adjusted employment level was 9.8 million, then the implicit seasonal factor would be 1.020 (10.0/9.8). This figure indicates that, because of seasonal events, employment for the month in question tended to be about 2 percent higher than it would be in an "average" month. The absolute value of the deviation from 1.0 of the implicit seasonal factor is calculated for each of the 12 calendar months in a given year, and the results are summed to create the total seasonality measure.

To test whether seasonal patterns have in fact been changing, a very rough estimate of these patterns was obtained by deriving annual estimates of total seasonality, as just described, for total nonagricultural employment from the Current Employment Statistics (CES) survey.[1] The results, presented in chart 1, show clearly that, from 1960 to the present, seasonal fluctuations have declined steadily (although at a slowing rate) and substantially. This finding provided sufficient evidence to warrant moving to the next step, the development of a more rigorous method for measuring aggregate seasonality.

For this analysis, total seasonality was measured as a weighted average of the seasonality in employment of the 10 major industry divisions (durable and nondurable goods manufacturing are treated as separate industries), using data from the CES. A similar exercise was performed using six age and sex groups from Current Population Survey (CPS)[2] data. The following description of our methodology focuses on the industry analysis.

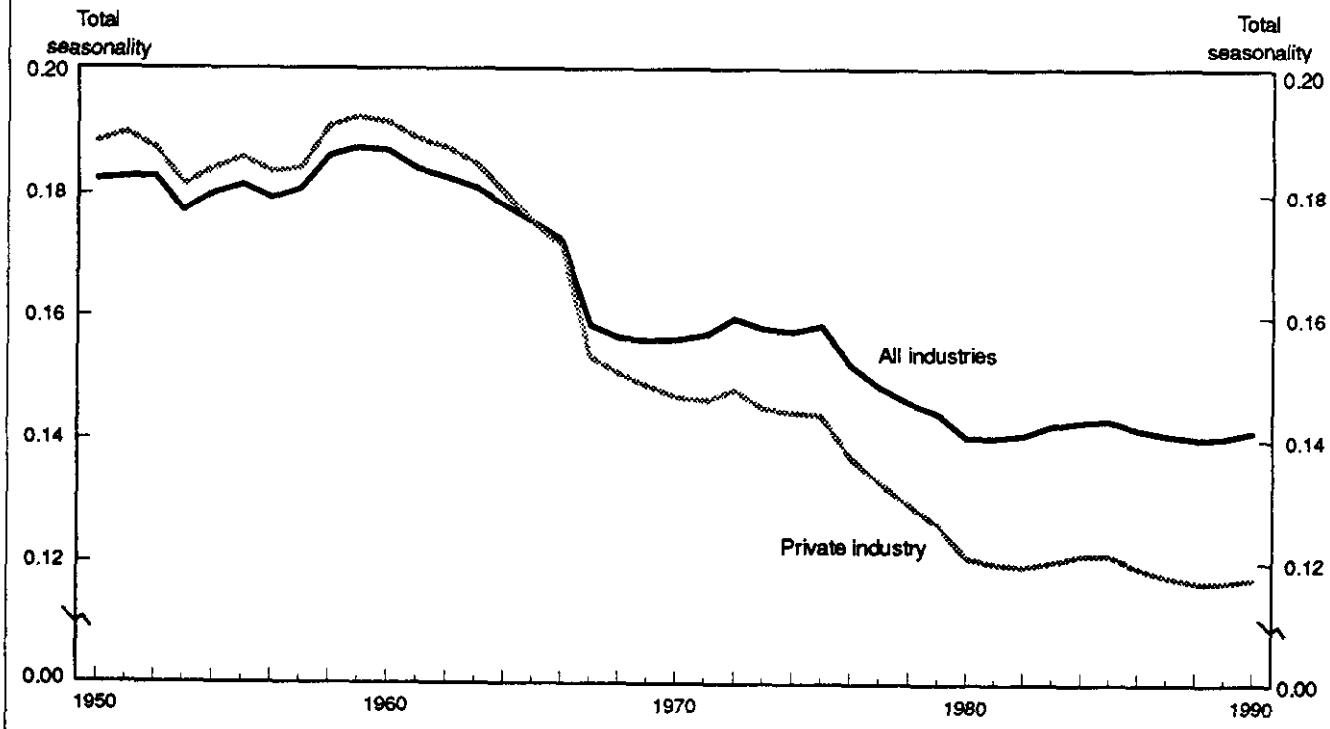
Our calculation of total seasonality in each of the 10 industries requires two inputs. First, for each year from 1939 to 1990[3]—a calculation of *total annual seasonality* was made. This figure is obtained by summing the absolute values of the differences of the 12 monthly implicit seasonal factors from 1.0. Thus, if seasonal adjustment "corrections" for an industry average 2 percent per month, then the total seasonality for that industry would be $.02 \times 12 = .24$.

Second, the calculation of total annual seasonality for each industry was multiplied by that industry's *employment share*. For example, if our hypothetical industry with total seasonality of .24 made up 10 percent of total employment, its contribution to the economywide seasonality calculation would be $.24 \times .10 = .024$. The separate calculations of each industry's total annual seasonality were summed across the 10 industry groups; the results are shown in the "all industries" curve in chart 1. Each industry, then, contributes to the total seasonality figure through its relative size (employment share) and month-to-month variation in seasonal employment.

These calculations indicated that aggregate seasonality had indeed begun a sustained decline around 1960.[4] Calculations of total annual seasonality for 1960 and 1990 are shown in table 1. As the table indicates, the total industry-weighted seasonal factor fell from 0.187 (an average of 1.6 percent per month) to 0.141 (an average of less than 1.2 percent per month), a decline in seasonality of 25 percent.

Note, however, that every one of the industries except government had lower total seasonality in 1990 than in 1960. Some experienced declines of as much as 50 percent in their average monthly seasonal employment swings. If the private sector is viewed separately, the total drop in seasonality from 1960 to 1990 was from 0.191 to 0.117, a drop of nearly 40 percent. (See table 2.) Moreover, we strongly suspect that the rising seasonality in government is an artifact of the way school personnel are treated in the CES survey, rather than a meaningful change in the nature of the industry. For that reason, we excluded government from our analysis and focused on the private economy.[5]

Chart 1. Change in total seasonality, 1950-90



NOTE: Total seasonality is the total amount by which the actual (unadjusted) estimates from a time series are either increased or decreased to filter out seasonal fluctuations for that series over the course of a year.

Table 1. **Total seasonality for all industries, 1960 and 1990**

Industry	1960			1990		
	Total annual seasonality	Employment share	Weighted seasonality[1]	Total annual seasonality	Employment share	Weighted seasonality[1]
Total aggregate seasonality	.....	.....	0.1870	.....	.....	0.1413
Mining	.1366	.0131	.0018	.1298	.0065	.0008
Construction	.9928	.0540	.0536	.6153	.0468	.0288
Durable goods manufacturing	.0774	.1741	.0135	.0542	.1014	.0055
Nondurable goods manufacturing	.1804	.1360	.0245	.0930	.0728	.0068
Transportation and public utilities	.1064	.0739	.0079	.0837	.0529	.0044
Wholesale trade	.1157	.0582	.0067	.0604	.0565	.0034
Retail trade	.2264	.1521	.0344	.1502	.1792	.0269
Finance, insurance, and real estate	.0792	.0485	.0038	.0740	.0613	.0045
Services	.1152	.1362	.0157	.0650	.2560	.0166
Government	.1628	.1538	.0250	.2605	.1667	.0434

[1]Total annual seasonality multiplied by employment share.

The use of the nine private industries in the calculation does not provide a perfect measure of the total amount of seasonality in the economy. The reason for this is that, within a major industry division, individual industries may have conflicting seasonal employment patterns that offset one another. For example, within retail trade, employment in restaurants tends to fall off a bit at the end of the year, at the same time that employment in department stores is typically surging. Thus, while they both are experiencing seasonal swings in employment (one positive, one negative), the level of seasonality obtained from their combined employment total would be less than the sum of the seasonality contributed by each of them individually.

Following this logic, then, we would obtain a larger (and better) measure of total seasonality the further we were able to disaggregate the economy into its component industries. In theory, total seasonal employment shifts would be best measured at the firm level; however, firm-level data are not available. Although seasonally adjusted data for more detailed industries are available or at least could be computed, we felt that, for a first examination of the issue, two-digit SIC level analysis would be useful in itself and would keep the data-processing requirements manageable.

Industry contribution to change

The aggregate decline in seasonality—that is, the change in the weighted average of the nine major industry groups—can be broken down further into three discrete components: a seasonal effect, an employment share effect, and an interaction effect. (See chart 2 for a graphical representation of these components.) The formula used to disaggregate the total change in seasonality into these separate factors, as well as a more detailed discussion, is given in the appendix.

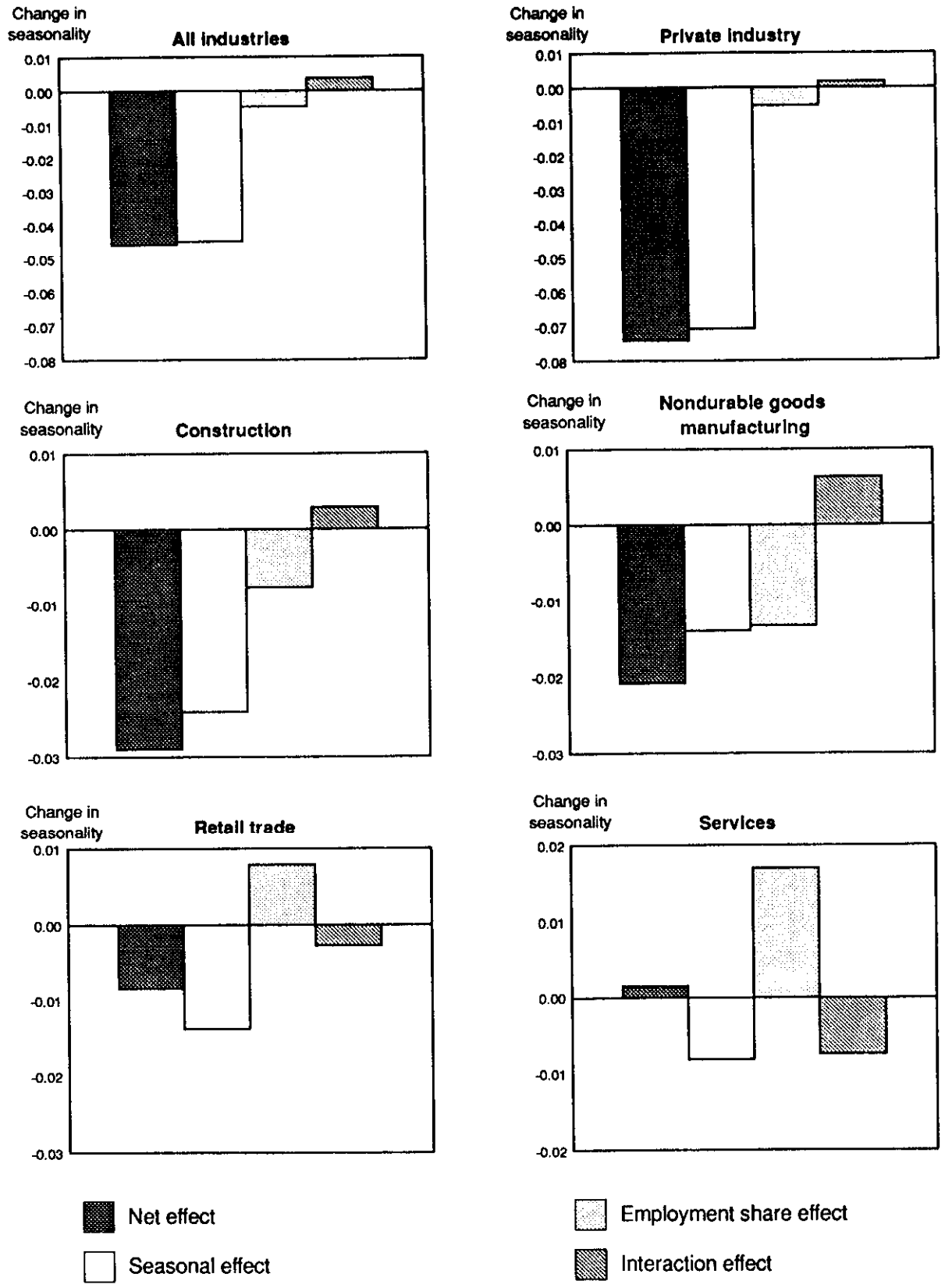
The *seasonal effect* for each industry shows the amount of the industry's contribution to changing seasonality in the aggregate economy that was due purely to changing seasonal employment patterns within the industry. That is, the seasonal effect holds employment share constant.

The *employment share effect* is just the opposite of the seasonal effect: it isolates the change in employment share, while seasonality is held constant. An industry's employment share effect is positive when the industry's relative employment share grows and negative when its relative employment share falls. Note that the employment share effects of the various industries will always offset each other to a large extent. This term is perhaps more interesting in the aggregate than it is for individual industries or divisions. As shown in table 3, the net employment share effect in the economy as a whole was –0.0049, which indicates that there was a small net shift in employment to industries that had relatively low levels of seasonality.

The *interaction effect* represents the results of shifts in employment among industries whose seasonality is rising or falling. In our analysis, its net effect is to increase slightly the level of seasonality in the economy.

Following is an examination of four industries that were important to the overall decline in seasonal employment: the construction, nondurable goods manufacturing, services, and retail trade industries. In addition, we analyze the breakdown of workers by full- and part-time status and provide further evidence of a less seasonal workplace. In a subsequent section, we examine the impact of changes among demographic groups, particularly women ages 25–54 years.

Chart 2. **Components of decline in seasonality, selected industries, 1960-90**



Construction. Although employing less than 6 percent of all private-sector workers in 1990, the construction industry accounted for nearly 30 percent of all seasonal swings in employment. During the 1980's, construction employment typically increased by 13 percent in the spring and declined by a similar amount in the fall and winter months. For this reason, changes in seasonal employment patterns within the construction industry affect the economy's total level of seasonal employment substantially. The level of seasonal activity in construction fell by nearly half from 1960 to 1990, making the industry the largest contributor to the decline in seasonal employment over the 30-year period.

At its peak in 1961, seasonal adjustment in the construction industry averaged 8.5 percent per month. This means that, on average, employment was adjusted either upward or downward by 8.5 percent each month to smooth out seasonal influences. (See chart 3, panel 1.) This factor dropped dramatically, to 6 percent per month, between 1960 and 1970, and declines continued for 20 additional years, albeit at the much slower pace of 8 percent per decade. In 1990, the construction industry was still the most prevalent seasonal employer, and monthly seasonal adjustments to employment remained slightly greater than 5 percent.[6]

A number of explanations have been advanced for declining seasonal employment in the construction industry. Technological improvements in materials may permit their use throughout more of the year. For example, concrete can now be poured in colder weather than it could be previously; thus, in some areas of the country, pouring concrete is no longer a seasonal, but a year-round, activity. Better utilization of existing technology—for example, the increased usage of clear plastic sheets to cover buildings—also extends construction activity, and thus employment, throughout more of the year.

Yet another factor that could explain the drop in seasonality in construction is the shift in employment in the industry from the colder north central and northeast regions to the warmer southern and western States: in 1960, employment was split evenly between the warmer and colder areas, but in 1990, 60 percent of all construction workers were employed in the south and west. This regional shift in employment should have reduced the aggregate level of seasonal employment. In fact, however, the effect was equal to only about 15 percent of the total decline in seasonality of the construction industry. Most of the decrease was caused by an actual drop in the amount of seasonal employment in the industry in all geographic regions.[7]

Nondurable goods manufacturing. There were fairly sharp drops in seasonality in this industry group overall (see chart 3, panel 2), as well as in all of the industries that make up the nondurable goods sector, except for petroleum refining and leather products. Owing to the highly diverse nature of the industries in the sector, however, it is difficult to generalize about specific causes of the declines, although there are undoubtedly some common factors. Advances in technology have led to efficiencies in a number of areas, allowing for more automation and less dependence on labor.[8]

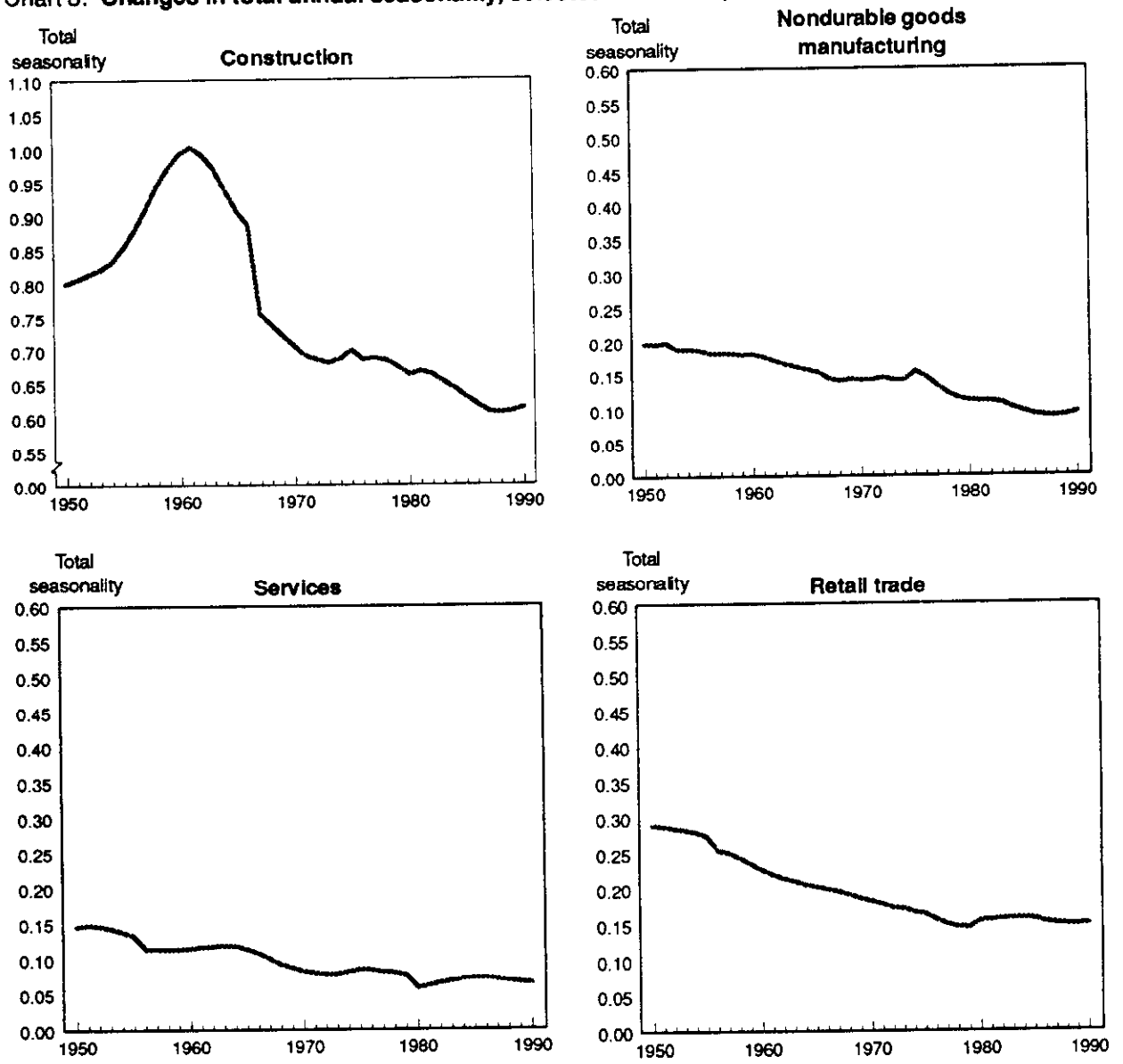
Due to both its relative size (nearly a quarter of the total employment in nondurables) and its disproportionate share of seasonal employment, food and kindred products was the driving force behind the decline in seasonality in nondurables. Largely because of the highly seasonal nature of the agricultural raw materials that go into food processing, 57 percent of seasonal employment in nondurables was concentrated in the food industry. The fall in seasonal employment in non-

Table 2. **Total seasonality for private industries, 1960 and 1990**

Industry	1960			1990		
	Total annual seasonality	Employment share	Weighted seasonality[1]	Total annual seasonality	Employment share	Weighted seasonality[1]
Total aggregate seasonality	.....	.....	0.1914	.....	.....	0.1174
Mining	.1366	.0155	.0021	.1298	.0078	.0010
Construction	.9928	.0638	.0634	.6153	.0561	.0345
Durable goods manufacturing	.0774	.2057	.0159	.0542	.1217	.0066
Nondurable goods manufacturing	.1804	.1607	.0290	.0930	.0873	.0081
Transportation and public utilities	.1064	.0874	.0093	.0837	.0635	.0053
Wholesale trade	.1157	.0688	.0080	.0604	.0678	.0041
Retail trade	.2264	.1798	.0407	.1502	.2151	.0323
Finance, insurance, and real estate	.0792	.0573	.0045	.0740	.0736	.0054
Services	.1152	.1610	.0185	.0650	.3072	.0200

[1]Total annual seasonality multiplied by employment share.

Chart 3. **Changes in total annual seasonality, selected industries, 1950-90**



NOTE: Total seasonality is the total amount by which the actual (unadjusted) estimates from a time series are either increased or decreased to filter out seasonal fluctuations for that series over the course of a year.

durables, therefore, was largely a function of the decline in this single industry. A combination of factors is responsible for falling seasonal employment in food processing. Increasing use of mechanical harvesting equipment is a major cause, as is automation of production facilities.[9] Also, according to experts in the industry, there has been a growing tendency to use imported agricultural raw materials, enabling production lines to continue to run, even when domestic raw materials are "out of season."

The apparel industry also showed a fairly large drop in seasonality. Average monthly seasonal employment in apparel in 1990 was less than half its 1960 level of 1.6 percent. While the effect of the drop on the total was not as dramatic as that of the food-processing industry, it was nevertheless significant.

Services. Employment in the services industry has exploded over the past three decades, from 14 percent of all nonfarm employees in 1960 to 26 percent in 1990. For that reason alone, the industry would have made up a growing share of the total seasonal employment swings. (See table 3.) Its influence was offset, however, because the rates of

seasonal in- and outflows have declined substantially over the period. The seasonal and interaction effects, each reflecting declining seasonality, nearly offset the employment share effect, resulting in a negligible overall influence on seasonality for the services industry.

For this analysis, however, the fact that the industry's average monthly seasonal adjustments were nearly cut in half between 1960 and 1990 is the most important point. (See chart 3, panel 3.) Looked at another way, had seasonality in the services industry not declined, overall seasonality in the workplace would have been considerably higher in 1990 than it actually was, all other things being equal.

Analyzing seasonal employment patterns in the services industry is complicated because, more than any other industry division, it is comprised of a diverse number of subindustries, each with its own seasonal characteristics. The components of the services industry range from beauty shops to legal services and from hotels and motels to colleges and universities. Some of these industries run counterseasonally to others, a phenomenon that is masked in the data for the broad industry category. For example, while hotels and motels typically hire extra employees in the summer to handle increased tourism, the tax preparation industry expands employment in the January-through-April tax-filing period and contracts in the summer. Hence, consolidating employment levels of the two industries results in estimates of seasonality that are much smaller than those suggested by an examination of the individual industries.

Disaggregation of the services industry to the two-digit SIC level does, however, reveal some interesting patterns of seasonal employment. The two-digit industries that seem to follow the pattern of seasonal employment during the year that is evidenced in the aggregate services industry are hotels and other lodging places, business services, health services, and legal services.[10] Educational services followed a completely opposite pattern of seasonal employment. Of all of these groups, hotels and health services experienced declining levels of seasonal employment, while seasonal employment in educational and legal services rose initially, but then fell back to its original level. The only group to experience an increase in seasonal employment was the business services industry, largely because of the growth in help supply services. This component, which more than tripled in size from 1982 to 1990, has expanded to meet the growing demand in many industries for temporary workers to satisfy peak seasonal labor requirements.

Because of these widely diverse seasonal patterns, it is not as useful analytically, as it is in the construction industry, to generalize about the causes of changing seasonality in services at the major industry level. We can still conclude, however, that the decline in the aggregate level of seasonal swings is in part attributable to the rapid decline in the seasonality of the services industry.

Table 3. **Components of change in weighted seasonality for private industries over the 1960–90 period**

Industry	Net change	Seasonal effect	Employment share effect	Interaction effect
Total	−0.0740	−0.0709	−0.0049	0.0018
Mining	−.0011	−.0001	−.0011	.0001
Construction	−.0288	−.0241	−.0076	.0029
Durable goods manufacturing	−.0093	−.0048	−.0065	.0019
Nondurable goods manufacturing	−.0209	−.0140	−.0132	.0064
Transportation and public utilities	−.0040	−.0020	−.0025	.0005
Wholesale trade	−.0039	−.0038	−.0001	.0001
Retail trade	−.0084	−.0137	.0080	−.0027
Finance, insurance, and real estate	.0009	−.0003	.0013	−.0001
Services	.0014	−.0081	.0168	−.0073

Retail trade. Monthly seasonal influences in the retail trade industry averaged nearly 2 percent in 1960 and were down to 1.2 percent in 1990. The rate at which seasonal levels declined was greatest in the 1950's (a decline of 21 percent for the decade) and reached its nadir in the 1980's (a decline of 10 percent during that decade). From 1960 to 1990, seasonal employment declined by a third. (See chart 3, panel 4.)

Typically, retail firms conduct a large portion of their business during the Christmas season, and their hiring patterns reflect this activity. Hiring occurs in the months preceding Christmas, primarily in October, November, and December. In January and February, as business falls sharply, employers trim payrolls. From March until June, payrolls grow again, but at a slow pace. From July through September, payrolls are fairly flat.

The magnitude of this seasonal employment change has declined. In the early 1950's, during the month of December, more than 9 percent of retail trade workers were employed on a seasonal basis, based on seasonal factors for that month. The rate of seasonal employment had fallen to 3 percent by the late 1980's. Historically, there has been seasonal employment growth in September and October, but in the late 1980's seasonal factors for these two months were less than half those of the late 1950's. Seasonal employment declines were also less prevalent for the January-through-March period during the late 1980's than in the period prior to 1960.

According to industry experts, automation has been a major factor in the decline in the level of seasonal employment in retail trade. Warehouse

operations have been streamlined by the expanded use of machinery, including mechanical lifts that help with loading and unloading and devices that track inventory. Deliveries are quicker for similar reasons, in particular due to the increased use of devices such as the conveyer belt. Making such activities less labor intensive reduces the need to expand employment to meet peak activity. Automation in other areas—for example, financial processing—has allowed firms to cut back on the number of employees hired to handle seasonal rush periods. Virtually all areas within the industry have cut back on their need for additional labor during the "busy season" by adopting some sort of labor-saving mechanism.

Perhaps also contributing to the decline in retail seasonal employment was the considerable increase in part-time employment. In 1968, the first year for which comparable data on such employment are available, 28.9 percent of all retail employees worked part time. By 1990, the figure had risen to 34.6 percent. This increase is partly a product of the dramatic change in store hours over the years. Once open only regular weekday hours, two weeknights, and Saturdays, many stores are now open six evenings a week and all weekend. This has created a greater need for part-time workers with flexible schedules to work the evening and weekend shifts. In addition, while it was once common for stores to hire teenagers during the summer to take the place of vacationing year-round workers, the greater reliance on year-round part-time workers (many of whom are themselves teens) afforded employers more flexibility and reduced the need for seasonal workers. As is discussed later, the hours of part-time, year-round workers can be adjusted to meet peak demand, reducing the need to adjust employment levels during especially busy periods.

The retail trade industry pays lower wages than most other industries, and benefits such as vacation leave, sick leave, insurance, and retirement plans can add significantly to employee costs. Employers can save on these costs by maintaining a larger part-time work force that receives fewer benefits. Administrative costs associated with hiring and dismissing seasonal workers can be avoided as well.

Demographic contribution to change

The same technique that was applied to industry employment was utilized to identify the demographic groups most closely associated with the decline in seasonality. We examined seasonal employment among six groups: men and women in each of three broad age groups. The results, shown in table 4, are derived from total employment estimates from the CPS.

The extent of seasonal flows into and out of employment fell for each of the six age and sex groups, but the most dramatic declines occurred among women ages 25 to 54. (See table 5.) Total annual seasonality for that group fell by nearly 60 percent. Interestingly, the seasonal factors for the group in 1990, summed across the 12 months, were virtually identical to those for men the same ages.

Total seasonality for young people did not decline so sharply. However, their flows into and out of employment (corresponding largely to the school calendar) are so sizable, that their relatively small declines in seasonality still had a substantial impact on the total decline.

The dramatic increase in labor market activity of women, particularly those with children, has revolutionized the workplace. Day care, flexible work schedules, and extended maternity leave are all in part attributable to the surge in the number of mothers in the workplace. (Women without children have always maintained relatively high levels of participation.) Leaving work in the summer months to care for their children hampered the career opportunities of many mothers, and, in order for them to be able to work while their young children were at home, support mechanisms needed to be put in place.

The expansion of such support mechanisms has enabled many women to work year round. Monthly seasonal adjustments to employment for women ages 25–54 averaged 1.5 percent in 1960; they have decreased steadily since then and, in 1990, averaged 0.7 percent. Roughly half of this decline occurred during the 1980's. Perhaps it is not just coincidence that the greatest declines in seasonal work among women occurred in a period when real earnings for men were either flat or declining. For many women, taking on a substantially greater responsibility for family earnings requires a "regular," year-round job.

Declining seasonality has both supply and demand components. As noted previously, from the demand side, the nature of many businesses has

Table 4. **Components of change in weighted seasonality by sex and age over the 1960–90 period**

Sex and age	Net change	Seasonal effect	Employment share effect	Interaction effect
Total	–0.0696	–0.0682	0.0058	–0.0073
Men:				
16–24	–.0239	–.0177	–.0080	.0018
25–54	–.0158	–.0114	–.0059	.0015
55 and over	–.0109	–.0064	–.0073	.0027
Women:				
16–24	–.0028	–.0090	.0082	–.0020
25–54	–.0140	–.0219	.0193	–.0114
55 and over	–.0021	–.0017	–.0005	.0001

Table 5. **Total seasonality by sex and age, 1960 and 1990**

Sex and age	1960			1990		
	Total annual seasonality	Employment share	Weighted seasonality[1]	Total annual seasonality	Employment share	Weighted seasonality[1]
Total aggregate seasonality	.....	.....	0.2279	.....	.....	0.1583
Men:						
16–24	.8696	.0929	.0808	.6792	.0836	.0568
25–54	.1014	.4484	.0455	.0758	.3907	.0296
55 and over	.1351	.1261	.0170	.0845	.0721	.0061
Women:						
16–24	.6012	.0629	.0378	.4573	.0765	.0350
25–54	.1749	.2124	.0372	.0717	.3229	.0232
55 and over	.1696	.0573	.0097	.1399	.0542	.0076

[1]Total annual seasonality multiplied by employment share.

changed such that employers have increased their preference for year-round workers. Similarly, the need and desire of many women for year-round work, and their growing availability for such employment, have served to reduce the seasonal labor supply.

Changes in hours

From 1960 to 1990, the proportion of employed persons who were working full time declined from 84.2 percent to 79.1 percent, while the percentage of those working part time increased from 15.8 percent to 20.9 percent. Similar to the trends in seasonality, the shifting pattern from full-time to part-time schedules took place largely in the earlier part of the period and may have contributed to the decline in seasonal employment, an issue already raised in discussing the retail trade industry. Because many part-time workers have some flexibility in the hours they are available to work, an expanded part-time work force may increase scheduling flexibility by reducing the amount of additional employment needed during periods of heavy seasonal activity.

The percentage of total hours worked by part-timers rose from 7.5 percent in 1960 to 11.2 percent in 1990. This development was attributable in part to an increase in the average part-time workweek, which grew from 19.0 hours to 21.0 hours.[11] As noted earlier, part-time workers may now be working more during periods of heavy seasonal activity to perform the work previously handled by seasonal help, but such a contention requires rigorous testing.

A DRAMATIC DECLINE in seasonal employment occurred during the post-World War II period. All industries (except, perhaps, government) contributed to this decline, which was most pronounced in the construction and nondurable goods manufacturing industries. Additionally, most demographic groups (particularly women ages 25 to 54 years) experienced falling levels of seasonal employment. Undoubtedly, declines in seasonality have had many root causes, including changing technologies that minimize seasonal labor requirements, greater use of year-round, part-time workers to meet seasonal requirements, and women's growing preference for year-round work, both as a prerequisite for higher earnings and for successful career advancement. A further factor was the shift of the population toward more temperate climates, which served to reduce employment swings in weather-sensitive industries.

While a workplace with dramatically smaller month-to-month employment swings clearly represents an important development, the change has occurred quietly to observers of labor market data. Perhaps this is because it has been largely invisible in the seasonally adjusted view of the world that analysts require to understand most other major labor market developments. Ironically, we depend on the seasonal adjustment process itself to improve our understanding of changes in the "real" labor markets. □

Footnotes

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[1] In 1992, this was a survey of approximately 370,000 nonfarm employers conducted by the Bureau of Labor Statistics in cooperation with the State Employment Security offices. In practice, total payroll employment derived from the CES is the sum of various independently adjusted industry employment series. Seasonal factors, then, are created for each component of the total, but not for the total itself. Typically, implicit seasonal factors derived from the aggregated series itself will understate the total amount of seasonal hiring and firing, because opposing seasonal patterns in the various industries may cancel each other out in the aggregate. For example, in the last 2 months of the year, when construction employment always declines, retail trade employment rises. Thus, these two components would offset each other in the aggregate. Despite this

limitation, the total employment series does exhibit large, predictable seasonal swings. Hence, we would expect any widespread changes in the magnitude of seasonal swings over time to be evident in the aggregate series.

[2] In 1992, this was a survey of roughly 60,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. The pattern of seasonality in CPS industry employment figures was also evaluated as a check on that obtained from the CES.

[3] Data for 1990 were the most recent available that had been adjusted to a benchmark (complete count) of total employment.

[4] Agricultural employment, which is highly seasonal, was not included for analysis in this study, because data pertaining to it are not collected in the CES. An analysis of agricultural employment data from the CPS revealed a substantial drop in seasonal employment in the industry, although it was not as large, in percentage terms, as the declines in some of the other industries.

[5] The rising levels of government seasonality over time can be traced primarily to local government education. CES estimates attempt to smooth out the effects of teachers leaving payrolls at the end of the school year and returning in the fall. However, other school personnel, such as cafeteria workers and many custodians, do leave and reenter payrolls; hence, the unadjusted CES employment estimates show seasonal employment swings. For our purposes, it appeared reasonable to view education employees as, in general, nonseasonal workers, however they are treated on employers' payrolls or in the CES estimating procedures.

[6] This seasonal hiring pattern is corroborated by data for private wage and salary construction workers, the corresponding industry group from the CPS: the level of seasonal hiring was much higher for these workers than for workers in other industries and dropped considerably during the 1960–90 period.

[7] The construction industry was analyzed using the same methodology that was used for the economy as a whole, except that employment share was determined by region rather than industry division. Regional employment was obtained by summing data from individual States. These series were then seasonally adjusted using an X–11 ARIMA procedure. While summed State data can differ from national totals, the figures on total employment obtained from the State data were in fact quite similar to those obtained from the national CES estimates for construction.

[8] This proposition is supported by a comparison of production workers to total employment in nondurables. In 1960, production workers accounted for 73 percent of employment in this division. By 1990, the number had fallen to 70 percent. In light of our finding that the levels of seasonal employment were nearly four times greater for production workers than for nonproduction workers in nondurables, this drop in the proportion of production workers would substantially reduce the industry's levels of seasonal employment.

[9] Many seasonal laborers employed in harvesting crops are employed by manufacturers in the food-processing industry. As a result, these workers would be classified as manufacturing, rather than agricultural, workers.

[10] Excluded from this list are those industries for which 30 years of historical seasonally adjusted data are not available and those that had small—500,000 or less—employment levels in 1990. Changes in their seasonality would have little impact on the total, even if such changes were relatively large.

[11] The average number of weekly hours worked by full-time workers remained steady over the 30-year period.

APPENDIX: Measuring seasonality and its components

The aggregate decline in seasonality from 1960 to 1990 is actually the difference of the weighted averages of the total seasonality in each of nine major industry groups for both years. Mathematically,

$$(1) \qquad \Delta WS^{60,90} = \sum_i (S_i^{90} \bullet E_i^{90}) - \sum_i (S_i^{60} \bullet E_i^{60}).$$

This expression can be simplified to

$$(2) \qquad \Delta WS^{60,90} = \sum_i [(S_i^{90} \bullet E_i^{90}) - (S_i^{60} \bullet E_i^{60})],$$

where WS is the total weighted seasonality in all industries,[1] S_i is equal to the total annual seasonality of industry i, calculated as the absolute difference of the monthly seasonal factors from 1.0, summed over the 12 months, and E_i is equal to the share of total employment for industry i. More simply, $\Delta WS^{60,90}$ represents the change in the extent to which unadjusted employment counts were "adjusted" in the seasonal adjustment process over the entire year.

The right-hand side of equation (2) can be expanded to give

$$(3) \quad \Delta WS^{60,90} = \sum_i [((S_i^{90} - S_i^{60}) \bullet E_i^{60}) + ((E_i^{90} - E_i^{60}) \bullet S_i^{60}) + ((S_i^{90} - S_i^{60}) \bullet (E_i^{90} - E_i^{60}))],$$

or

$$(4) \quad \Delta WS^{60,90} = \sum_i [(\Delta S_i^{60,90} \bullet E_i^{60}) + ((\Delta E_i^{60,90} \bullet S_i^{60}) + (\Delta S_i^{60,90} \bullet \Delta E_i^{60,90})].$$

Expanding our original equation in this way enables us to isolate three discrete components of each industry's contribution to falling seasonality: a seasonal effect, an employment share effect, and a residual, or interaction, effect.

The *seasonal effect* (s) for each industry is found by multiplying the change in the industry's seasonal factor by its base-year employment share; that is,

$$(5) \qquad s_i = \Delta S_i^{60,90} \bullet E_i^{60},$$

which is the first term on the right-hand side of equation (4).

The seasonal effect gives the amount of the industry's contribution to changing seasonality in the aggregate economy that was due purely to changing seasonal employment patterns within the industry. In

our analysis, every industry except government exhibited a negative seasonal effect.

The *employment share effect* (e) is just the opposite of the seasonal effect: it holds seasonality constant and isolates the effect of changing employment share. We have

$$(6) \qquad e_i = \Delta E_i^{60,90} \bullet S_i^{60},$$

which is the second term on the right-hand side of equation (4).

If an industry has *any seasonal employment activity at all*, the employment share effect will be positive if the industry's employment is growing relative to the total and negative if it is shrinking.

To illustrate the employment share effect, consider a hypothetical economy with only two industries. Suppose that in 1960, industry A employed 25 percent of all workers in the economy and had a total seasonality level of 0.1; therefore, seasonal employment in 1960 in industry A was equal to 2.5 percent (0.25 • 0.1) of total employment in the economy. Suppose next that by 1990, industry A increased its share of total employment to 50 percent. Because we are trying to measure only the effect of changing employment share, seasonality is held constant at 0.1. In 1990, then, seasonal employment in industry A was equal to 5 percent (0.5 • 0.1) of total employment in the economy. Accordingly, the amount of seasonal employment in the economy that is due solely to the increasing employment share in industry A has risen from 2.5 percent to 5 percent of total employment.

In table 3, the net employment share effect in the private economy is –0.0049, which indicates that there was a net shift in employment to industries that had relatively low levels of seasonality. This influence, however, accounts for less than 10 percent of the total decline in seasonality between 1960 and 1990.

The *interaction effect* (r) shows the result of the interaction between changing seasonality and changing employment share. It describes the shifts in employment into or out of industries with increasing or decreasing rates of seasonality and is given by the final term on the right-hand side of equation (4); that is,

$$(7) \qquad r_i = \Delta S_i^{60,90} \bullet \Delta E_i^{60,90}$$

This term is distinct from the employment share effect, which deals with shifts among industries where seasonality is held static. One way to consider the interaction effect is to think about it in terms of its two components: changing employment share and changing seasonality. The services industry provides a good example. That industry experienced a sizable decline in seasonal employment, coupled with a very strong rise in employment share, resulting in a strongly negative interaction effect. Because seasonality fell in an industry that increased its share of total employment, the interaction effect component of this industry's net contribution to the total change in seasonality from 1960 to 1990 was also negative.

It is interesting to note that although an industry may experience a decline in seasonality, its net contribution to changing seasonality in the economy may be negligible or even positive. Again, the services industry is a good example. This industry had a drop in seasonality of 0.0502 between 1960 and 1990. Its net contribution to the total decline, however, was 0.0014, a positive (though small) figure. This was because its negative seasonal and interaction effects were offset by a large positive employment share effect. In other words, even though the rate of seasonal employment swings in services declined by nearly half (from 0.1152 to 0.0650), by growing so rapidly, the industry actually increased the amount of seasonal activity in the economy.

Footnote to the appendix

[1] The term "industry" is used here primarily for convenience, as the primary focus of this paper is on industry divisions. The same procedures and notation are used if the aggregate is broken down by geographic region, demographic