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Volume Author/Editor: Ruth P. Mack

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Chapter Author: Ruth P. Mack

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APPENDIX A

DESCRIPTION OF METHOD

A. Preliminary Processing

1. SEASONAL FLUCTUATIONS

All time series have been examined for the presence of seasonal patterns; whenever such patterns were evident, they were removed before study of cyclical or subcyclical fluctuation was undertaken. Brief notes on the methods used are given below. For a fuller description and discussion of the various methods used by the National Bureau to eliminate seasonal variation in monthly data, see Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, National Bureau of Economic Research, 1947, Chapter 3, sec. 10 and Appendix.

With one or two exceptions, noted in the description of each series, one of two methods is used—"standard" or "moving" seasonal adjustments. Typically, the first step for both methods is to express the data as ratios to a centered twelve-month moving average, the last step is to divide the original data by the appropriate seasonal index. The intermediate steps may differ.

a. Standard Adjustment. The ratios and the original data are studied to determine the stretch of years for which seasonal patterns appear not to have changed materially. The ratios for each month in turn are then averaged for the selected periods—usually not more than three for the interwar years. (An exception to this procedure was made in a few cases where the data exhibited a clear-cut, fairly constant seasonal pattern over a large number of years; in this case averages were struck for the original figures rather than for the ratios and they were adjusted for trend; see Burns and Mitchell, *op. cit.*, p. 46, Method 1.) The indexes for the calendar year are adjusted to sum to 1,200.

b. Moving Seasonal Adjustment. These are used where the series showed a seasonal pattern that did not appear stable for a discernible period of time. For each month in turn, changes that seem to occur in the ratios over the years were indicated by a free-hand curve. The seasonal indexes as read from the curves for all twelve months for each calendar year were adjusted to sum to 1,200.

In the course of this study, exploration of evidence of shifting market prospects has raised the question of whether we have not in fact removed, in the course of a moving seasonal adjustment, factors of a subcyclical

nature (see Chapter 9, Tables 36 and 40 and related discussion). But at the stage of the study at which these discoveries were made it was no longer possible to consider changing seasonal corrections.

2. MONTHLY FIRST DIFFERENCES

Change from month to month in the standing of many activities has been calculated. This has been done uniformly for data on stocks. Month-to-month change in stocks is termed inventory investment; these series are in physical terms and do not involve investment in the monetary sense.

For the most part, month-to-month change has been calculated from seasonally corrected data; and no further seasonal corrections have been made except in a few instances. For this reason, as well as for others, the figures tend to have a heavy saw-tooth pattern. Consequently they have typically been smoothed by a centered five-month moving average. The smoothed series is ordinarily the basic data in which turns have been marked and for which calculations have been made.

3. CHARTING

All time series are first charted on a uniform arithmetic time scale of sufficient size (a year covers about one and three-eighths inches) for monthly movements to be clearly visible. The vertical scale is logarithmic with one cycle occupying ten inches. The figures are first charted without the correction for seasonal variation; indeed, inspection of these charts is a necessary step in making the correction. After the seasonal patterns have been removed, these figures are plotted though the original ones, and the seasonal index or indexes are also shown.

First-difference series are plotted on the same horizontal scale but with an arithmetic vertical scale. Both the month-to-month and centered five-month averages are ordinarily drawn.

These charts are probably the single most important tool of investigation that has been utilized.

B. Identifying Fluctuations

4. SPECIFIC CYCLES

After the removal of seasonal patterns, each time series has been examined for the presence of specific cycles. These fluctuations have been defined by Arthur Burns and Wesley Mitchell as ". . . wave-like movements, the duration of which is of the same order as that of business cycles" (Burns and Mitchell, *op. cit.*, p. 24). Peaks and troughs in these cycles have been marked for all time series by the National Bureau staff (not specifically for this study). A full discussion of the working methods of identifying specific cycles is given in Burns and Mitchell (*op. cit.*, Chapter 4, sec. I).

5. SPECIFIC SUBCYCLES

After seasonal patterns are removed, each time series is also examined for the presence of specific subcycles. These movements are too slight to fall within "the lower limit of the range of amplitude of all fluctuations that we class confidently as specific cycles," or too short to be considered "of the same order of duration as business cycles" (Burns and Mitchell, *op. cit.*, pp. 58 and 57), yet too long or too steep to be judged a run of random movements. Occasionally, these movements are characterized by merely a retardation of the predominant movement instead of by a rise or fall. To warrant inclusion as a subcycle, such retardation must consist of a virtually horizontal area on a rising or falling bank rather than of a mere lessening of the rate of rise or fall. Fluctuations that are primarily the result of a few very high or low months are excluded, since only movements showing a fairly persistent upward or downward progression (or a leveling of a previous movement) or a clear difference in level for several months in the neighborhood of peaks and troughs were marked. No subcycles were included whose peaks were less than five months from the previous or following peak and the same for troughs. After these specific subcycles are identified, peaks or troughs are marked according to the same principles as those used in dating specific cycles. *The peaks and troughs marked as specific-cycle turning points and those marked as the turning points of minor waves together constitute the specific-subcycle turns for the activity in question.*

C. Reference Chronology

6. GENERAL

In order to compare the typical behavior of an individual activity with that of another or to judge the impact of activities on the industry or on economic activity as a whole, it is convenient to use a formalized frame of reference that specifies the dates when fluctuations in the economy at large or in the industry sequence have occurred. Three such chronologies are used: business cycles, SLH cycles (cycles in the shoe, leather, hide industry), and SLH subcycles.

7. BUSINESS CYCLES

These consist of ". . . expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more

than one year to ten or twelve years . . ." (Burns and Mitchell, *op. cit.*, p. 3). Trough and peak months have been selected after study of specific cycles in many sorts of activities and recourse to descriptive evidence of business annals (see W. C. Thorp, *Business Annals*, National Bureau of Economic Research, 1926). A full discussion of the working methods of identifying business cycles is given by Burns and Mitchell (*op. cit.*, Chapter 4, sec. IV).

8. SLH SUBCYCLES

Fluctuations of the sort designated as specific subcycles occurred in many activities in the shoe, leather, hide sequence at about the same time. In the SLH-subcycle chronology we endeavor to determine the months when peaks and troughs in these fluctuations tend to occur. Twenty-eight turns were selected for the interwar period. These constitute the SLH-subcycle chronology. For a discussion of how the selections were made and the rationale of the procedure, see Chapter 4, pp. 34–37. Table 8 gives the peak and trough dates.

9. SLH CYCLES

Many of the activities in the shoe, leather, hide sequence show specific cycles about the same time that they occur in general business. (An exception is the 1926–1927 recession.) The months when these major turns tend to occur had been incorporated in the SLH-subcycle chronology. However, in many contexts it is useful to separate the major from minor subcycle reference turns. The major ones are designated as SLH-cycle dates; they constitute the SLH-cycle chronology. In Chapter 4, Table 9, the dates are given and compared with those of business cycles. SLH cycles are bounded by their SLH-cycle turning points, ignoring such minor turning points as may intervene.

D. Timing

10. SELECTING RELATED (MATCHED) TURNS

a. General. In order to determine whether a given activity tends to lead, lag, or synchronize with some other activity or with general business or industry affairs as a whole, a set of rules are followed for selecting "related" turns in the two sets of data. Ordinarily, selection is made among like turns—peaks are compared with peaks and troughs with troughs. But sometimes, both logic and the behavior of the data suggest that a given activity tends characteristically to rise when others fall and vice versa; in such case the analysis is made on *an inverted basis*—peaks are matched with troughs and vice versa.

It may be desirable to compare turns in a given activity with those of a reference chronology or with those of some other selected activity. Depending on the context, it may be desirable to make comparison between cycle turns, subcycle turns, or crossed comparisons. The following sections indicate the common and special procedures that are followed in dealing with these general problems.

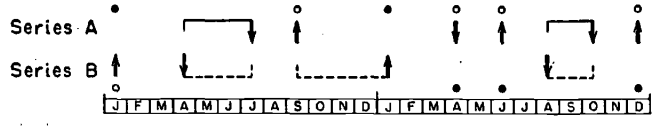
b. Standard Rules. In order for a specific turn (S) to be considered related to a like reference turn (R), three criteria must be met: "(1) there is no other reference turn in the interval between S and R (including the month of S)"; "(2) there is no other specific-cycle turn in the interval between S and R (including the month of R)" (Burns and Mitchell, *op. cit.*, p. 118); and (3) there is no other like specific-cycle turn in the interval between R (including the month of R) and the following reference turn. If criterion (3) is not met, that is, a given reference turn is surrounded by two specific turns both of which meet criterion (1) but only one of which, because of the intervening opposite specific turn, can meet criterion (2), neither competing turn is related unless the one that meets both criteria is no more than a specified number of months distant from the reference turn. When business cycles or SLH cycles provide the reference frame, the specified number of months is three. When SLH subcycles provide the frame the specified number of months is two. In matching specific subcycles to the SLH-subcycle chronology no distinction is made between major (cycle) or minor (subcycle) peaks and troughs; the timing rules are applied as if only one sort of turn had been noted. Thus an SLH-cycle peak may be matched with either a major or minor specific peak and likewise for a minor reference peak.

c. Relaxed Rules. In the case of a series that conforms well to the reference frame, one of two competing turns (see sec. 10b) may be considered related to the reference turn. This is done when one of the two specific turns seems distinctly stronger than the other and, in view of the characteristic timing of the series, the more likely to be the event associated with the event recorded in the reference frame. To arrive at this judgment the amplitude and shape of the competing movements are examined, and use is made of any descriptive information concerning the competing fluctuations (see Burns and Mitchell, *op. cit.*, pp. 120–123 for a full discussion and illustration of relaxed rules for matching cyclical turns). There is no difference between the methods used in dealing with cycles or subcycles. We have, however, been very wary of relaxing rules for subcyclical comparisons.

d. Relating Specific-Subcycle Turns in Two Activities. As indicated (sec. 10a), it is sometimes useful to compare a specific activity with some other specific

activity rather than with a reference chronology. In doing this, we arbitrarily select one as the reference frame and follow identical procedures to those described in sections 10b and 10c. Which series is used as reference depends on the history of the investigation —the series selected happens to be the one for which a number of timing comparisons with other activities is being made at the moment. It should be noted, however, that the technique of relating turns does not give identical answers, with signs reversed, irrespective of how the reference and specific roles are assigned. However, the difference is without economic meaning. Furthermore, it is typically quantitatively insignificant. Consequently, I have not bothered to recalculate computations when the original context in which they were made called for one series and a context in which they were finally used called for another series to provide the reference frame. Ideally, a new set of rules should have been derived that yielded symmetrical answers; this, however, we have not done.

The following example will serve to illustrate the problem. In the diagram (a reproduction of a fragment of one of our worksheets) arrows indicate peaks and troughs in two activities, A and B. When A is matched with B as reference, related turns are shown with solid lines linking the specific to the reference turn; when the roles are reversed (B matched to A) dotted lines are used; circles show unrelated specific turns and dots unmatched reference turns.



The last turn in A and the first turn in B are unrelated because of the initial and terminal dates of the data. But aside from this, we see that the second turn in A is related to the third one in B when A is the reference series. But when B is the reference, the second and fourth turns in A compete: both the second and fourth meets criterion (1) though only the second meets criterion (2) (see sec. 10b); under the standard rules, neither is deemed related, since the turn in question is more than two months (subcyclical comparisons) before the reference turn and no strong reason for relaxing rules is present. In consequence, the timing of A with respect to B is somewhat different (after allowing for the opposite sign) depending on whether comparisons are made with A or with B providing the reference frame.

e. Relating Specific-Cycle Turns in Two Activities. It has been found useful to make these comparisons not for all specific-cycle turns but only for those related to the SLH-*cycle* chronology. The procedure is identical to the one described in section 10d with two exceptions: (1) only specific-*cycle* (not -subcycle) turns are considered; and (2) for the series used as the reference frame, only those cycle turns are used that are deemed related to the reference chronology; in selecting these related turns, rules are relaxed much more readily than would ordinarily be the case. Cycle turns in the other series are matched in the usual way with these *major cycle specific turns* in the reference series.

11. SUMMARY MEASURES OF TIMING

a. General. The central tendency for leads (—), lags (+), or synchronous (0) timing to dominate related turns has been expressed in many ways. Most measures that I have used are self-explanatory:

1. A simple count of the number of leading, synchronous, and lagging turns
2. A tally of the number of turns synchronizing, or leading or lagging by a specified number of months
3. Average timing for all turns (this is an arithmetic mean—lags plus leads divided by the number of related turns)
4. Positional mean timing for all turns (a simple arithmetic average of the timing for the central three or four turns when all are arrayed from longest lead to longest lag)
5. Average deviation from the mean (I state it in units of months, not as a percentage of the mean)

b. Timing for Peaks and Troughs. Average timing is always calculated separately for peaks and troughs. Only by chance are the figures identical, and it is necessary to determine whether the differences are meaningful. Several techniques have been used to aid in this judgment:

(1) Inspection of leads and lags at individual turns to determine whether the averages are influenced by a few exceptional figures.

(2) A more accurate answer to the same question can be obtained by calculating the average deviation from the mean separately for peaks and troughs, striking a weighted average of the two figures and seeing whether it is significantly smaller than the average deviation for all turns.

(3) Comparison of the number of leading, synchronous, and lagging turns for peaks and for troughs. The usefulness of this measure is limited by the fact that it depends on how nearly synchronous is the average timing.

(4) A more general answer to the question posed in (3) is obtained by means of a *consistency index.* This is a measure of the extent to which the difference in timing at individual peaks and troughs conforms with

the difference between average peak and average trough timing. From the timing at each related peak is subtracted the timing at first the preceding, then the following related trough. For each comparison the timing is "consistent" if the sign of the difference is the same as the sign of the difference between average peak and average trough timing. A consistent sign receives a score of +100, an inconsistent sign is rated —100, and, if the timing is identical, the score is zero. The scores are summed algebraically and divided by the number of comparisons that were made. On the basis of experience with the figures, and comparison with other methods of evaluation outlined in this section, we read an index of less than +30 as suggesting that the difference in peak and trough timing may typically be ignored.

E. Conformity

12. GENERAL

The question in all measures of conformity is the extent to which expansion and contraction phases of fluctuations occur concurrently (or concurrently after allowing for a tendency to lead or lag). The question is thus more limited than that comprehended in correlation techniques; it measures defined ups and downs, not all ups and downs or their extent.

Comparisons may be between an activity and a reference chronology or between two activities. Comparisons are typically made among expansion phases and among contraction phases; but when logic and observation indicate that a given activity typically rises when others fall, expansion in this activity is matched with contraction in others ("inverted" comparisons).

Many of the measures that are used primarily in other contexts actually measure conformity. This is true of the percentage of turns that are matched, the number of specific turns unrelated to a reference frame, or the number of reference turns unmatched with a specific series. Average deviation from mean timing, taken in conjunction with the number of matched turns, is a good measure of conformity. However, our main reliance in judging conformity has been placed on two measures described in sections 13 and 14 below.

13. INDEX OF CONFORMITY

Indexes were computed for the conformity of all activities to the SLH-subcycle chronology. The procedure follows the standard cyclical conformity measures used by the National Bureau and fully described by Burns and Mitchell (*op. cit.*, Chapter 5, pp. 179–182).

Briefly, the index measures the tendency of an activity to have a higher standing at reference peaks than at reference troughs (or vice versa in the case of "inverted" series). The standing of a given activity is computed at the date of each reference turn as the sum of its standing on the month of turn and the preceding and following month. (For first difference series, the standing is a five-month total centered at the month of turn.) From these standings conformity indexes may be computed with or without adjustment for timing and trend. Except in a very few cases, we have used the adjusted measures and do so wherever it is not otherwise indicated, but a description of the adjusted index is facilitated by a prior description of the unadjusted one. The standing at each peak is compared with the previous and following troughs; a conforming expansion is credited when the standing at peak is higher than at the previous trough, and a conforming contraction is credited when the standing at peak is higher than in the following trough. Each conforming phase is rated +100, each nonconforming phase —100, and no difference between peak and trough standings is rated zero. All ratings for expansion are summed and similarly for contractions. The general conformity measure that I have used is a simple arithmetic average for all phases.

The *adjusted conformity measures* allow first for a typical lead or lag of the specific series relative to the reference chronology. Using average timing as a guide, the reference frame is shifted forward or back before computing the standings. The size of the shift is selected so as to maximize conformity without materially reducing reference amplitude (see sec. 15 below). The adjusted measures allow, in the second place, for the underlying slope of the series in the neighborhood of each particular phase. When the method is applied to *cycles* the underlying slope is chiefly that of a unidirectional time trend. But when it is applied to subcycles, the slope may also be that of the cyclical bank on which the minor phase occurs. The "trend-adjusted" conformity is obtained by comparing monthly rates of change. The standing at each trough is subtracted from that of the following peak (and each peak standing from that of the following trough) and divided by the number of months in the expansion (or contraction) phase covered. The monthly rate of change during each contraction is compared with that of the previous and following expansion. For each comparison, a conforming movement is one in which the series in contraction falls more or rises less than in expansion. Scores are assigned and averaged, as explained previously, to yield the trend adjusted conformity index. The measure is similar to the "index of conformity to reference cycles, both ways" (trough to trough and peak to peak), Burns and Mitchell, *op. cit.* Table 42, p. 177.

14. PERCENTAGE OF MONTHS IN UNLIKE PHASE

This measure is typically computed between subcycles in a given activity and the SLH-subcycle chronology, or between two activities. I describe the former. A tally of months is made during which a reference expansion was in process and the specific activity failed likewise to be in an expansion phase, similarly for the following contraction, and again for the following expansion, until all months covered by the data have been included. The total number of months in unlike phase is divided by the number of months covered. When a series shows a tendency to lead or lag the reference frame, comparisons are made with the frame shifted forward or backward by the number of months that will minimize the percentage of months in unlike phase.

Identical calculations are made between any two activities using either one as surrogate for the reference chronology. It is immaterial which is used as reference since (unlike the timing measures) the procedure is perfectly symmetrical.

Percentages in the neighborhood of 50 or greater mean, of course, that no correspondence between fluctuations is present. It is less simple to decide at what figure correspondence is notable. The reader has probably found to his horror that I have paid some attention to figures ranging between 16 and 31 per cent. No single percentage figure, of course, represents a given degree of significance. The shorter the fluctuations, the more notable is a given figure. Furthermore, in comparing two activities to impute causal impact, the less well each conforms to industry affairs as a whole, the more likely it is that such temporal association as appears in the figures is due to direct influences rather than to the roundabout influence of factors influencing the industry as a whole. But to complicate matters further, though this may be the case it does not have to be. In view of these complications, I have not tried to set up any standards, but have used the measures in what has seemed to me to be a sensible way in each context and always (whether or not specifically stated) as merely one of the factors on which judgment rests.

F. Amplitude

15. REFERENCE AMPLITUDE

This measures the extent of the rise and fall of the specific activity that takes place during periods delineated by the reference chronology. It is calculated for subcycle and cycle reference chronologies. The standing of the series at reference peaks and troughs is determined as a centered three-month total. Rises during reference expansions are added to falls during contractions (falls during expansion and rises during contraction subtracted) to obtain the aggregate absolute amplitude. Relative amplitude is obtained by expressing this figure as a percentage of the average monthly value (multiplied by three) of the series between the first and last specific-subcycle turns marked in the series. (For first difference series, the five-point standings are used. The base figure is the average value, multiplied by five, of an appropriate series with which the amplitude of the first difference series may be compared.) Amplitude is ordinarily recorded on a per month basis (by dividing the aggregate relative amplitude by the number of months covered) or on a per phase basis (by dividing the aggregate by the number of phases included).

If the series typically leads or lags the reference frame, account is taken of the difference in timing by setting the reference frame forward or back the indicated number of months before computing the standings.

The calculation of reference amplitude parallels the procedure described by Burns and Mitchell (*op. cit.*, p. 174). But in order to facilitate comparisons between cyclical and subcyclical amplitudes, we have expressed rises and falls during each cycle or subcycle as a percentage of the average value of the data over the entire series, rather than, in accordance with the usual National Bureau method, of the average value over each cycle.

16. SPECIFIC-SUBCYCLE AMPLITUDE

This measures the rise and fall in the activity during the specific subcycles marked in the activity. The standing at each specific turn is calculated as a weighted three-point sum of the month of turn, the month preceding, and the month following; with the month of turn receiving double weight. A two-point standing, each month receiving double weight, is used if the length of a specific phase is shorter than three months. Very occasionally two months are also used where an eligible, extremely low month would cause a peak standing to be substantially lower than that of several neighboring months and analogously for troughs. From each peak is subtracted the standing at the preceding and following trough. The total rise during expansions is added to falls during contractions and expressed as a percentage of the per month average value, multiplied by four, of the series calculated for the period between the dates of the initial and terminal specific-subcycle turns marked. (For first difference series, for which a centered five-month total is used, the base figure is the average value, multiplied by five, of an appropriate series with which the ampli-

tude of the first difference series may be compared.) Aggregate amplitude is divided by the number of months between the first and last specific turns to give per month amplitude and by the number of phases to obtain per phase amplitude.

The calculation of specific-subcycle amplitude parallels the procedures for calculating specific-cycle amplitude described by Burns and Mitchell (*op. cit.*, Chapter 5, sec. IV). Two major differences are first that our amplitude calculations are expressed as relatives of the average standing of the whole series rather than of each cycle (see comment at end of section 15) and second that we used a weighted three-month rather than simple three-month total to express the peak and trough standing. We chose to put this additional weight on the month of turn because of the brevity of many of the fluctuations and to minimize the number of instances in which it would be necessary to depart from standard practice and base the standings at turns on figures for one or two months.

G. Patterns of Fluctuation

17. NINE-POINT REFERENCE PATTERNS

These provide a technique for describing the typical behavior of a series during the cycles or subcycles delineated by a reference chronology. In calculating the SLH-cycle and SLH-subcycle reference-patterns, I have used methods identical to those used to compute business-cycle patterns. They are described and evaluated by Burns and Mitchell (*op. cit.*, Chapter 5, sec. VII; Chapter 7, sec. V; Chapter 8, sec. VII).

Briefly, the procedure is as follows: Each SLH reference cycle (subcycle) is broken up into nine stages. "Stage I covers the three-months centered on the initial trough, stage V covers the three months centered on the peak, and stage IX the three months centered on the terminal trough. Stages II to IV cover successive thirds of the length of the expansion, and stages VI to VIII cover successive thirds of the contraction" (Burns and Mitchell, *op. cit.*, p. 29). The standing during the months covered by each stage within each reference cycle (subcycle) is calculated and expressed as a ratio of the average value for the cycle (subcycle)—the initial and terminal troughs of each cycle (subcycle) are included with a weight of one-half. To obtain the *average* pattern during reference cycles (subcycles), the standings are averaged for each stage for all cycles (subcycles). From the nine-point patterns, the rate of change from stage to stage may be computed. The average change per month, in reference-cycle relatives, from stage to stage within each cycle (subcycle) is averaged for each stage for all cycles (subcycles).

18. NINE-POINT SPECIFIC PATTERNS

Average specific patterns are computed in a manner exactly analogous to that for reference patterns, except that specific rather than reference cycles (subcycles) are divided into nine stages and provide the base for the cycle relatives (see Burns and Mitchell, *op. cit.*, Chapter 5, sec. VI).

H. General Correlation

19. INSPECTION OF TIME SERIES

By far the most important technique used in this study was simply a careful examination of the course of each time series and its relation to that of others. Since all data are plotted on the same time scale (see section 3 above) and in ample proportions, visual comparisons can be easily made. When desirable, charts can be superimposed and transilluminated for more precise comparison. The eye makes a preliminary study of both conformity and amplitude. In addition, distinctions with respect to similarities and differences can be made for various periods covered by the data. All of the methods described in this appendix may properly be considered tools for extending and checking the basic tool of inspection of charted data.

20. OTHER CORRELATION TECHNIQUES

The correspondence among data with respect to both the incidence and extent of fluctuation has been studied by a variety of more or less standard methods that are explained, where necessary, in the text. They include the ranking of one or more sets of data and, on occasion, their correlation. For series that share a large number of fluctuations, I have made rank tabulations of matched phase-by-phase amplitude measures and correlated these. In some of the preliminary work, matched peak and trough standings have themselves been correlated for two or more series; this introduces some flexibility in timing associations and reduces the number of observations without the blurring that the use of annual data implies. On the few occasions where the question could be made sufficiently precise and the data permitted, multiple correlation of monthly data was undertaken.

I. Errata

21. In the preparation of the final charts, a few errors were uncovered. Their correction, since they could be made only in galley proof, would have been costly and would have exposed the manuscript to the risk of the further error typically involved in piecemeal

corrections. Accordingly, where the changes were so small as to be immaterial to the detailed argument, they were not entered. I list them herewith:

Tanners' margin over hide cost for sole leather (18), with hide cost taken two months previous, trough in October 1925 changed to September 1925

Cattle-hide prices (22 and 23), peak in June 1929 changed to July 1929. Hide price ratio (25): country to Frigorifico, trough in February 1934 and peak in April 1934 deleted

Shoe production for domestic consumption (40), peak in July 1931 changed to May 1931

Domestic consumption of cattle-hide leather (45), trough in May 1932 changed to July 1932

Value of cattle-hide leather production (65), trough in July 1922 changed to June 1922

Ratio (87) of cattle-hide leather consumption to cattle-hide leather stock of leather-goods manufacturers, peak in March 1931 changed to May 1931

Discretionary packer hide stock (102), peak in January 1921 deleted and trough in November 1938 changed to September 1938

Tanners' hypothetical hide orders (104), peak in August 1921 changed to November 1921

APPENDIX B

CATALOGUE OF SERIES

PRICES

A. Shoes

1. Wholesale Price of Boots and Shoes, Monthly, 1919–1943

UNIT: Index numbers (1926 = 100) for dollar value

SOURCE: *Wholesale Prices, 1930,* Bureau of Labor Statistics, Bull. 543 and subsequent issues

COVERAGE AND CONSTRUCTION: Price quotations were obtained on twenty-one standard models of men's, women's, and children's shoes, probably from as many manufacturers. They were weighted by census data on output for selected years. No seasonal adjustment was required.

2. Average Factory Price of Shoes, Monthly, 1919–1942.

UNIT: Cents per pair

SOURCE AND COVERAGE: Tanners' Council of America and NBER [See (1)]

CONSTRUCTION: *1926–1940:* Wholesale Price of Boots and Shoes (1) converted to dollar units by the Tanner's Council using figures for average factory price per pair of boots, shoes, and slippers calculated from data for value and quantity of output published in biennial *Census of Manufactures.*

1919–1925: Failing biennial census data from which to calculate average bench-mark figures for all but the first of these years, (1) was linked to this series in 1925 and extended backward. This gave a price in 1919 that came close to the one census bench mark available. By a similar procedure, the data were extended to 1941 and 1942.

No seasonal adjustment was required.

REMARKS: Ideally, the index attempts to reflect two sorts of price change: change in price of identical models; and change in the distribution of buying as between various sorts of models and price lines.

3. Wholesale Price of Cattle-Hide Leather Shoes, Monthly, 1919–1941

UNIT: Index numbers (1935–1939 = 100) for dollar value

SOURCE: NBER

CONSTRUCTION AND COVERAGE: Of all the reports submitted to the Bureau of Labor Statistics on the price of shoes, ten were selected that appeared to refer to shoes whose uppers were made from cattle-hide leather. A simple average was struck of the index numbers of the shoe prices. Prior to 1926, only four series were available, and the average price of these series was adjusted to the level of the larger number of series available in 1926. Similar adjustments for minor changes in sample were made in other years.

No seasonal adjustment was required.

4. Unit Wholesale Price of Cattle-Hide Leather Shoes, Monthly, 1919–1941

UNIT: Cents per pair

SOURCE: NBER

CONSTRUCTION: (3) was converted to cents per pair using the average factory price of shoes in 1939. This figure ($1.68 per pair) was obtained from *Census of Manufactures, 1939,* Vol. II, Part 2, Table 4.

No seasonal adjustment was required.

5. Labor Cost per Cattle-Hide Leather Shoe, Monthly and Annual, 1919–1941

UNIT: Cents per pair

SOURCE: NBER

COVERAGE AND CONSTRUCTION: An index of factory pay-

rolls per dollar of shoe output was constructed using Factory Payrolls, Boots and Shoes (128) divided by Value of Shoe Production (41) and multiplied by 100. To convert this to an index of payrolls per pair, the resultant figures were multiplied by Wholesale Price of Boots and Shoes (1) and converted to dollar figures using data on the average labor cost per pair in 1939 as estimated from census data.

REMARKS: The series represents the labor cost of producing a more or less standard pair of shoes (see discussion, Chapter 12, note 14).

6. Fixed Costs per Cattle-Hide Leather Shoe, Annual, 1921–1941

UNIT: Cents per pair

SOURCE: NBER

CONSTRUCTION: The series was constructed on the assumption that short-term changes in unit overhead, except for changing salary rates, were largely a function of changing volume of output. The basic method therefore was to obtain the appropriate figure for aggregate overhead on the basis of an average for the period, adjusted for change in salary rates, and then to obtain unit overhead by dividing this figure by the appropriate measure of output.

In executing the first step, overhead per pair each year was obtained by substracting from selling price: Leather Cost per Cattle-Hide Leather Shoe (20), Labor Cost per Cattle-Hide Leather Shoe (5), and profits of 2.5 per cent of selling price [Unit Wholesale Price of Cattle-Hide Leather Shoes (4)]. The resultant figures averaged 23.2 per cent of selling price and were subject to an upward trend. The figures were adjusted for trend and multiplied by the value of output averaged for the whole period covered. Two-thirds of the resultant annual figures for aggregate overhead were assumed to consist of salaries, and were adjusted for change in rates by a centered index of salaries in the wearing-apparel industry. The figure was then returned to a per pair basis by dividing by the volume of shoe output, Shoe Production in Standardized pairs (42).

REMARKS: There appears to be no way whereby adequate direct data on annual fixed costs per pair of shoes can be obtained. These estimates are based on the assumption that month-to-month or even a one-year change in fixed costs per unit of output are essentially a function of changes in output; and the method outlined is expected to allow estimation of at least the most important short-term changes in fixed costs per pair of shoes (see also text discussion, p. 162).

7. Sum of Three Sorts of Costs of Shoe Production, Annual, 1921–1941 (also called Total Cost of Shoe Production for Current Leather Buyer)

UNIT: Cents per pair

SOURCE: NBER

CONSTRUCTION: Annual data for the following three costs were summed:

Leather Cost per Cattle-Hide Leather Shoe (20), current (LIFO) cost of leather
Labor Cost per Cattle-Hide Leather Shoe (5)
Fixed Costs per Cattle-Hide Leather Shoe (6)

8. Retail Price of Staple Shoes, Monthly, 1923–1941

UNIT: Index numbers (July 1914 = 100)

SOURCE: National Industrial Conference Board and Bureau of Labor Statistics

COVERAGE: The series represents the average retail price of a sample of two to ten more or less standard shoe models.

Prior to 1939: National Industrial Conference Board data were used. It consisted of reports from a few retailers in each of eighty to ninety-five cities on the price in the current and previous months of first one, and after 1925, two, best-selling women's and men's shoe models.

Beginning in July 1940: The BLS index for the cost of shoes purchased by wage earners and lower-salaried clerical workers in large cities [a component of the Consumers' Price Index for Moderate-Income Families in Large Cities (1935–1939 = 100)] was used.

CONSTRUCTION: *Prior to 1931:* The NICB index was smoothed by a five-month moving average.

After 1931: The month-by-month figures were used. The BLS index was linked in July 1940 and used thereafter.

9. Average Retail Price of Shoes, Monthly, 1926–1941

UNIT: Cents per pair

SOURCE: NBER [see (8)]

CONSTRUCTION: Retail Price of Staple Shoes (8) was adjusted to bench-mark figures by the ratio method (for a discussion of this method, see Simon Kuznets, *National Income and Its Composition,* NBER, 1941, pp. 479–483). The bench marks were derived from the average factory price per pair of boots, shoes, slippers, and other footwear as calculated from figures on value and quantity of production published in the biennial *Census of Manufactures;* the price was raised to retail level by applying a markup of 41 per cent of retail.

REMARKS: At times when price change is rapid and considerable trading up or down takes place, the index may give a very inaccurate picture of month-by-month change. In 1932 to 1933 this problem may have been acute.

The markup figure is the one most frequently reported to me by members of the trade. Independent calculations suggested that it was reasonable (see

Ruth Mack, *Factors Influencing Consumption: An Experimental Analysis of Shoe Buying*, National Bureau of Economic Research, Technical Paper 10, 1954, Table A-9 and pp. 105–107). However, a careful and thoughtful shoe manufacturer who read the finished volume expressed the opinion that it was too high.

10. Unit Margin over Leather (LIFO) and Labor Cost, Monthly, 1919–1941
UNIT: Cents per pair
SOURCE: NBER
CONSTRUCTION: Leather Cost per Cattle-Hide Leather Shoe (20), current (LIFO) cost of leather, plus Labor Cost per Cattle-Hide Leather Shoe (5) were subtracted from Unit Wholesale Price of Cattle-Hide Leather Shoes (4).

11. Aggregate Margin over Leather (LIFO) and Labor Cost, Annual, 1922–1941
UNIT: One thousand dollars
SOURCE: NBER
CONSTRUCTION: Unit Margin over Leather (LIFO) and Labor Cost (10) multiplied by Shoe Production in Standardized Pairs (42).

12. Percentage Margin over Leather (LIFO) and Labor Cost, Annual, 1919–1941
UNIT: Percentage of selling price
SOURCE: NBER
CONSTRUCTION: Annual data for Unit Margin over Leather (LIFO) and Labor Cost (10) divided by Unit Wholesale Price of Cattle-Hide Leather Shoes (4) and multiplied by 100.

13. Percentage Margin over Leather (Best Buyer), Labor and Fixed Costs, Annual, 1922–1941
UNIT: Percentage of selling price
SOURCE: NBER
COVERAGE AND CONSTRUCTION: Fixed Costs per Cattle-Hide Shoe (6), Labor Cost per Cattle-Hide Leather Shoe (5) and Leather Cost per Cattle-Hide Leather Shoe (20), best purchase, were summed and subtracted from Unit Wholesale Price of Cattle-Hide Leather Shoes (4) to give margin over total costs in cents per cattle-hide shoe. These figures were divided by the wholesale price series and multiplied by 100 to give margin over total cost in percentage units.

14. Percentage Margin over Leather (LIFO), Labor and Fixed Cost, Annual, 1922–1938
UNIT: Percentage of selling price
SOURCE: NBER
CONSTRUCTION: Annual data for Leather Cost per Cattle-Hide Leather Shoe (20), current (LIFO) cost of leather, Labor Cost per Cattle-Hide Leather Shoe (5) and Fixed Costs per Cattle-Hide Leather Shoe (6) were summed, subtracted from Unit Wholesale Price of Cattle-Hide Leather Shoes (4), and expressed as a percentage of series (4).

15. Percentage Margin over Leather (FIFO), Labor and Fixed Costs, Annual, 1922–1938
UNIT: Percentage of selling price
SOURCE: NBER
CONSTRUCTION: Annual data for Leather Cost per Cattle-Hide Leather Shoe (20), historic (FIFO) cost of leather, Labor Cost per Cattle-Hide Leather Shoe (5), and Fixed Costs per Cattle-Hide Leather Shoe (6) were summed, subtracted from Unit Wholesale Price of Cattle-Hide Leather Shoes (4), and expressed as a percentage of series (4).

B. Leather

16. Upper Leather Prices, Monthly, 1919–1942
UNIT: Cents per square foot of black, chrome-tanned side leather ("*B*" grade), f.o.b. Boston
SOURCE AND COVERAGE: Bureau of Labor Statistics Bull. 39, 1902, and succeeding issues on wholesale prices.
REMARKS: Data indicate the monthly average of the mean high-low transaction price (tanner to shoe manufacturer and leather jobber) on Tuesday of each week.

No adjustment for seasonal variation was required.

17. Sole Leather Prices, Monthly, 1890–1942
UNIT: Cents per pound of oak, scoured-back sole leather, f.o.b. Boston
SOURCE AND COVERAGE: Bureau of Labor Statistics Bull. 39, 1902, and succeeding issues on wholesale prices.
REMARKS: Data indicate the monthly average of the mean high-low transaction price (tanner to jobber and manufacturer) on Saturday of each week.

No adjustment for seasonal variation was required.

18. Tanners' Margin over Hide Cost for Sole Leather, Monthly, 1919–1941
UNIT: Cents per pound of sole leather
SOURCE: NBER [see Sole-Leather Prices (17) and Packer Hide Prices (21)]
CONSTRUCTION: One pound of hide typically yields 0.7 pound of sole leather (see Merrill Watson, *Economics of Cattlehide Leather Tanning*, Rumph, 1950, p. 95). Accordingly, (21), adjusted for seasonal variation, was multiplied by $1 \div 0.7$ to raise it to cents per pound of sole leather. This series was then subtracted from (17) as indicated below.

1. Current (LIFO)—last in, first out hide cost: the difference between sole leather price in a given month and hide cost in the same month;

2. Current cost lagged: the difference between sole leather price of a given month and hide cost dated two months earlier;

3. Adjusted LIFO: an examination of the timing association between the two price series suggested that the lagged relation might have been typical before 1931 and the current one thereafter. A series was constructed on this basis—see text discussion, Chapter 13, note 9.

19. Cattle-Hide Leather Prices, Monthly, 1920–1941

UNIT: Dollars per equivalent hide

SOURCE AND COVERAGE: NBER [see Upper-Leather Prices (16) and Sole-Leather Prices (17)]

CONSTRUCTION: (16) and (17) were each weighted by a twelve-month moving total of Cattle-Side Upper-Leather Production (66) and Sole Leather Production (67) respectively (sole and side upper leather accounted for 86 per cent of all cattle-hide leather production in 1939) to give the wholesale price per pound (or square foot—one square foot of upper leather approximately equals one pound of sole) of leather. The series was converted to dollars per equivalent hide by using the 1939 figure for the average price per equivalent hide of cattle-hide leather as calculated from census data.

No seasonal adjustment was required.

REMARKS: The use of moving production weights was predicated on evidence that a tendency was present to trade up in prosperity and down in depression. The conversion procedure assumes that the number of pounds of sole or upper leather per equivalent hide was constant throughout the period; however, small changes did occur.

20. Leather Cost per Cattle-Hide Leather Shoe, Monthly, 1919–1941

UNIT: Cents per pair

SOURCE: NBER [see Upper Leather Prices (16) and Sole Leather Prices (17)]

CONSTRUCTION: Average price of cattle-hide leather used in a pair of cattle-hide leather shoes was obtained by weighting (16) by 2.5 and (17) by 0.7. The weights reflect estimates of the relative number of square feet of upper leather and pounds of sole used for cattle-hide leather shoes.

Leather costs were computed on the following bases:

1. Current (LIFO)—last in, first out valuation: leather price was taken in the given month;

2. Current cost lagged: leather price was taken two months earlier, presumably at the time the leather was ordered;

3. Best purchase: sum of lowest price for sole leather and for upper leather in eight-month period prior to stated month, weighted as indicated above;

4. Historical cost (FIFO)—first in, first out valuation: the assumptions of the calculation are that half of current consumption consists of high-style leathers, which were purchased in the preceding month at the price prevailing in that month. The other half of current consumption consists of style-staple leathers purchased in various months (but not more than six months ago). The oldest stocks of staple leather are used first.

To calculate the time when currently consumed style-staple leathers were bought, it is necessary to picture aggregate stocks of staple leathers. Starting with a typical figure for age of stock (equal monthly accretions were assumed), the history of gross additions to style-staple stock was built up by taking Domestic Consumption of Cattle-Hide Leather (45) in the given month plus change in stock during the month [investment in Cattle-Hide Leather Stock of Leather-Goods Manufacturers, E.O.M. (74)], minus one-half of Domestic Consumption of Cattle-Hide Leather (45) the next month (hypothetically, the amount of high-style leather received). The gross subtractions from staple stock were equal to one-half current domestic consumption, and they were assumed to use up additions to the oldest staple stock first.

C. Hides

21. Packer Hide Prices, Monthly, 1919–1942

UNIT: Cents per pound of green, salted, heavy native steers, f.o.b. Chicago

SOURCE: Wholesale price bulletins of the Bureau of Labor Statistics

REMARKS: Figures are monthly averages of the mean high-low transaction price (packer to tanners, brokers, and dealers) on Saturday of each week.

NBER made the standard adjustment for seasonal variation.

22. Cattle-Hide Prices, Monthly, 1921–1941

UNIT: Index numbers (1929 = 100) for value per pound of hides

SOURCE: Tanners' Council of America, Inc., Bureau of Labor Statistics, and Pratt Brothers, Inc.

CONSTRUCTION: Three prices for important sectors of the hide trade were averaged. The three series, all reported in cents per pound at the average of Saturday prices during the month in the Chicago market, were for heavy native packer steer hides, light native packer cow hides and country hides (extremes). For 1926 to 1938, Tanners' Council furnished the completed index; for other years, NBER placed the individual series on the base 1929 = 100 and combined them in the same way as the Tanners' Council portion.

NBER made the standard adjustment for seasonal variation.

REMARKS: A test of the adequacy of the series was made by comparing it to a hide price series computed for the biennial census years 1929 to 1939 (except 1933) using Census Bureau tabulations for the meat-packing industry. Price change for both series appeared to be very similar.

23. Cattle-Hide Prices, Monthly, 1921–1941

UNIT: Dollars per equivalent hide

SOURCE: NBER

CONSTRUCTION: Cattle-Hide Prices (22) was converted to dollar units using the average price of hides obtained from tabulations for the meat-packing industry in the 1939 *Census of Manufactures.*

24. Hide Price Ratio: Packer to Frigorifico, Monthly, 1919–1942

NUMERATOR: Packer Hide Prices, cents per pound (21).

DENOMINATOR: Frigorifico Steer Hide Prices, Buenos Aires. Price is reported in cents per pound, including cost and freight, at New York. *1919–1923:* The source was *Pratt's Manual of Hide and Skin Prices and Trade Statistics,* Pratt Brothers Co., Inc., undated; thereafter, Tanners' Council of America, Inc. For 1924 to 1930 (the latest year for which the Pratt Brothers' reports are available) differences in the monthly average between the two series are less than half a cent.

REMARKS: The standard adjustment for seasonal variation was applied directly to the ratios.

25. Hide Price Ratio: Country to Frigorifico, Monthly, 1919–1942

NUMERATOR: A monthly average of the mean high-low transaction price (packer to tanners, brokers, and dealers) on Saturday of each week, in cents per pound f.o.b. Chicago, for green, salted, heavy country cow hides. Quotations are from wholesale price bulletins, Bureau of Labor Statistics.

No adjustment for seasonal variation was required.

DENOMINATOR: Same as that used in Hide Price Ratio: Packer to Frigorifico (24), unadjusted for seasonal variation.

REMARKS: The standard adjustment for seasonal variation was applied directly to the ratios.

26. Hide Price Ratio: Country plus Frigorifico to Packer, Monthly, 1919–1941

NUMERATOR: A simple average of the wholesale price of Frigorifico steer hides and country heavy cow hides [see Hide Price Ratio: Country to Frigorifico (25) and Hide Price Ratio: Packer to Frigorifico (24)].

DENOMINATOR: Packer Hide Prices (21).

REMARKS: The ratios were adjusted for seasonal variation.

SHOES

A. Sales

27. Department-Store Shoe Sales, Monthly, 1926–1940

UNIT: Index numbers (1939 = 100) for dollar sales

SOURCE: Constructed by NBER from data collected by Federal Reserve district banks

COVERAGE: Sales of shoe departments of department stores were available from the following districts: Boston, Chicago, Cleveland, Dallas, New York, Richmond, and San Francisco. Failing data for shoe departments for the Federal Reserve Bank of Philadelphia, an index of thirty-one shoe stores was used. The eight districts represented accounted for 84 per cent of the department-store sales in the country in 1939.

In 1939, shoe sales of the group of department stores submitting sales data constituted 19 per cent of estimated shoe sales of all department stores (including leased departments but excluding mail-order houses) in the United States. For individual districts, coverage ranged from 13 to 56 per cent. For earlier years, coverage was somewhat less.

CONSTRUCTION: For six of the Federal Reserve districts, data on department-store sales of women's and children's shoes and of men's and boy's shoes were reported as a percentage change from the same month of the previous year. (For Boston, other years had been used as the base.) The seven banks also supplied information on the percentage of business done each month for some one year. Linked index numbers for men's and for women's shoe sales were constructed for each district. The two indexes were then combined into a single index weighting women's shoes 0.60 and men's 0.40, weights based on shoe sales for the country as a whole. The Philadelphia district was represented by an index of sales of shoe stores. Each index was corrected for seasonal variation.

The eight districts were then combined into a national index using weights for each district based on the Federal Reserve Board sample, 1939–1941. These weights were designed to reflect the relative importance of shoe sales in each district.

Finally, the national index was adjusted for the changing date of Easter.

REMARKS: A full discussion of the construction of the indexes was given in Ruth P. Mack, *Factors Influencing Consumption: An Experimental Analysis of Shoe Buying,* NBER, Technical Paper 10, 1954, pp. 80–88, and 119.

28. Department-Store Shoe Sales (Stock Sample), Monthly, 1926–1940

UNIT: Index numbers (1939 = 100) for dollar sales

SOURCE: Constructed by NBER from data collected by Federal Reserve district banks
COVERAGE: Data from the following districts were used: New York, Boston, Cleveland, Chicago, and Richmond. In 1939, total department-store sales in these five districts accounted for about 60 per cent of total department-store sales in the United States. In 1939, shoe sales of the group of department stores submitting sales data amounted to 16 per cent of estimated shoe sales of all department stores (including leased departments but excluding mail-order houses) in the United States. For individual districts, coverage ranged from 13 to 56 per cent. For earlier years, coverage was somewhat less.
CONSTRUCTION: National indexes were computed separately for department-store sales of men's and boys' and of women's and girls' shoes. Weights for each district were obtained as described for Department-Store Shoe Sales (27). The two national indexes were separately corrected for seasonal variation and the changing data of Easter. They were then combined by weighting women's shoe sales 0.60 and men's 0.40 as in (27).
REMARKS: The index was constructed for use in conjunction with the data on shoe stocks of department stores for which data were available from five Federal Reserve districts only. Note that two additional national indexes were provided—one for men's and boy's and one for women's and girl's shoe departments.

29. Department-Store Shoe Sales (Stock Sample), Deflated, Monthly, 1926–1940
UNIT: Index numbers * for dollar value of shoe sales adjusted for change in shoe price
SOURCE: NBER
CONSTRUCTION: Department-Store Shoe Sales (Stock Sample) (28) was divided by Retail Price of Staple Shoes (8) and multiplied by 100.
REMARKS: Price of staple shoes (8) rather than of all shoes (9) was used on the assumption that much of the difference between the two indexes reflects shifts from or to high-price outlets to or from low-price outlets (including basement shoe departments not included in the sales sample) rather than trading up or down within a given type of outlet.

30. Chain-Store Shoe Sales, Monthly, 1926–1940
UNIT: Index numbers (1939 = 100) for dollar value of shoe sales
SOURCE: Constructed by NBER from data collected by Federal Reserve Bank of New York and by NBER
COVERAGE: Until 1931, six chains, including four men's shoe systems, one women's shoe chain, and one family system, reported. In 1929, they accounted for 15 per cent of total chain-store shoe sales in the United States as determined by census figures. In 1932, the women's shoe chain dropped out, and in 1939, the five remaining systems accounted for 14 per cent of total chain-store shoe sales in that year.
CONSTRUCTION: Aggregate dollar sales of the sample were expressed as relatives of average monthly sales in 1939 and linked when the sample changed. The index was adjusted for seasonal variation, for the shifting date of Easter, and for the varying number of Saturdays and Sundays in a month using standard methods.

31. Retail Shoe Sales, Monthly, 1926–1940
UNIT: One million dollars
SOURCE: Constructed by NBER using Department-Store Shoe Sales (27), Chain-Store Shoe Sales (30), and data collected by Department of Commerce
CONSTRUCTION AND COVERAGE: The series was constructed in two parts, 1926–1935 and 1935–1941; the final step in the computation was to link the earlier and later segments of the series using a simple average of the June–December 1935 data.

1926–1935: (27) and (30), adjusted for seasonal variation and the changing date of Easter, were combined into a single index using weights reflecting their relative importance in total shoe sales in the country. The combined index was adjusted to the trend of total annual retail shoe sales for the country. For this purpose preliminary estimates of total shoe sales were constructed from annual averages of monthly census data on shoe production adjusted by NBER for undercoverage, net exports, and year-to-year change in shoe stocks, and converted to dollar units using the Average Factory Price of Shoes (2) raised to retail level. Annual ratios of this series and our department-chain index (placed on a dollar base) were computed and fitted by a logarithmic straight line. By means of this equation, the data based on the department- and chain-store materials were adjusted to the trend of total sales.

1935–1941: (27) was combined with Department of Commerce data for twenty-five chain organizations and several hundred independent shoe stores (starting with fifty-nine stores in mid-1935, the number included rose rapidly to over 400 in 1939). The figures were adjusted for trend by the Commerce Department using 1939 and 1935 census data and information on sales tax receipts. Adjusted for seasonal variation, these figures were raised to the level of sales of all shoe chains, lease departments and independent stores estimated from 1939 retail census data. The series was then adjusted for the shifting date of Easter. (27) was put on a base representing shoe sales of all retail out-

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

lets other than chain, leased departments and independent stores as estimated from retail census data. The two series were then totaled and adjusted for the varying number of Saturdays and Sundays in the month.

REMARKS: A detailed description of the construction of this series is presented in Ruth P. Mack, *Factors Influencing Consumption: An Experimental Analysis of Shoe Buying*, Technical Paper 10, NBER, 1954, Appendix, Part I; Part II of the appendix offers an evaluation of the final estimate. The Commerce sample is discussed by William C. Shelton and Bernard Beckler, "Revised Estimates of Sales of Retail Stores," *Survey of Current Business*, November 1943, pp. 6–14 and 19.

32. Retail Shoe Sales in Standardized Pairs, Monthly, 1926–1941 (also called Shoe Sales in Constant Dollars)

UNIT: Index numbers * for dollar value of shoe sales adjusted for change in shoe price

SOURCE: NBER

CONSTRUCTION: Retail Shoe Sales (31) in a given month was divided by Retail Price of Staple Shoes (8) in the same month.

REMARKS: The price series used reflects the change in price of a given assortment of shoes of a constant grade. The effect of the deflation is discussed in Chapter 5, pp. 45–46 and note 5.

33. Retail Shoe Sales in Pairs, Monthly, 1926–1940

UNIT: One million pairs

SOURCE: NBER

CONSTRUCTION: Retail Shoe Sales (31) in a given month was divided by Average Retail Price of Shoes (9) in the same month.

REMARKS: The price deflator purports to represent the average retail price at which all shoes were sold. The resulting quantities differ from those obtained by using the price of a more or less constant sample of staple items—the usual procedure (see text, as cited for series 32).

34. Shoe Wholesalers' Sales, Monthly, 1919–1942

UNIT: Index numbers (1923–1925 = 100) for dollar value of shoe sales

SOURCE: NBER, using data collected by up to ten Federal Reserve district banks and by the Department of Commerce in cooperation with the National Association of Credit Men.

COVERAGE: The Federal Reserve indexes were based on reports for from five to eighteen firms in each district; independent wholesalers and manufacturers' branches were included.

In 1929: The reporting firms were located in ten districts and accounted for 54 per cent of all wholesale shoe sales in the country.

Between 1930 and 1935: From six to nine districts could be used, and the sample was accordingly reduced.

Beginning in 1936: Reports based on the Commerce sample were used; in 1939 it covered thirty-four large firms that did about 45 per cent of all wholesale shoe sales in the country.

CONSTRUCTION: The series was constructed in two parts, and the segments were spliced using overlapping information for 1936.

1919–1936: Through 1929, ten district indexes and sales of three large national wholesalers were placed on a 1923–1925 base, adjusted for sample change, and combined into a single index (see "New Index of Wholesale Distribution," *Federal Reserve Bulletin*, December 1927, pp. 817–827). From 1930–1935, the indexes were extended by NBER using information published in Federal Reserve district bulletins and direct reports from district banks. The district indexes were combined using weights for the several districts based on 1929 data in the *Census of Distribution 1930, Vol. II, Wholesale Distribution.* Weights for missing districts were apportioned among neighboring districts. The index representing the three largest firms was similarly included with a weight commensurate with its share of total United States sales.

1936–1942: The Commerce data, giving percentage change in wholesale sales of "shoes and other footwear" from the same month of the previous year and the previous month of the same year, were published in the Department's monthly release on wholesale trade (variously titled). Indexes (1939 = 100) were computed using each set of figures, and the two series were then averaged; they were linked to the earlier segment in 1936.

A moving adjustment for seasonal variation was made for the entire series, 1919–1942 (see Appendix A, sec. 1b).

35. Shoe Wholesalers' Sales, Deflated, Monthly, 1919–1942

UNIT: Index numbers * for dollar value of shoe sales adjusted for change in average wholesale price of all shoes

SOURCE AND COVERAGE: NBER [see Shoe Wholesalers' Sales (34)]

CONSTRUCTION: (34) in a given month divided by Average Factory Price of Shoes (2) in the same month.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purpose for which it was used.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

36. Shoe Wholesalers' Sales (Stock Sample), Monthly, 1924–1942

UNIT: Index numbers (1929 = 100) for dollar value of shoe sales

SOURCE: NBER [see Shoe Wholesalers' Sales (34)]

COVERAGE: Data from five Federal Reserve district banks were used: New York, Richmond, Chicago, Minneapolis, and St. Louis. The sample of reporting firms in the five Federal Reserve districts accounted for an average of 25 per cent of all shoe wholesalers' sales in the country. From five to eleven firms were included in each district sample. See (34) for information on the Commerce segment.

CONSTRUCTION: The series were constructed in two parts, and the segments were linked using overlapping information for 1937.

1924–1937: The index is a simple average of the data for each district on a 1929 base, adjusted for seasonal variation by the standard method. For years when only three districts were available (1924 to 1925 and 1933 to 1937), the figures were raised to the level of five districts.

1937–1942: The Commerce data described in connection with (34) were linked to the earlier segment. The index (1939 = 100), adjusted for seasonal variation by the standard method, was based on reports of percentage change from the previous month of the same year.

REMARKS: This series, the original one available before the recomputation for (34) was undertaken, was continued in use whenever comparisons between wholesalers' sales and stocks were required. The Federal Reserve districts included in this sample were those from which data on shoe wholesalers' stock were available [See Shoe Wholesalers' Stock, E.O.M., Deflated (46) below].

37. Shoe Wholesalers' Sales (Stock Sample), Deflated, Monthly, 1924–1942

UNIT: Index numbers * for dollar value of shoe sales adjusted for change in average wholesale price of all shoes

SOURCE AND COVERAGE: NBER [see Shoe Wholesalers' Sales (Stock Sample) (36)]

CONSTRUCTION: (36) in a given month was divided by Average Factory Price of Shoes (2) in the same month.

B. Production and Orders

38. AIM Shoe and Leather Orders, Monthly, 1927–1946

UNIT: Index numbers (1926 = 100) for volume of orders

SOURCE: Associated Industries of Massachusetts, Boston

COVERAGE AND REMARKS: In 1929, the index was based on reports from eighteen concerns, of which six were shoe manufacturers. AIM does not consider the sample for shoe and leather manufacturing to be representative of the industry in the state as a whole; the data are intended to be used in conjunction with orders in other industries to provide an indication of trends rather than of the level of activity.

Reports of each firm are included in whatever form they are submitted; most of them appear to be stated in dollar units.

CONSTRUCTION: AIM weights orders of each firm by the amount of capitalization of the firm and expresses the sum of these weighted figures for the sample as a percentage of the comparable figure averaged for 1926.

NBER made the standard adjustment for seasonal variation.

39. Shoe Production, Monthly, 1919–1943

UNIT: One thousand pairs

SOURCE: Annual supplements to *Survey of Current Business,* Dept. of Commerce and, for 1919 to 1921, *Federal Reserve Index of Industrial Production,* Board of Governors of the Federal Reserve System, October 1943

COVERAGE: *1921–1943:* Commerce Department estimated that the sample covered from 95 to 99 per cent of total shoe production.

1919–1921: The Federal Reserve extrapolated annual Census Bureau figures on shoe production by means of reports from forty-three firms to the Federal Reserve banks at Chicago, Philadelphia, and Boston, January–October 1921, and from eight firms to the Boston bank, 1919–1920. The first sample represents about 8 per cent and the second about 6 per cent of total United States shoe production in those years.

CONSTRUCTION: *November 1921–1943:* NBER applied a moving adjustment for seasonal variation (see Appendix A, sec. 1b) to "production of boots, shoes and slippers," compiled from monthly reports to the Census Bureau.

January 1919–October 1921: The Federal Reserve index of shoe production (1935–1939 = 100) was linked to the annual total for the Commerce series.

40. Shoe Production for Domestic Consumption, Monthly, 1926–1942

UNIT: One million pairs

SOURCE: NBER

COVERAGE AND CONSTRUCTION: Shoe Production (39) each month was raised to complete industry coverage using data on production of "boots and shoes, other than rubber" in the biennial *Census of Manufactures,* 1927–1939. A monthly series on net imports of shoes, calculated by subtracting domestic exports each month

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

from imports for consumption, was then added each month. The data on imports are reported in the yearly publications (variously titled) of the Bureau of Foreign and Domestic Commerce; the method of collection, sources and coverage are reviewed in the introductory pages to the Commerce publications.

41. Value of Shoe Production, Monthly, 1919–1941
UNIT: One million dollars
SOURCE: NBER
CONSTRUCTION: Shoe Production (39) in a given month, multiplied by Average Factory Price of Shoes (2) in the same month.
REMARKS: A more precise title for this series would be Current Output of Finished Shoes Valued at Current Prices.

42. Shoe Production in Standardized Pairs, Monthly, 1921–1941
UNIT: Index numbers * for shoe output adjusted for changes in shoe quality
SOURCE: NBER
CONSTRUCTION: NBER estimates for Value of Shoe Production (41) were adjusted for change in the price of a given assortment of shoes of a constant grade by dividing each month by Wholesale Price of Boots and Shoes (1). The figures were linked to the average factory price of shoes in 1939 ($1.68) obtained from *Census of Manufactures, 1939*, Vol. II, Part 2, Table 4.
REMARKS: This series represents an effort to determine the volume of output had no changes in the quality of shoes occurred. It endeavors to convert changes in quality into equivalent changes in output of standardized shoes. The same problem applies at the retail level [see Retail Shoe Sales in Standardized Pairs (32)].

43. Women's Shoe Production, Monthly, 1922–1943
UNIT, SOURCE, AND COVERAGE: See Shoe Production (39), of which this is a published component.
REMARKS: A moving adjustment for seasonal variation was applied by NBER (see Appendix A, sec. 1b).

44. Men's Shoe Production, Monthly, 1922–1943
UNIT, SOURCE, AND COVERAGE: See Shoe Production (39), of which this is a published component.
REMARKS: A moving adjustment for seasonal variation was applied by NBER (see Appendix A, sec. 1b).

45. Domestic Consumption of Cattle-Hide Leather, Monthly, 1921–1941
UNIT: One million equivalent hides
SOURCE: NBER
CONSTRUCTION: A centered, eighteen-month moving average was struck for monthly ratios of the Tanners' Council series on domestic consumption of cattle-hide leather by all leather-goods manufacturers to Shoe Production (39). Shoe production was then corrected by these smoothed estimates of change in the amount of cattle-hide leather used per pair of shoes. For the first nine months of 1921, the series was extrapolated by the Tanners' Council series mentioned above.
REMARKS: The Tanners' Council series was based on information about cattle-hide use for various sorts of shoes which was then built into estimates on the basis of numerous assumptions. The inability to clarify the methods used and the seemingly unreasonable behavior of the data (abrupt and unexplained changes in its relation to shoe output occurred from time to time) led to the decision to compute a new series in the manner indicated.

C. Stock and Turnover

46. Shoe Wholesalers' Stock, E.O.M., Deflated, 1924–1942
UNIT: Index numbers * for dollar value of shoe stock adjusted for change in the wholesale price of all shoes.
SOURCE: NBER
COVERAGE: About 23 firms reported stocks amounting to about one-quarter of all stock in 1939.
CONSTRUCTION: The Commerce Department and Federal Reserve district data included and the methods used to combine them were identical to those for Shoe Wholesalers' Sales (Stock Sample) (36). Since the seasonal movement was quite similar from district to district, the standard adjustment was applied to the completed index (1929 = 100) for dollar values.

To obtain an index for the physical volume of stock, the figures each month were divided by the current Average Factory Price of Shoes (2).
REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in shoe wholesalers' stock, deflated.

47. Investment in Shoe Stock, All Hands, E.O.M., 1926–1941
UNIT: One million pairs
SOURCE: NBER
COVERAGE: The series purports to estimate finished-shoe stock in all hands—manufacturers', wholesalers', and retailers'.
CONSTRUCTION: Retail Shoe Sales in Pairs (33) in a given month was subtracted from Shoe Production for Domestic Consumption (40) in the same month.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which the series was used.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which the series was used.

48. Shoe Stock, All Hands, E.O.M., 1926–1940
UNIT: One million pairs
SOURCE: NBER
CONSTRUCTION: Investment in Shoe Stock, All Hands, E.O.M. (47) was linked to a bench-mark figure, for December 31, 1939, and cumulated for previous and subsequent months. The bench-mark estimate was obtained as follows: From the relevant census data, end-of-year shoe stocks of retailers, wholesalers, and manufacturers were calculated. Dollar estimates for these three categories (at cost) were converted to pair estimates by endeavoring to take into account the earlier prices at which inventories were bought and the difference between cost and retail price.

49. Department-Store Shoe Stock, E.O.M., 1926–1940
UNIT: Index numbers (1939 = 100) for stock at retail value
SOURCE: Constructed by NBER from data collected by five Federal Reserve district banks
COVERAGE: The sample of department stores reporting shoe stocks is somewhat smaller than that submitting the shoe sales data used to construct Department-Store Shoe Sales (Stock Sample) (28).
CONSTRUCTION: Data were typically reported as percentages of the same month of the previous year. The banks also supplied data for the dollar value of stock each month for some particular year. National indexes for women's and girls' and for men's and boys' shoe stock were constructed and adjusted for seasonal variation [see (28)]. They were combined with equal weights.
REMARKS: The 50-50 relationship was chosen, though sales had been weighted 60-40 [see Department-Store Shoe Sales (27)], to provide a rough adjustment for the fact that stocks of men's shoe departments turn more slowly than those of women's shoe departments.

50. Department-Store Shoe Stock, Deflated, M.O.M. or E.O.M., 1926–1940
UNIT: Index numbers * for dollar value of shoe stock adjusted for change in shoe price
SOURCE: NBER [see Department-Store Shoe Stock, E.O.M. (49)].
COVERAGE AND CONSTRUCTION: For M.O.M. data, the centered two-month moving average of (49) was divided by current Retail Price of Staple Shoes (8). For E.O.M. data, (49) each month was deflated.
REMARKS: (8) was used because department stores typically value inventory at selling price rather than at cost. See also (29), REMARKS.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in department-store shoe stock, deflated.

51. Investment in Department-Store Shoe Stock (Derived), Deflated, 1926–1940
UNIT: Index numbers * for dollar value of shoe stock adjusted for change in shoe price
SOURCE: NBER
CONSTRUCTION: The national indexes for men's and for women's department-store shoe receipts [used to derive Department-Store Shoe Receipts, Deflated (62)] were adjusted for seasonal variation. Department-Store Shoe Sales (Stock Sample) (28) adjusted for change in shoe price and raised to the correct absolute relation to stocks [as described for the calculation of (62)] was subtracted each month from the combined index for receipts in the same month.
REMARKS: This series provides an internally consistent sequence with sales and receipts. The point at which seasonal corrections were performed is the chief source of its difference from (50).

52. Department-Store Shoe Stock (Derived), Deflated, E.O.M., 1926–1940
UNIT AND SOURCE: See Investment in Department Store Shoe Stock (Derived), Deflated (51).
CONSTRUCTION: The figures for (51) were cumulated and linked to the average 1939 figure for the direct estimates of department-store shoe stock [see Department-Store Shoe Stock, Deflated, M.O.M. (50)].

53. Investment in Retailers' Shoe Stock on Hand and on Order, E.O.M., 1926–1941
UNIT: One million pairs
SOURCE: NBER
CONSTRUCTION: In each month, Retail Shoe Sales (33) was subtracted from a series purporting to show all distributors' new orders for shoes. To represent orders, Shoe Wholesalers' Sales, Deflated (35) were raised to the level of total output by the average ratio for 1922 to 1942 of Shoe Production (39) to Shoe Wholesalers' Sales (35).

54. Distributors' Shoe Stock, E.O.M., 1926–1940
UNIT: One million pairs
CONSTRUCTION: The index of Shoe Wholesalers' Stock, E.O.M., Deflated (46) and the index of Department Store Shoe Stock (Derived), Deflated, E.O.M. (52) were separately converted to pairs and summed month by month. The conversion factors are estimates of the average quantity of shoe stocks in the hands, respec-

* The index was not returned to the base of the original series because the effect of the operation would have been immaterial to the purposes for which the series was used.

tively, of all wholesalers and of all retailers. They are based on the estimated percentage distribution, 1925–1940, of shoe stocks among retailers, wholesalers (including manufacturer-owned wholesalers in separate establishments), and manufacturers, obtained by linking annual data on department-store shoe stocks, wholesale shoe stocks, and shoe production to appropriate 1939 census data on shoe inventories of retailers, wholesalers, and manufacturers, respectively.

REMARKS: (46) and (52), converted to pairs as described above, were used separately and in conjunction with (54) for the amplitude analysis in Chapter 7. For rationale of computation see Table 27 and the discussion on it.

First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment by shoe distributors.

55. Ratio of Department-Store Shoe Sales to Stock (Derived), Monthly, 1926–1940

NUMERATOR: Monthly Department-Store Shoe Sales (Stock Sample), Deflated (29), adjusted to the correct absolute relation to stocks using the department-store sales-stock ratio of 4.8 in 1939, a figure based on data for large stores collected by the Controllers' Congress of the National Retail Dry Goods Association.

DENOMINATOR: End-of-month Department-Store Shoe Stock (Derived), Deflated (52).

56. Ratio of Department-Store Shoe Sales to Stock, Monthly, 1926–1940

NUMERATOR: Monthly Department-Store Shoe Sales (Stock Sample), Deflated (29).

DENOMINATOR: Middle-of-month Department Store Shoe Stock, Deflated (50).

57. Ratio of Shoe Wholesalers' Sales to Stock, Monthly, 1924–1942

NUMERATOR: Monthly Shoe Wholesalers' Sales (Stock Sample) (36).

DENOMINATOR: Middle-of-month Shoe Wholesalers' Stock, 1929 = 100 [(46) two-month moving average].

58. Ratio of Retail Shoe Sales to Stock, All Hands, Monthly, 1926–1941

NUMERATOR: Monthly Retail Shoe Sales (33).

DENOMINATOR: Middle-of-month Shoe Stock, All Hands [(48) two-month moving average].

59. Ratio of Retail Shoe Sales to Distributors' Shoe Stock, Monthly, 1926–1940

NUMERATOR: Monthly Retail Shoe Sales (33).

DENOMINATOR: End-of-month Distributors' Shoe Stock (54).

D. Receipts

60. Shoe Wholesalers' Receipts, Deflated, Monthly, 1924–1942

UNIT: Index numbers * for dollar value adjusted for change in shoe price

SOURCE AND COVERAGE: See Shoe Wholesalers' Sales (Stock Sample), Deflated (37) and Shoe Wholesalers' Stock, E.O.M., Deflated (46)

CONSTRUCTION: (46) was raised to the correct absolute relation to sales using data in *Census of Business, 1939*, Vol. II, *Wholesale Trade*, which indicated that wholesalers' average end-of-month stock was twice as large as average monthly sales in 1939. Month-to-month change in this series was added to (37).

61. Shoe Wholesalers' Receipts, Monthly, 1924–1942

UNIT: Index numbers * for dollar values

SOURCE: NBER

CONSTRUCTION: The product of Shoe Wholesalers' Receipts, Deflated (60) in a given month and Average Factory Price of Shoes (2) in the same month.

62. Department-Store Shoe Receipts, Deflated, Monthly, 1926–1940

UNIT: Index numbers * for dollar value adjusted for change in shoe price

SOURCE: NBER

CONSTRUCTION: Receipts for men's and boys' and for women's and girls' shoe departments were calculated separately and combined. Receipts for each group were computed by using the men's and women's components (prior to seasonal correction) for Department-Store Shoe Sales (Stock Sample) (28), both deflated by Retail Price of Staple Shoes (8), and investment in department-store shoe stock—(50) prior to seasonal correction. The sales series was raised to the correct absolute relation to stock by applying sales-stock ratios based on data for large stores collected by the Controllers' Congress of the National Retail Dry Goods Association (the annual stock-turnover figure was 2.8 for women's and 2.2 for men's shoe departments). Increases in stock during the month were then added to (or decreases subtracted from) sales during the month to get receipts. A moving adjustment for seasonal variation was applied separately to the two receipts series (for women's and for men's shoe departments) (see Appendix A, sec. 1b—adjustment was made for absolute differences rather than ratio relationships). They were combined with a weight of 0.60 for women's and 0.40 for men's shoe departments.

* The deflated index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

REMARKS: It was necessary to compute receipts separately for women's and for men's shoes because stocks were larger relative to sales in the former than the latter. After experiment, it also seemed preferable to use seasonally uncorrected data for sales and for stocks (for the computation of change in stocks) and make the seasonal correction directly for receipts and sales.

63. Department-Store Shoe Receipts, Monthly, 1926–1940

UNIT: Index numbers * for dollar receipts

SOURCE: NBER

CONSTRUCTION: Seasonally adjusted data for Department-Store Shoe Receipts, Deflated (62) were multiplied by Retail Price of Staple Shoes (8). The series was then corrected for the changing date of Easter.

LEATHER

A. Production

64. Cattle-Hide Leather Production, Monthly, 1921–1941

UNIT: One million equivalent hides

SOURCE: Bureau of the Census and Tanners' Council of America

CONSTRUCTION AND COVERAGE: *January 1921–April 1932:* Compiled by Census Bureau, under the Kreider Act (41 Stat. L. 1057, June 5, 1920), using reports from the entire industry. The series was converted to equivalent hide units by the Tanners' Council.

May 1932–December 1941: At the expiration of the Kreider Act, the Tanners' Council raised direct reports from almost all tanners to the level of the entire industry.

NBER made the standard adjustment for seasonal variation.

REMARKS: Leather made from kips is included (see Chapter 2, note 8). Production is reported when all tanning and finishing operations have been performed.

Total production includes production of sole and upper leather [Cattle-Side Upper-Leather Production (66) and Sole Leather Production (67)] as well as production of other sorts of cattle-hide leathers including leather belting and upholstery leather.

Monthly data, beginning 1932, have been published in annual supplements to the *Survey of Current Business.*

65. Value of Cattle-Hide Leather Production, Monthly, 1921–1941

UNIT: One million dollars

SOURCE: NBER

CONSTRUCTION: Cattle-Hide Leather Production (64) each month was multiplied by Cattle-Hide Leather Prices (19) in the same month.

REMARKS: A more accurate title for this series is Current Output of Leather Valued at Current Leather Prices.

66. Cattle-Side Upper-Leather Production, Monthly, 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: Bureau of the Census and Tanners' Council of America

COVERAGE: The Tanners' Council series is based on reports from almost the entire industry.

CONSTRUCTION: *1922–1943:* Direct reports from the Tanners' Council.

1921: Figures on production of chrome-tanned, cattle-side upper-leather, which were published in monthly issues of *Report on Hides, Skins and Leather,* Bureau of the Census, were raised to the level of Tanners' Council series using the ratio of annual totals in 1922.

NBER made the standard adjustment for seasonal variation.

67. Sole Leather Production, Monthly, 1921–1943

UNIT: One thousand cattle backs, bends or sides

SOURCE: Bureau of the Census and Tanners' Council of America

COVERAGE: The Tanners' Council series is based on reports from almost the entire industry.

CONSTRUCTION: *1922–1943:* Direct reports from the Tanners' Council.

1921: Figures on production of hemlock-, oak-, and union-tanned cattle-hide sole leather, published in monthly issues of *Report on Hides, Skins and Leather,* Bureau of the Census, were raised to the level of Tanners' Council series using the ratio of annual totals in 1922.

NBER made the standard adjustment for seasonal variation.

REMARKS: Production is recorded when leather is completed or, if the tanner prepares his own cut-stock, after this cutting operation has also been performed.

68. Cattle-Hide Wettings, Monthly, 1921–1944

UNIT: One million equivalent hides

SOURCE: Bureau of the Census and Tanners' Council of America

COVERAGE AND CONSTRUCTION: *January 1921–March 1927:* Tanners' Council constructed the series by adjusting cattle-hide and kip leather production for month-to-month change in stocks in process, both reported to the Census Bureau. To eliminate kip side wettings, 10 per cent was deducted from total wettings.

* The index was not returned to the original base because the effect of the operation would have been immaterial to the purposes for which it was used.

This deduction represented the average relation between kip wettings and total wettings as reported to the Census Bureau during 1928 and 1930.

April 1927–April 1932: Compiled by the Census Bureau, under the Kreider Act (41 Stat. L. 1057, June 5, 1920), using reports on cattle-hide wettings (kips excluded) from the entire industry.

May 1932–December 1944: After the expiration of the Kreider Act, the Tanners' Council obtained reports on cattle-hide wettings (kips excluded) from nearly all tanners and raised these figures to the level of the entire industry.

NBER made the standard adjustment for seasonal variation.

REMARKS: Wettings are recorded when hides undergo the first of the tanning operations—soaking.

Wettings of upper leather and sole leather [Cattle-Side Upper-Leather Wettings (69) and Sole-Leather Wettings (70)] do not sum to total wettings adjusted for the difference in units: the two components are too large because they include kips and too small because they exclude other sorts of cattle-hide leathers (such as upholstery, belting, and saddle leathers).

69. Cattle-Side Upper-Leather Wettings, Monthly, 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: The sum each month of Cattle-Side Upper-Leather Production (66) and change between beginning and end-of-month In-Process Cattle-Side Upper Leather Stock (77).

70. Sole-Leather Wettings, Monthly, 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: The sum each month of Sole-Leather Production (67) and change between beginning- and end-of-month In-Process Sole-Leather Stock (81).

B. Stock

71. Finished Cattle-Hide Leather Stock in All Hands, E.O.M., 1920–1943

UNIT: One million equivalent hides

SOURCE: Tanners' Council of America and Bureau of the Census

COVERAGE: *1922–1932:* Under the Kreider Act (41 Stat. L. 1057, June 5, 1920), the Census Bureau obtained information from tanners on finished and in-process leather stock and from manufacturers of leather goods, on finished leather. A large proportion of the trade was covered (for the whole industry sequence in 1929, 80 per cent of the establishments producing hides, leather and shoes, as reported to the *Census of Manufactures,* were included). Data are published in *Report on Hides, Skins and Leather.*

After the expiration of the Kreider Act in April 1932: The Tanners' Council obtained information on tanners' leather stock from almost the entire industry and raised the sum to the industry level. They estimated leather stock of leather-goods manufacturers (see below).

CONSTRUCTION: *January 1922–April 1932:* The series was calculated by taking the difference each month between leather stock in process and leather stock, finished and in process, using Census Bureau materials.

December 1920–December 1921 and May 1932–December 1943: The Tanners' Council continued the series using the sum of finished leather stock in tanners' hands and estimates of finished leather stock in the hands of leather-goods manufacturers.

NBER made the standard adjustment for seasonal variation.

REMARKS: This series, which was used only in connection with certain aggregative comparisons, was not revised in accordance with our new estimates of cattle-hide leather consumption [see Domestic Consumption of Cattle-Hide Leather (45)] and the derived estimates of leather-goods manufacturers' stock (see Cattle-Hide Leather Stock of Leather-Goods Manufacturers, E.O.M. (75)].

First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in Finished Cattle-Hide Leather in All Hands.

72. Tanners' Finished Cattle-Hide Leather Stock, E.O.M., 1921–1943

UNIT: One million equivalent hides

SOURCE: Tanners' Council of America and NBER

CONSTRUCTION AND COVERAGE: *1922–1943:* Data were compiled by the Tanners' Council using direct reports from practically the entire industry, raised by the Council to the level of 100 per cent of the industry.

1921: Figures were extrapolated by NBER using data on various kinds of finished leather stock, published in the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

NBER made the standard adjustment for seasonal variation.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitutes tanners' inventory investment in Cattle-Hide Leather In Process.

73. In-Process Cattle-Hide Leather Stock, E.O.M., 1921–1940

UNIT: One million equivalent hides

SOURCE, COVERAGE, AND CONSTRUCTION: The data for January 1921 to April 1932 were collected under the

Kreider Act (41 Stat. L. 1057, June 5, 1920) by the Bureau of the Census. Thereafter the Tanners' Council obtained reports from almost the whole industry and raised these figures to the level of full coverage.

NBER made the standard adjustment for seasonal variation.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitutes inventory investment in Cattle-Hide Leather In Process.

74. Investment in Cattle-Hide Leather Stock of Leather-Goods Manufacturers, 1921–1941

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: Total cattle-hide leather consumption —the sum of Domestic Consumption of Cattle-Hide Leather (45) and Net Exports of Cattle-Hide Leather (88)—in a given month was subtracted from Cattle-Hide Leather Receipts (Tanners' Leather Shipments) (89) in the same month.

75. Cattle-Hide Leather Stock of Leather-Goods Manufacturers, E.O.M., 1921–1941

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: Investment in Cattle-Hide Leather Stock of Leather-Goods Manufacturers, (74) was linked to a base figure for June 1929 for finished cattle-hide leather stock in hands of leather-goods manufacturers, dealers, and importers and cumulated forward and backward. The base figure was obtained by subtracting Tanners' Finished Cattle-Hide Leather Stock, E.O.M. (72) from Finished Cattle-Hide Leather Stock in All Hands, E.O.M. (71).

REMARKS: Reasons for recomputing this series are included in the discussion of cattle-hide leather consumption [see Domestic Consumption of Cattle-Hide Leather (45)].

76. Tanners' Finished Shoe-Side Upper Leather Stock, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: Tanners' Council of America and Bureau of the Census

COVERAGE AND CONSTRUCTION: *1922–1943*: The Tanners' Council obtained reports on all tanners' stock of finished shoe-side upper leather.

1921: NBER extrapolated the series on the basis of figures for tanners' stock of chrome-tanned upper leather, published in the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

NBER made the standard adjustment for seasonal variation.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute tanners' inventory investment in Finished Shoe-Side Upper Leather.

77. In-Process Shoe-Side Upper Leather Stock, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE, COVERAGE, AND CONSTRUCTION: *1922–1943:* Tanners' Council reports on all cattle-hide and kip upper leather in process of production.

1921: NBER extrapolated the series on the basis of Census Bureau data on chrome-tanned upper leather stock in process, published in the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

NBER made the standard adjustment for seasonal variation.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in Shoe-Side Upper Leather in Process.

78. Minimum-Service Stock of In-Process Cattle-Side Upper Leather, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: Identical to Upper-Leather Wettings (69) each month.

REMARKS: The minimum processing period for upper-leather stock is assumed to be one month; therefore minimum-service stock equals total inflow into production—upper-leather wettings—during the minimum processing period (see text discussion in Chapter 13, pp. 191–192).

79. Discretionary Stock of In-Process Cattle-Side Upper Leather, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: The difference each month between In-Process Upper-Leather Stock (77) and Minimum-Service Stock of In-Process Upper Leather (78).

REMARKS: See text, as cited for series 78.

80. Tanners' Finished Sole-Leather Stock, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: Tanners' Council of America and Bureau of the Census

COVERAGE AND CONSTRUCTION: *1922–1943*: The series is the Tanners' Council report on all tanners' stock of finished cattle-hide sole leather. When tanners themselves cut sole leather into shapes, equivalent sides of cut-sole leather stock are included in the figures.

1921: NBER extrapolated the series on the basis of figures for tanners' stock of finished hemlock-, oak-, and

union-tanned leather, published in the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

No seasonal adjustment was required.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute tanners' inventory investment in Finished Sole Leather.

81. In-Process Sole-Leather Stock, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: Bureau of the Census and Tanners' Council of America

CONSTRUCTION: *1922–1943:* Tanners' Council reports on stock of all cattle-hide sole leather in process of tanning.

1921: NBER extrapolated the series on the basis of Census Bureau data on hemlock-, oak-, and union-tanned sole-leather stock in process published in the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

No adjustment for seasonal variation was required.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute Inventory investment in In-Process Sole Leather.

82. Minimum-Service Stock of In-Process Sole-Leather, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides.

SOURCE: NBER

CONSTRUCTION: A two-month moving total of Sole-Leather Wettings (70) stated in the second month was used.

REMARKS: Assuming that the minimum period required to process sole leather was two months, minimum-service stock equals the volume of inflow into the production period during this processing period (see text, as cited for series 78).

83. Discretionary Stock of In-Process Sole Leather, E.O.M., 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: The difference each month between In-Process Sole-Leather Stock (81) and Minimum-Service Stock of In-Process Sole Leather (82).

REMARKS: For further discussion, see text, as cited for series 78.

84. Ratio of Tanners' Upper-Leather Shipments to Tanners' Upper-Leather Stock, Monthly, 1921–1941

Seasonally adjusted data in equivalent hide units were used.

NUMERATOR: Tanners' monthly Cattle-Side Upper-Leather Shipments (90).

DENOMINATOR: Tanners' end-of-month Cattle-Side Upper Leather Stock (76).

85. Ratio of Tanners' Sole-Leather Shipments to Tanners' Sole Leather Stock, Monthly, 1922–1943

Seasonally adjusted data in equivalent hide units were used.

NUMERATOR: Tanners' monthly Sole-Leather Shipments (91).

DENOMINATOR: Tanners' end-of-month Finished Sole-Leather Stock (80).

86. Ratio of Tanners' Leather Shipments to Tanners' Leather Stock, Monthly, 1921–1941

Seasonally adjusted data in equivalent hide units were used.

NUMERATOR: Tanners' monthly Cattle-Hide Leather Shipments (89).

DENOMINATOR: Tanners' middle-of-month Cattle-Hide Leather Stock [(72)—two-month moving average].

87. Ratio of Cattle-Hide Leather Consumption to Cattle-Hide Leather Stock of Leather-Goods Manufacturers, Monthly, 1921–1941

Seasonally adjusted data in equivalent hide units were used.

NUMERATOR: Monthly Domestic Consumption of Cattle-Hide Leather (45).

DENOMINATOR: End-of-month Cattle-Hide Leather Stock of Leather-Goods Manufacturers (75).

C. Receipts

88. Net Exports of Cattle-Hide Leather, Monthly, 1921–1941

UNIT: One thousand equivalent hides.

SOURCE: Bureau of the Census and Tanners' Council of America

CONSTRUCTION: *1922–1941:* Reports on exports and imports of cattle-hide leathers were reduced by the Tanners' Council to equivalent hide units using standard conversion ratios. Imports each month were subtracted from exports in the same month to obtain net exports.

1921: NBER extrapolated the series using data from *Monthly Summary of Foreign Commerce of the United States,* Bureau of the Census, on exports, re-exports, and imports.

No adjustment for seasonal variation was required.

89. Cattle-Hide Leather Receipts (Tanners' Leather Shipments), Monthly, 1921–1943

UNIT: One thousand equivalent hides.

SOURCE: Tanners' Council of America and NBER

CONSTRUCTION AND COVERAGE: *1922–1943:* Data are Tanners' Council compilations based on reports from the whole industry.

1921: The series was calculated by subtracting investment in Tanners' Finished Cattle-Hide Leather Stock (72) from Cattle-Hide Leather Production (64).

The standard adjustment for seasonal variation was made.

REMARKS: Receipts of exporters for shipment to foreign customers are included in the figures.

90. Cattle-Side Upper-Leather Receipts (Tanners' Cattle-Side Upper-Leather Shipments), Monthly, 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: Investment in Tanners' Finished Cattle-Side Upper Leather Stock (76) was subtracted from Cattle-Side Upper Leather Production (66) in the same month.

REMARKS: The receipts of exporters for shipment to foreign customers are included in the figures.

91. Sole-Leather Receipts (Tanners' Sole-Leather Shipments), Monthly, 1921–1943

UNIT: One thousand equivalent cattle sides

SOURCE: NBER

CONSTRUCTION: Investment in Tanners' Finished Sole-Leather Stock (80) each month was subtracted from Sole-Leather Production (67). When tanners themselves cut sole leather into shapes, equivalent sides of cut-sole are included in the figures on stock and production and consequently in those for receipts (shipments).

REMARKS: The receipts of exporters for shipment to foreign customers are included in the figures.

HIDES

A. Production

92. Federally Inspected Slaughter, Monthly, 1921–1941

UNIT: One thousand cattle hides

SOURCE: *Report on Livestock, Meats and Wool Market Statistics and Related Data, 1944,* Dept. of Agriculture; for drought-killed cattle, the 1938 supplement to the *Survey of Current Business*

COVERAGE: The data cover the number of animals (including rejected carcasses) slaughtered by establishments in interstate or foreign commerce. Drought-killed cattle purchased by the Federal Surplus Relief Corporation during June 1934 to February 1935 and August to September 1936 are included in the figures.

REMARKS: The count of cattle slaughtered is identical to the number of hides received from this source, excluding kips (hides heavier than calf skins and lighter than cattle hides, as defined—see Chapter 2, note 8).

NBER made the standard adjustment for seasonal variation.

Movement into sight from federally inspected slaughter may also be called movement into sight of domestic packer hides. However, domestic packer hides also come from the uninspected slaughter of large intrastate packing houses (see Chapter 2, pp. 12 and 16.

93. Cattle Hides, Movement into Sight from Uninspected Domestic Slaughter (Country Slaughter), Monthly, 1921–1941

UNIT: One thousand hides

SOURCE: Tanners' Council of America

CONSTRUCTION: *Prior to May 1932:* The Tanners' Council calculated the series by subtracting federally inspected slaughter (Department of Agriculture data) and net cattle-hide imports (Department of Commerce series) from the Tanners' Council's estimates of total movement into sight of cattle hides from all sources (see 94).

From May 1932: The series was compiled from direct reports to the Tanners' Council of tanners' receipts of hides from uninspected cattle slaughter.

NBER made the standard adjustment for seasonal variation.

REMARKS: This series is a composite of two unlike parts. The first, prior to 1932, is a faulty estimate (because of inadequate information on stock) of movement into sight. The second is a better estimate of a different concept—tanners' receipts.

The second title, Country Slaughter, is less accurate than the first since the figures include packer hides from large intrastate packing houses (see Chapter 2, "Provision of the Raw Material").

94. Cattle Hides, Total Movement into Sight, Monthly, 1921–1941

UNIT: One million hides

SOURCE: Tanners' Council of America

CONSTRUCTION: *Prior to May 1932:* Tanners' Council calculated the series by adding to cattle-hide wettings the change between beginning- and end-of-month stock of raw cattle hides in all hands, using series compiled by the Bureau of the Census.

From May 1932: The figures are the sum of federally inspected slaughter (including drought-killed animals, 1934–1936), net cattle-hide imports, and tanners' hide receipts from uninspected (country) slaughter, all based on direct reports from the establishments concerned.

NBER applied a moving adjustment for seasonal variations (see Appendix A, Sec. 1b).

REMARKS: Ideally, the series would report the initial appearance of raw hides on American markets; it falls short of this requirement with respect to the uninspected hide components. The character and extent of the failure differ before and after 1932 [see Cattle-Hides, Movement into Sight from Uninspected Domes-

tic Slaughter (Country Slaughter) (93), REMARKS]. For the years 1921 to 1940, uninspected slaughter represented 34 per cent of the total (federally inspected accounted for 52 per cent and the net imports for the remaining 14 per cent).

95. Value of Cattle Hides, Total Movement into Sight, Monthly, 1921–1941
UNIT: One million dollars
SOURCE: NBER
CONSTRUCTION: Cattle Hides, Total Movement into Sight (94) each month multiplied by current Cattle-Hide Prices (23).
REMARKS: A more accurate title for this series is Movement into Sight Valued at Current Hide Prices.

96. Ratio of Cattle-Hide Leather Consumption to Federally Inspected Slaughter, Monthly, 1921–1941
Seasonally adjusted data in equivalent hide units were used.
NUMERATOR: Monthly Domestic Consumption of Cattle-Hide Leather (45).
DENOMINATOR: Monthly Federally Inspected Slaughter (92).

B. Stock

97. Cattle-Hide Stock in All Hands, E.O.M., 1921–1943
UNIT: One million equivalent hides
SOURCE: Bureau of the Census and Tanners' Council of America
COVERAGE AND CONSTRUCTION: *Prior to May 1932:* The figures were compiled by the Census Bureau under the Kreider Act (41 Stat. L. 1057, June 5, 1920) using reports from packers, butchers, dealers and importers. Although reports were compulsory, many small butchers and dealers were not covered.

From May 1932: The Tanners' Council derived month-to-month change in raw hide stock in all hands by taking the difference each month between movement into sight of cattle hides and cattle-hide wettings. These figures for inventory investment were cumulated forward from the April 1932 Census Bureau figure for stocks proper. Hides purchased and held in government warehouses after the 1934 drought are included.

NBER made the standard adjustment for seasonal variation.

98. Tanners' Cattle-Hide Stock, E.O.M., 1921–1943
UNIT: One million equivalent hides
SOURCE: Tanners' Council of America
COVERAGE AND CONSTRUCTION: Except in 1921, the figures were compiled by the Tanners' Council using reports from practically the entire industry; for 1921, the figures were obtained from the monthly *Report on Hides, Skins and Leather,* Bureau of the Census.

NBER made the standard adjustment for seasonal variation.
REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in Tanners' Cattle Hides.

99. Cattle-Hide Stock in Hands Other than Tanners', E.O.M., 1921–1943
UNIT. One million equivalent hides
SOURCE: NBER
CONSTRUCTION: Calculated by taking the difference each month between Cattle-Hide Stock in All Hands, E.O.M. (97) and Tanners' Cattle-Hide Stock (98). The standard adjustment for seasonal variation was applied to the residuals.
REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in Raw Cattle Hides in Hands Other than Tanners'.

100. Tanners' Cattle-Hide Stock on Hand and on Order, E.O.M., 1921–1941
UNIT: One million equivalent hides
SOURCE: NBER
CONSTRUCTION: Cattle-Hide Wettings (68) each month were subtracted from hide receipts adjusted for the difference between the dates when imported hides were presumably ordered and received—Tanners' Hypothetical Hide Orders (104)—to obtain change in stock on hand and on order. Change was linked to stock proper in January 1921 and cumulated forward.

101. Packer Hide Stock in Hands Other than Tanners', E.O.M., 1920–1940
UNIT: One million equivalent hides
SOURCE AND COVERAGE: NBER [see Finished Cattle-Hide Leather Stock in All Hands, E.O.M. (71)]
CONSTRUCTION: *Prior to May 1932:* Information supplied under the Kreider Act (41 Stat. L. 1057, June 5, 1920) to the Bureau of the Census was used in whatever form it was available. For July 1922 to December 1929 total packer hide stock held by packers, butchers, dealers and importers was reported and used. For November 1920 to June 1922 and January 1930 to April 1932, this series was extended by using data on change between beginning- and end-of-month stock of packers and dealers.

From May 1932: After the Kreider Act expired, change in Cattle-Hide Stock in Hands Other than Tanners' (99) was produced primarily by change in domestic packer-hide stocks, since change in stock other than tanners' was small in the case of imports and unreported in the case of country hides. Accord-

ingly, month-to-month change in (99) was reduced by one-third to allow for stocks of other than packer hides. Change was then linked to the April 1932 figure for packer hide stocks of others.

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute inventory investment in Packer Hides in Hands Other than Tanners'.

102. Discretionary Packer Hide Stock in Hands Other than Tanners', E.O.M., 1920–1940

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: Assuming that the assembly, cure, and grading of hides requires about one and a half months, packers' minimum service stock may be measured by federally inspected slaughter during the past month and a half. Discretionary stock is the difference between minimum service stock and actual total stock—Packer Hide Stock in Hands Other than Tanners', E.O.M. (101).

REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute investment in Discretionary Packer Hide Stock in Hands Other than Tanners'.

C. Receipts

103. Tanners' Cattle-Hide Receipts from All Sources, Monthly, 1921–1943

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: Inventory investment (change between beginning- and end-of-month stock) in Tanners' Cattle-Hide Stock (98) was subtracted from Cattle-Hide Wettings (68).

NBER applied the standard adjustment for seasonal variation to the derived series.

104. Tanners' Hypothetical Hide Orders, Monthly, 1921–1941

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: On the average, domestic hides are assumed to be delivered less than two weeks after they are ordered; consequently, orders for domestic hides are identical to receipts in the same months. For imported hides, receipt often follows orders by about two months. Accordingly, I subtract current imports from tanners' total receipts and add those of two months later.

105. Net Imports of Cattle Hides, Monthly, 1921–1941

UNIT: One million equivalent hides

SOURCE: Tanners' Council of America

CONSTRUCTION: The series covers imports for consumption (excluding imports for re-export) minus exports. It was compiled from reports prepared by the Bureau of Foreign and Domestic Commerce and converted to equivalent hide units by the Tanners' Council.

No adjustment for seasonal variation was required.

106. Tanners' Hypothetical Orders for Imported Hides, Monthly, 1921–1941

UNIT AND SOURCE: See (105)

CONSTRUCTION: Net Imports of Cattle Hides (105) taken two months before the given month, presumably when ordered [see Tanners' Hypothetical Hide Orders (104) for explanation of procedure].

107. Tanners' Country-Hide Receipts, Monthly, 1921–1941

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: *Prior to May 1932:* Change between beginning- and end-of-month stock of domestic, other than packer, cattle hides in the hands of packers, butchers, dealers, and importers (see 101) was subtracted from Cattle Hides, Movement into Sight from Uninspected Domestic Slaughter (93). The standard adjustment for seasonal variation was applied to the residuals, and they were then smoothed by a centered, three-month moving average.

From May 1932: The series is identical to Cattle Hides, Movement into Sight from Uninspected Domestic Slaughter (93), which for this period actually reports receipts of country hides at tanners' yards.

REMARKS: Receipts of country hides could also be called, more accurately, receipts from uninspected slaughter, since packer hides from large intrastate packing houses are included (see text, as cited for series 92).

108. Tanners' Packer Hide Receipts, Monthly, 1921–1941

UNIT: One million equivalent hides

SOURCE: NBER

CONSTRUCTION: *January 1921–April 1932:* Change between beginning- and end-of-month Packer Hide Stock in Hands Other than Tanners' (101) was subtracted from Federally Inspected Slaughter (92).

Beginning May 1932: Tanners' Country Hide Receipts (107) and Net Imports of Cattle Hides (105) were subtracted from Tanners' Cattle-Hide Receipts from All Sources (103).

REMARKS: The shift in procedure in 1932 was motivated by an effort to follow the most direct and presumably reliable set of reports available to us.

Packer Hide Receipts is more accurately called hide receipts from federally inspected slaughter since do-

mestic packer hides also come from the uninspected slaughter of large intrastate packing houses (see Chapter 2, note 8).

109. Tanners' Country plus Imported Hide Receipts, Monthly, 1921–1941
UNIT: One million equivalent hides
SOURCE: NBER
CONSTRUCTION: *January 1921–April 1932:* Tanners' Packer Hide Receipts (108) were subtracted from Tanners' Cattle-Hide Receipts from All Sources (103). For the charts and a number of the calculations, the data were smoothed by a centered three-month average.

From May 1932: Net Imports of Cattle Hides (105) and Tanners' Country Hide Receipts (107) were summed each month.
REMARKS: See (108) *Remarks.*

110. Ratio of Net Imports of Cattle Hides to Tanners' Country Hide Receipts, Monthly, 1921–1941
The component series are in equivalent hide units.
NUMERATOR: Monthly Net Imports of Cattle Hides (105).
DENOMINATOR: Monthly Tanners' Country Hide Receipts (107).

111. Ratio of Tanners' Hypothetical Orders for Imported Hides to Their Price-Sensitive Country Hide Receipts, Monthly, 1921–1941
The component series are in equivalent hide units.
NUMERATOR: Monthly imports of raw cattle hides for consumption, compiled by the Bureau of Foreign and Domestic Commerce, dated two months earlier (orders are imports two months hence).

Adjustment for seasonal variation was not required.
DENOMINATOR: Tanners' Country Hide Receipts (107) minus an estimate of true by-product country hide receipts. I have assumed that hides produced by large intrastate packers are a true by-product whose supply does not react sensitively to changes in hide prices. This portion was assumed broadly to parallel the federally inspected kill. Its movements were estimated by a centered twelve-month moving average of Federally Inspected Slaughter (92). The level was estimated by linking the moving average to a base figure for February 1929. This is the month when country hide receipts were at their lowest point for the years 1921 to 1941, and I assumed that virtually all receipts in this month consisted of true by-product hides.

COMPOSITE STOCKS

112. Tanners' Raw and In-Process Stock, E.O.M., 1921–1941
UNIT: One million equivalent cattle hides
SOURCE: NBER
CONSTRUCTION: Tanners' Cattle-Hide Stock, E.O.M. (98) was added to In-Process Cattle-Hide Leather Stock, E.O.M. (73).
REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute investment in Tanners' Raw and In-Process Stock.

113. Tanners' Raw and In-Process Stock on Hand and on Order, E.O.M., 1921–1941
UNIT: One million equivalent cattle hides
SOURCE: NBER
CONSTRUCTION: In-Process Cattle-Hide Leather Stock, E.O.M. (73) was added to Tanners' Cattle-Hide Stock on Hand and hypothetically on Order, E.O.M. (100).
REMARKS: First differences in these data, typically smoothed by a five-month moving average, constitute investment in Tanners' Raw and In-Process Stock on Hand and on Order.

114. Tanners' Total Stock of Cattle Hides and Leather, E.O.M., Annual and Monthly, 1921–1940
UNIT: One million equivalent cattle hides
SOURCE: NBER
CONSTRUCTION: Tanners' Raw and In-Process Stock, E.O.M. (112) was added to Tanners' Finished Cattle-Hide Leather Stock, E.O.M. (72).

The annual series is an average of end-of-month stock for the year.

The annual series per unit of production was calculated by dividing the figures for average end-of-month stock each year by the annual per month average of Cattle-Hide Leather Production (64).
REMARKS: First differences in monthly data, typically smoothed by a five-month moving average, constitute inventory investment in Tanners' Total Cattle Hides and Leather.

115. Hide Value of Tanners' Total Stock of Hides and Leather, Annual, 1921–1941
UNIT: One million dollars
SOURCE: NBER
CONSTRUCTION: Annual per month averages for Tanners' Cattle-Hide Stock, E.O.M. (98), In-Process Cattle-Hide Leather Stock, E.O.M. (73) and Tanners' Finished Cattle-Hide Leather Stock, E.O.M. (72) were summed and multiplied by the annual per month average of Cattle-Hide Prices (23).

To obtain Hide Value per Dollar of Production, this series was divided by the annual per month average of Value of Cattle-Hide Leather Production (65).

116. Cattle-Hide and Cattle-Hide Leather Stock Awaiting Processing, M.O.M., 1921–1941
UNIT: One million equivalent hides

SOURCE: NBER
CONSTRUCTION: The sum of Tanners' Cattle-Hide Stock, M.O.M [(98)—two-month moving average], In-Process Cattle-Hide Leather Stock, M.O.M [(73)—two-month moving average], and cattle-hide leather stock in the hands of leather-goods manufacturers, dealers, and importers.*

117. Cattle-Hide and Cattle-Hide Leather Stock Awaiting Sale, M.O.M., 1921–1941
UNIT: One million equivalent hides
SOURCE: NBER
CONSTRUCTION: The sum of Cattle-Hide Stock in Hands Other than Tanners', M.O.M. [(99)—two-month moving average] and Tanners' Finished Cattle-Hide Leather Stock, M.O.M. [(72)—two-month moving average].

118. Total Stock of Hides, Leather, and Shoes, E.O.M., 1926–1940
UNIT: One million equivalent cattle hides
SOURCE: NBER
CONSTRUCTION: Shoe Stock, All Hands, E.O.M. (48) was converted to equivalent hide units using an annual estimate of cattle-hide leather consumed per shoe produced [see Domestic Consumption of Cattle-Hide Leather (45), *Construction*]. These estimates of the hide component of shoe stocks were used along with Cattle-Hide Stock in All Hands, E.O.M. (97), Finished Cattle-Hide Leather Stock in All Hands, E.O.M. (71), and In-Process Cattle-Hide Leather Stock, E.O.M. (73). The four series were summed after the average size of the several stockpiles had been reduced to allow for the use of other than cattle-hide leather in shoe production, and the uses other than in shoe production of cattle-hide leather.

119. Value of Total Stock of Hides, Leather, and Shoes, E.O.M., 1926–1940
UNIT: One million dollars at 1939 prices
SOURCE: NBER
CONSTRUCTION: Each component series used in Total Stock of Hides, Leather, and Shoes, E.O.M. (118) was valued at an appropriate average monthly price in 1939, and the four series were totaled. For shoe stock, the series used was Average Factory Price of Shoes (2). Cattle-Hide Leather Prices (19) was used to value finished leather stock; Cattle-Hide Prices (23) was used for hide stock; and a mean of the two prices was used to value stock in process.
REMARKS: Note that "raw" materials stock (including retailers' shoe stock) is valued at cost and "finished" stock at selling price. No effort was made to adjust in either case to include just the correct amount of value added. The calculation tends to minimize the influence of shoe stocks on the total.

120. Ratio of Cattle-Hide Leather Production to Tanners' Raw and In-Process Stock on Hand and on Order, Monthly, 1921–1941
The component series, adjusted for seasonal variation, are in equivalent hide units.
NUMERATOR: Monthly Cattle-Hide Leather Production (64).
DENOMINATOR: Tanners' end-of-month Raw and In-Process Stock on Hand and on Order (113).

121. Stock-Location Ratio, Monthly, 1921–1941
The component series, adjusted for seasonal variation, are in equivalent hide units.
NUMERATOR: Middle-of-month Cattle-Hide and Cattle-Hide Leather Stock Awaiting Processing (116).
DENOMINATOR: Middle-of-month Cattle-Hide and Cattle-Hide Leather Stock Awaiting Sale (117).
REMARKS: See discussion in Chapter 15, pp. 223–224, and Table 61, note a.

122. Turnover Ratio of Finished Stockpiles, Monthly, 1921–1941
CONSTRUCTION: An average was struck of two ratios with the first receiving a double weight: (1) Ratio of Tanners' Leather Shipments to Tanners' Leather Stock (86); (2) Ratio of Tanners' Receipts of Raw Cattle Hides to Cattle-Hide Stock in Hands Other than Tanners', middle-of-month (99—two-month moving average).
REMARKS: The weights recognize the greater size of tanners' stock. The one-to-one relationship would exaggerate the influence, in the total, of packers' and dealers' stock turnover, which is higher than that of tanners.

GENERAL

123. Wholesale Price Index, All Commodities, Monthly, 1890–1951
BASE: 1926 = 100.
SOURCE AND COVERAGE: *Wholesale Prices, 1931,* Bureau of Labor Statistics, Bull. 572 and subsequent issues.

124. Cost-of-living Index, Monthly, 1913–1952
BASE: 1935–1939 = 100
SOURCE AND COVERAGE: *Change in Cost of Living in Large Cities in the United States,* Bureau of Labor Statistics, Bull. 699, 1941, and subsequent issues.
REMARKS: Prior to September 1940, monthly price data were collected only for food, coal, electricity, and oil; other items included in the combined index were

* The series actually used was one discarded in later calculations. It was in effect the preliminary estimate of Finished Cattle-Hide Leather Stock in All Hands, E.O.M. (71) from which Tanners' Finished Cattle-Hide Leather Stock, E.O.M. (72) was subtracted.

priced at intervals of from three to six months. The combined index for months between pricing dates was estimated by the Department of Commerce using monthly prices for the four groups for which they were available and assuming an even rate of change in the cost of the other items between pricing dates. These unpublished estimates were furnished by the Department upon request (see the 1942 supplement to the *Survey of Current Business*, pp. 179–180).

125. Personal Income Payments, Monthly, 1929–1946
UNIT: One million dollars
SOURCE AND CONSTRUCTION: *National Income Supplement 1947, Survey of Current Business*, Dept. of Commerce, Table 48. Terms and concepts are defined on page 8. Data, adjusted for seasonal variation, are reported as monthly totals at annual rates. The bonus adjustment was made by NBER as follows: The amount of the Adjusted Service Benefit Payment was published in *Monthly Income Payments in the United States, 1929–40*, Dept. of Commerce, 1940, p. 44; and *Annual Report of the Secretary of the Treasury on the State of the Finances for Fiscal Year Ending June 30, 1936*, 1937, pp. 354–355 and . . . *June 30, 1937*, 1938, pp. 334–337. We assumed that a part of the monthly payments—an average amount still being paid out after the first rush of bond redemptions had tapered off—was spent each month as if it were ordinary income. The rest was assumed to influence spending gradually—in equal parts over the nine months after it was received. These redistributed bonus payments were added to total income from which the actual bonus payment had been subtracted.

126. Disposable Civilian Income, Monthly, 1929–1946
UNIT: One million dollars at annual rates
SOURCE AND COVERAGE: See Personal Income Payments (125); data on military pay obtained from unpublished *Technical Notes* made available to NBER by the National Income Division of the Commerce Department
CONSTRUCTION: (125) was adjusted as follows:

1. Personal tax and nontax payments to state, federal and local governments were subtracted. To obtain monthly figures, the annual figures were simply divided by twelve. Since year-to-year changes were not extreme, no effort was made to smooth the year-end shift in monthly payments.

2. I aimed to adjust income received by the military (included in income payments) which was probably not spent like most civilian incomes. To this end one-half of total cash paid to the military was deducted. To obtain monthly figures, the annual military payments were divided by twelve, except in 1940 and 1941 when changes were too extreme to permit them to concentrate at the turn of the year. In these years, the annual figure (at a monthly rate) was applied to July, and a straight-line interpolation was used to smooth the transition from the previous to the following year.

127. Factory Payrolls, Monthly, 1926–1940
UNIT: One million dollars
SOURCE AND COVERAGE: "Production-Worker Employment, Payrolls, Hours and Earnings in All Manufacturing Industries, Durable and Non-Durable Goods Division, 1909–1938," mimeographed, Release LS49–1297, September 1948, and "Employment, Pay Rolls, Hours, and Earnings," mimeographed, Release LS50–0003, September 1949, Bureau of Labor Statistics.
CONSTRUCTION: NBER converted the BLS index of Factory Payrolls (1939 = 100) to dollars by linking it to the figure for wages in all manufacturing industries in 1939 as reported in the *Census of Manufactures, 1939*, Vol. I, Table 4.

128. Index of Factory Payrolls, Boots and Shoes, Monthly, 1919–1941
BASE: 1923–1925 = 100.
SOURCE AND COVERAGE: *Revised Indexes of Factory Employment and Payrolls, 1919–1933*, Bureau of Labor Statistics, Bull. 610, 1941, and subsequent issues.

129. Man-Hours, All Manufacturing, Monthly, 1921–1941
BASE: 1939 = 100.
SOURCE AND COVERAGE: *Wages, Hours and Employment in the United States, 1914–1936*, National Industrial Conference Board Study 229, 1936, Table 2; Board of Governors of the Federal Reserve System (mimeographed releases R&S 1611, December 1948 and R&S 1573, June 1948); and Bureau of Labor Statistics [see Factory Payrolls (127)].
CONSTRUCTION: *January 1932–December 1941*: The Bureau of Labor Statistics' index of factory employment (1939 = 100), adjusted for seasonal variations by the Board of Governors, was multiplied by the BLS series on average weekly hours of labor (hours of work per week). (Seasonal adjustment of the latter series was made by NBER.) The product in each month was divided by the average product in 1939.

For the period prior to 1932, the Conference Board index of Man-Hours, 25 Manufacturing Industries (1923 = 100) was converted to a 1939 base using the relation between the NBER index and the NICB index in the first quarter of 1932. The index was adjusted for seasonal variation by NBER before conversion to the new base.

130. Ratio of Factory Payrolls to Disposable Civilian Income, Monthly, 1929–1941
NUMERATOR: Factory Payrolls (127).
DENOMINATOR: Disposable Civilian Income (126).

APPENDIX C: TIMING AND AMPLITUDE MEASURES FOR SELECTED

SERIES NO., APP. B	SERIES TITLE [b]	% OF REF. TURNS MATCHED BY SPECIFIC TURNS [c]	MEAN LEAD (−) OR LAG (+), ALL TURNS (*mo.*) [d]	AVER. DEV. FROM MEAN, ALL TURNS (*mo.*)	SLH REFERENCE CONFORMITY AND AMPLITUDE [e] SYNCHRONOUS TIMING			
					Subcycle Conformity		*Reference Amplitude per Mo.* [h]	
					% of Mo. in Unlike Phase [k]	*Index of Conformity* [l]	*Cycle*	*Subcycle*
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
33	Retail shoe sales	91	+0.3	1.4	26	+67	0.36	0.67
33	First differences, retail shoe sales	64	−1.5	1.5	45	+5	m	m
31	Retail shoe sales (dollars)	83	+0.5	1.6	23	+62	0.75	0.60
35	Shoe wholesalers' sales, deflated	86	−2.0 [n]	1.3	29	+62	0.68	0.98
34	Shoe wholesalers' sales (dollars)	86	−1.1 [n]	1.8	26	+62	0.85	0.91
38	AIM shoe and leather orders (dollars)	71	−1.6 [n]	1.7	37	+68	1.74	1.84
48	Shoe stock, all hands, E.O.M.	61	+2.1	2.2	42	+57	0.55	0.36
54	Distributors' shoe stock, E.O.M.	75	+2.8	2.1	44	−33	0.45	0.13
52	Department-store shoe stock, E.O.M., deflated	74	+2.6	2.2	56	−5	0.43	0.14
46	Shoe wholesalers' stock, E.O.M., deflated	56	+1.2	1.8	40	+8	0.32	0.25
47	Investment in shoe stock, all hands	91	0	2.4	32	+62	0.48	0.87
54	Distributors' investment in shoe stock	83	+0.6	1.3	24	+80	0.36	0.80
51	Investment in department-store shoe stock, deflated	77	+0.1	1.4	34	+81	0.02	0.06
46	Shoe wholesalers' inventory investment	88	−0.5	2.8	37	+75	0.12	0.52
39	Shoe production	93	−0.3	1.3	19	+100	0.81	1.55
45	Domestic consumption of cattle-hide leather	86	−1.0	1.3	20	+100	0.70	1.58
75	Cattle-hide leather stock of leather-goods manufacturers, E.O.M.	82	−0.6	2.1	31	+77	0.60	2.00
74	Investment in cattle-hide leather stock of leather-goods manufacturers	71	−2.8	2.0	45	+46	0.01	0.29
89	Tanners' leather shipments	93	−1.8 [n]	1.3	31	+100	0.71	1.94
72	Tanners' finished cattle-hide leather stock, E.O.M.*	93 *	−0.6 *	1.6 *	19 *	−85	−1.01	−1.69
72	Tanners' investment in finished cattle-hide leather stock *	86 *	−3.5 [o,*]	2.1 *	50 *	+15	+0.21	−0.11
64	Cattle-hide leather production	100	+0.2	1.2	17	+100	0.84	1.12
73	In-process cattle-hide leather stock, E.O.M.	86	−0.2	2.5	33	+54	0.29	0.36
73	Investment in cattle-hide leather stock in-process	75	−2.4	2.1	46	+46	0.04	0.24
68	Cattle-hide wettings	93	−0.2	1.1	17	+100	0.92	1.86
98	Tanners' cattle-hide stock, E.O.M.	79	−0.9	2.9	35	+46	1.07	1.17
98	Tanners' investment in cattle-hide stock	50	−3.3	3.1	59	−54	−0.07	−0.29
114	Tanners' total stock of cattle hide and leather, E.O.M.*	79 *	+0.4 *	2.8 *	39 *	−77	−0.13	−0.38
114	Tanners' total investment in cattle hide and leather stock *	71 *	−2.8 *	2.6 *	47 *	−23	−0.18	−0.15
103	Tanners' cattle-hide receipts from all sources	86	−1.2 [n]	1.4	20	+69	0.79	1.40
108	Tanners' packer hide receipts	71	−2.5 [n]	1.6	46	−23	0.27	−0.53
107	Tanners' country hide receipts	75	−1.6 [n]	2.2	43	+54	−0.11	1.83
105	Net imports of cattle hides	82	+0.7 [n]	1.6	35	+69	5.37	7.15
109	Tanners' nonpacker hide receipts	92	+0.2	1.4	21	+85	1.35	3.46
101	Packer hide stock in hands other than tanners', E.O.M.*	86 *	−0.7 *	2.4 *	36 *	−77	−0.07	−1.46
101	Investment in packer hide stock in hands other than tanners' *	75 *	−2.5 *	2.3 *	52 *	0	+0.17	+0.13
94	Cattle hides, total movement into sight	82	+0.4	2.0	33	+62	0.83	1.18
92	Federally inspected slaughter	91	−2.6	4.1	50	−15	0.10	−0.62
9	Average retail price of shoes	39	+5.1	3.0	55	−5	0.29	0.03
8	Retail price of staple shoes	44	+2.1	3.4	48	−12	0.18	0.01
1	Wholesale price of boots and shoes	54	+3.5	2.8	48	+46	0.27	0.10
2	Average factory price of shoes	57	+4.4	3.1	53	+31	0.29	0.13
19	Cattle-hide leather prices	82	+0.7 [o]	1.9	33	+77	0.98	1.27
22	Cattle-hide prices	93	+0.1	1.9	27	+92	1.65	2.48
19	First differences, cattle-hide leather prices	79	−1.9 [o]	2.7	39	+69	m	m
22	First differences, cattle-hide prices	89	−2.9 [o]	2.0	49	+31	m	m

SERIES IN THE SHOE, LEATHER, HIDE SEQUENCE, 1922–1940 [a]

SLH REFERENCE CONFORMITY AND AMPLITUDE [c]						SPECIFIC AMPLITUDE PER MO. [f]			
TIMING ADJUSTED FOR TYPICAL LEAD (−) OR LAG (+) [g]									
Subcycle Conformity			Reference Amplitude per Mo. [h]						
Timing Adj. (mo.)	% of Mo. in Unlike Phase [k]	Index of Conformity [l]	Cycle	Subcycle	Ratio, Cycle to Subcycle [j]	Selected Major Cycle [i]	Subcycle	Ratio Selected Cycle to Subcycle [j]	SERIES NO., APP. B
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
0	26	+67	0.36	0.67	0.53	0.64	1.29	0.50	33
−2	36	+80	m	m	m	m	m	m	33
0	23	+62	0.75	0.60	1.20	1.00	1.32	0.77	31
−2	19	+69	0.79	1.77	0.44	0.99	2.59	0.38	35
−1	21	+85	0.93	1.36	0.65	1.00	1.99	0.51	34
−2	32	+79	1.82	1.90	0.79	2.18	4.67	0.47	38
+2	41	+52	0.59	0.43	1.31	0.56	0.67	0.83	48
+2	37	+81	0.48	0.43	1.15	0.63	0.80	0.78	54
+2	43	+62	0.44	0.38	1.25	0.56	0.73	0.78	52
+4	25	+68	0.46	0.86	0.49	1.01	1.86	0.55	46
0	32	+62	0.48	0.87	0.44	0.77	1.58	0.48	47
0	24	+80	0.36	0.80	0.40	0.78	1.68	0.44	54
0	34	+81	0.18	0.68	0.49	0.52	1.34	0.40	51
0	37	+75	0.12	0.52	0.24	0.70	1.58	0.40	46
0	19	+100	0.81	1.55	0.53	1.07	2.23	0.49	39
0	20	+100	0.70	1.58	0.45	0.99	2.11	0.48	45
0	31	+77	0.60	2.00	0.29	1.63	3.33	0.48	75
−2	32	+77	0.22	0.92	0.25	0.58	1.84	0.32	74
−1	24	+100	0.93	2.68	0.35	1.23	3.70	0.34	89
0 [o]	19 [o]	−85	−1.01	−1.69	0.61	1.47	2.44	0.60	72
−3 [o]	33 [o]	−69	−0.25	−0.43	0.23	0.87	2.32	0.40	72
0	17	+100	0.84	1.62	0.52	1.03	1.95	0.53	64
0	33	+54	0.29	0.36	0.74	0.57	0.88	0.64	73
−2	36	+65	0.07	0.42	0.17	0.33	1.00	0.35	73
0	17	+100	0.92	1.86	0.48	1.12	2.28	0.50	68
−1	34	+46	1.06	1.32	0.76	1.34	2.79	0.48	98
−3	43	+31	0.17	0.24	0.64	0.43	1.08	0.39	98
0 [o]	39 [o]	−77	−0.13	−0.38	0.39	p	p	p	114
−2 [o]	39 [o]	−77	−0.04	−0.79	0.06	0.70	2.32	0.35	114
−1	18	+85	0.99	1.69	0.56	1.26	2.53	0.51	103
−2	31	+77	0.59	1.31	0.44	1.98	3.55	0.47	108
−2	39	+69	0.09	1.94	0.05	1.57	3.75	0.47	107
+1	32	+62	4.75	10.02	0.59	6.61	18.21	0.36	105
0	21	+85	1.35	3.46	0.41	2.07	5.16	0.40	109
−1 [o]	33 [o]	−54	−0.10	−1.52	0.08	p	p	p	101
−3 [o]	34 [o]	−69	−0.12	−1.47	0.09	0.66 [q]	2.25 [q]	0.32 [q]	101
0	33	+62	0.83	1.18	0.70	1.26	2.56	0.49	94
−2	44	+19	0.07	−0.22	−0.56	0.76 [q]	1.13 [q]	0.69 [q]	92
+5	41	+14	0.43	0.17	2.05	0.63	0.66	0.94	9
+2	40	+17	0.22	0.12	1.39	0.50	0.52	0.95	8
+4	34	+54	0.31	0.18	1.77	0.41	0.44	0.91	1
+4	39	+46	0.37	0.22	1.56	0.57	0.67	0.83	2
+1	32	+85	0.99	1.36	0.68	1.49	2.40	0.61	19
0	27	+92	1.65	2.48	0.61	2.63	3.89	0.68	22
−2	35	+77	m	m	m	m	m	m	19
−3	33	+85	m	m	m	m	m	m	22

Notes to Table

[a] The characteristic association of the series with the SLH chronology is inverse. Timing measures are computed with specific peaks matched to reference troughs and specific troughs to reference peaks. Columns 4 and 9, the percentage of months in unlike phase, are computed with specific expansions matched to reference contractions and analogously for specific contractions. This is *not* done for the reference conformity and amplitude measures, columns 5 to 7 and 10 to 13; here, the negative sign indicates the character of the association.

[a] Measures are computed for all series starting with the turn associated with the reference peak in 1923 and ending in 1940. Exceptions are shoe sales, stock, receipts, and retail shoe prices (1926–1940), shoe and leather orders (1927–1940), and shoe wholesalers' stock, deflated (1924–1940).

[b] All series are in physical units except where specifically stated otherwise. First-difference and inventory investment series are centered five-month moving averages of the month-to-month change.

[c] Percentage of all SLH-subcycle reference turns occurring in the years covered by the data to which specific turns are matched in accordance with our timing rules (see Appendix A, secs. 10a, b, c and d).

[d] Except where specifically indicated (see notes n and o), differences between average peak and trough timing do not seem to be consistently repeated in individual turns; consistency indexes are under 30.

[e] The method of computing reference amplitude is given in Appendix A, sec. 15.

[f] The method of obtaining specific amplitude is given in Appendix A, sec. 16.

[g] The average number of months lead or lag, given in column 2, was taken into account by shifting the reference frame forward or back the appropriate number of months. The appropriate lead or lag was selected to maximize the amplitude and conformity measures (see Appendix A, secs. 13 and 15).

[h] The period covered is never longer than 1923 to 1940. For the cycle amplitude for series beginning in 1926 or 1927, the rise during the first SLH-cycle expansion, which begins July 1924, was taken from the first subcycle trough (March 1926 or October 1927) covered by the data.

[i] Specific-cycle amplitude was computed using only those specific-cycle turns associated with the SLH-cycle chronology (see Appendix A, secs. 9 and 10e). If no cycle turn was related to the initial SLH-cycle turn covered by the data, the earliest subcycle turn that would maximize the amplitude was used to provide a fragment of the initial expansion phase. Likewise, the highest specific-subcycle peak after February 1938 was used to provide a fragment of the terminal cycle expansion phase.

[j] In calculating the cycle to subcycle ratio, subcycle amplitude was averaged for the same period as that for which cycle amplitude was available.

[k] The method of calculating the percentage of months in unlike phase is given in Appendix A, sec. 14. The period is either June 1922 to December 1940 or, for shoe stock, sales and retail shoe prices, June 1926 to December 1940. For shoe and leather orders, the period is June 1927 to December 1940; for retail price of staple shoes, it is June 1926 to June 1940.

[l] The method of obtaining the conformity index is given in Appendix A, sec. 13. Indexes in column 10 are calculated after allowing for the characteristic lead or lag relative to the SLH chronology as indicated in column 8.

[m] The amplitude computations were omitted because they are not meaningful without further explanation and calculations.

[n] Peaks tended to lead more or lag less than troughs. See Chapter 16, note 7.

[o] Peaks tended to lead more or lag less than troughs:

	Average Timing, Peaks minus Troughs	*Consistency Index*
Tanners' investment in finished leather stock	—1.3	30
Cattle-hide leather prices	—1.8	45
First differences, cattle-hide leather prices	—1.9	33
First differences, cattle hide prices	—2.6	39

[p] It was not possible to match specific cycles in the series to the SLH-cycle chronology even had we relaxed our rules to the maximum permitted by our procedures (see Appendix A, sec. 10e).

[q] The drought phase, 1934–1936 (see p. 26) was omitted in the calculation. Incidentally, government stocks of drought hides were omitted from series 101.