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CHAPTER 15

HIDE PRICES

At each step whereby consumer demand for shoes moves toward tanneries, the price at which hides are sold asserts its impact on the process of change. Alteration in hide prices affects costs and so the price at which producers are willing to sell; it affects expectations and so the time when distributors or producers are anxious to buy and to sell; it affects the volume of hides that appear on the central markets of the country. But all of these things and the actions resulting from them likewise affect the price of hides, and it is this aspect of the matter to which this chapter is devoted; we aim to draw together such information bearing on how hide prices change over the months and years. In the final section we return to the two-way causal association between prices and output and set down a few inferences as to its bearing on the cyclical process.

Cycles and Subcycles in Hide Prices

In Chapter 3, hide prices were found to have a strong conforming cyclical pattern that tended to lead the business-cycle reference dates. But since the lead is found in the industry as a whole, hides conform synchronously to the cycle chronology developed for the shoe, leather, hide industry and to the subcycle chronology also. (The index of conformity for the latter is 96.) What is more, the extent of the rise in prices during prosperity and fall during recession is extreme—1.65 per cent per month of their average standing during SLH cycles and 2.48 during subcycles. The cyclical variability is not clearly exceeded by any of the data that we have analyzed, including those on orders and shipments; the subcyclical amplitude is exceeded only by imports.[1] On these matters there is no need to linger. I ask, however, a further question about how hide prices respond to fluctuations in the industry. It involves the *shape* of fluctuations in hide prices.

THE SHAPE OF FLUCTUATIONS

Specific *cycles* in hide prices do not swell and ebb in a smooth sine-like curve. The fact that subcycles appear disposes of this possibility. Study of the hide price series shown in Chart 46 indicates that *subcycles* likewise can hardly be said to have a regular wavelike shape. But close scrutiny of each subcyclical phase seems often to show tendencies for the rise in prices to slow down *sometime* before the peak, and the fall to slow down sometime before the trough.

But the eye is not a reliable detector of retardation; to help it, month-to-month first differences are also shown. This series has, of course, a strongly saw-tooth appearance since it possesses the usual heavy random component of first difference series. But the chart does not suggest the presence of successions of flat areas first above and then below the zero line—the pattern of first differences corresponding to triangular subcycles in the data proper. When the monthly first differences are smoothed, first by a three-month and then by a five-month moving average (both centered), the waves are clarified.

Peaks and troughs may be selected in both the smoothed and unsmoothed differences. Although in some cases they are located in the latter with hesitation, the difficulty is not nearly so extreme as it was, for example, in the case of retail sales. Matching the turns in first differences with those in prices proper, we find that turns in the first differences lead by an average of about three months. Table 60 provides (in the first three columns) details concerning the distribution of leads of various durations. Marked modes appear: a large number of turns are synchronous for the month-by-month series, lead by one month for the three-month average, and by two months for the five-month average. This bias is produced by the arithmetic of the calculation.[2] In spite of these shifting modes, the average lead for the three series is virtually the same.

The table indicates (in the last three columns) that the rate of increase or decrease of hide prices also starts to decline before the peaks or troughs in industry affairs in general. This is not the result of the behavior of prices themselves, which are synchronous, on the average.[3] The lead of first differences is especially clear at peaks, where all matched turns lead the reference peaks

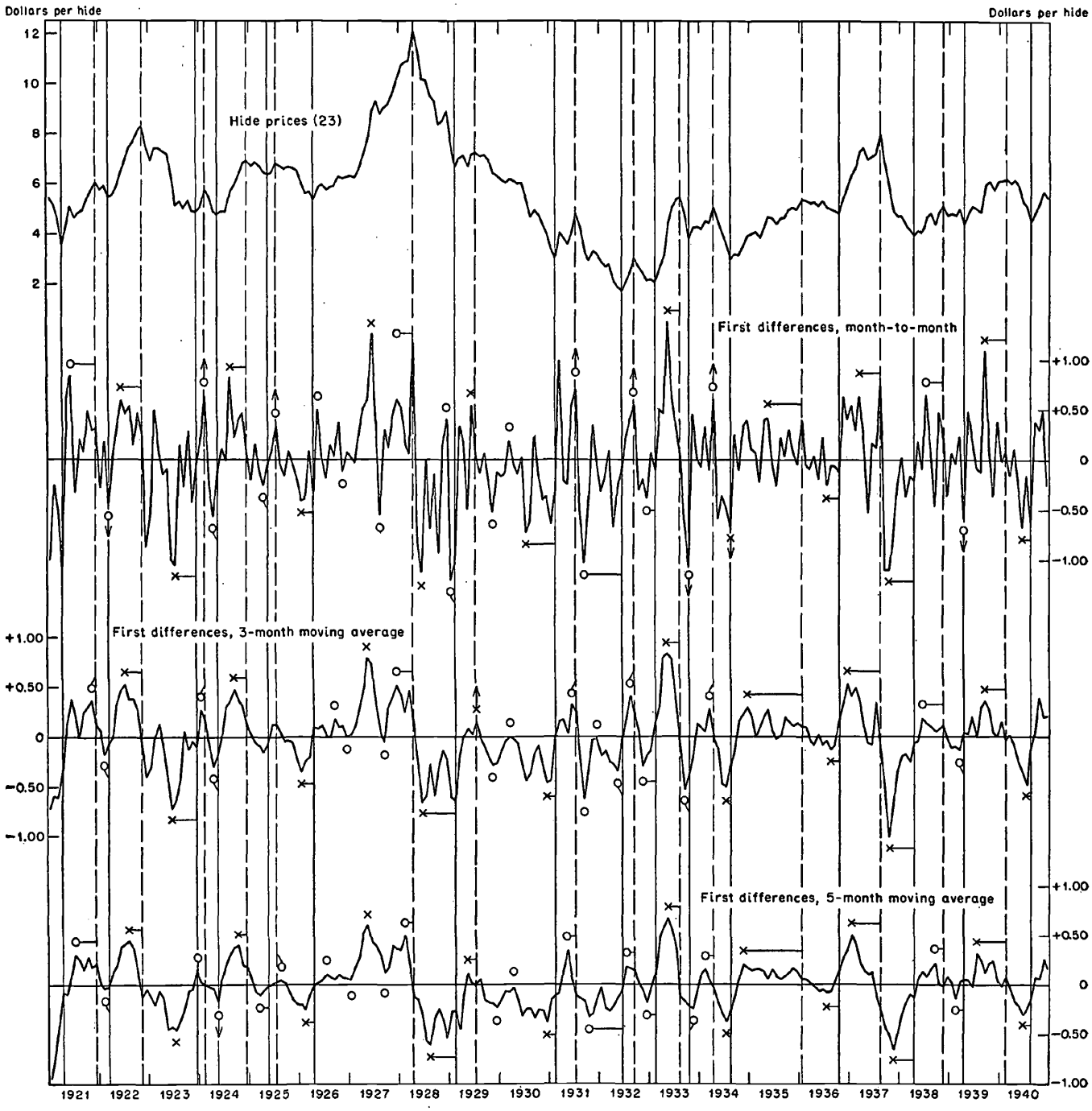
[1] The *specific* subcyclical amplitude of hide prices is 3.89 per cent of the average standing; this was exceeded by imports and by shoe and leather orders.

[2] See discussion in Chapter 5, last section.

[3] The average timing for hide prices when related to the SLH reference chronology is +0.1 month. There were 12 leads, 12 lags, and 3 synchronous turns with the following distribution: lags of 3 or 4 months, 3; of 1 or 2 months, 9; synchronous turns, 3; leads of 1 or 2 months, 10; of 3 or more, 2. Though the average timing at peaks was −0.5 and at troughs +0.6, there were virtually the same number of leads and lags at peaks and troughs

CHART 46

Hide Prices and Their Rate of Change, 1921–1940



Specific-subcycle peaks and troughs (broken and solid vertical lines) in *hide prices* (series 23 in Appendix B) are used as reference frame. For the other series, specific-cycle turns are marked by × and specific-subcycle turns by O. When a specific turn is matched with a turn in the reference series, a horizontal line or vertical arrow indicates the association.
The moving averages are centered.

for the smoothed data, and in the unsmoothed ones the only exceptions are two synchronous turns.[4] These fig-

and the consistency index for the difference between peak and trough timing is only 17.

[4] As the last line of the table shows, the consistency indexes for smoothed data are high. The fact that the tendency for peaks to lead the SLH chronology is stronger in the smoothed than in the month-to-month data seems to be due to a repeated conformation around the peaks—a few scattered very sharp rises with a tendency for the last ones to be highest, and a sharp drop thereafter. In these cases the turn in the smoothed series is, of course, marked earlier than in the unsmoothed ones. (Note the peaks in early 1928, 1931, 1937.)

TABLE 60

Timing of Subcyclical Turns in Rates of Change in Hide Prices, 1921–1940

	REFERENCE FRAME: HIDE PRICES PROPER [a] First Differences [c] in Hide Prices			REFERENCE FRAME: SLH-SUBCYCLE CHRONOLOGY [b] First Differences [c] in Hide Prices		
		Moving Averages			Moving Averages	
	Monthly	3-Month	5-Month	Monthly	3-Month	5-Month
Matched [d] turns, number:						
All	30	27	28	29	27	27
Lagging by						
Two months and over	0	0	0	1	3	1
One month	0	1	2	1	0	1
Synchronous	9	1	1	2	3	4
Leading by						
One month	3	11	3	7	4	2
Two months	3	3	12	5	8	5
Three or four months	6	5	3	7	5	10
Five months and over	9	6	7	6	4	4
Mean lead (−) or lag (+), months:						
All turns	−2.9	−2.8	−3.1	−2.8	−2.3	−2.8
Peaks	−2.9	−3.7	−3.6	−3.4	−3.5	−4.2
Troughs	−2.8	−2.0	−2.5	−2.3	−1.4	−1.5
Turns with lead of stipulated period * or longer:						
Lead, months	1	2	3	1	2	3
Turns, number	21	14	10	25	17	14
Percentage of all turns	70%	52%	36%	86%	63%	52%
Percentage of all peaks	60%	62%	43%	86%	77%	69%
Percentage of all troughs	80%	43%	29%	87%	50%	36%
Consistency index for difference between peak and trough timing [e]	+17	+23	+22	+22	+42	+44

* Note: Minimum length of lead required for turns in each of the first-difference series to have been observed prior to the turn in prices proper—one month longer than the arithmetic bias.

[a] Series 23 in Appendix B; see also Appendix B, sec. I.

[b] For a description of this, see Appendix A, sec. 8.

[c] First differences are month-to-month change or centered moving averages of month-to-month change.

[d] For the rules used in matching subcycle turns, see Appendix A, secs. 10a, b, c, and d.

[e] For a description of the consistency index, see Appendix A, sec. 11b, ¶4.

ures seem to indicate that forces of reversal manifest themselves in slackening rates of growth before actual reversals either in prices or industry affairs as a whole set in.

It would be interesting to know whether subcycles in hide prices tend to reach maximum rates of change at any one segment of their banks. Study suggests that, though there is some tendency for peaks (or troughs) in first differences not to appear at the earliest third of the rise (or fall), they seem equally likely to fall anywhere else, though the center third has some preference if we ignore the synchronous turns.[5] But these conclusions, though certainly not negative, are shaky. The location of the turns in the month-to-month first differences retains an element of willfulness that the jumpy character of the figures made it impossible to allay. The moving averages, on the other hand, are biased in the direction of short leads, as was explained in the last section of Chapter 5.

The second difficulty can be made irrelevant if we ask a slightly different question. At several points in this investigation, it has seemed that retardation of change in hide prices may be observed by the trade, and that it may touch off reactions that tend to reverse the direction of change. How often would a business-

[5] Specific-subcycle phases in hide prices were divided into three equal sections and a tally made of the third of the expansion phase in which each peak in first differences fell, and the third of the contraction in which the trough fell. (The month-to-month first difference series was used.) Five turns fell in the first, 12 in the second, and 13 in the last third. As we have seen, there is a strong tendency, due to random factors, for turns to occur in the last month; it occurred 9 times. Eliminating these entirely (on the assumption that could the random factor have been removed these turns would have been located in respective thirds proportionately to the other turns) the count was 5 in the first, 12 in the second and 4 in the last. Patterns constructed according to the usual National Bureau methods fail to show a reliably indicated tendency for retardation to be stronger at some stages of either specific or reference subcycles than at others. We used the Friedman rank significance test. See analogous discussion for retail sales in the last section of Chapter 5.

man have been able to observe from *past* prices that their rate of change had slackened before this information would be conveyed by a drop in prices proper? For month-to-month change, the two pieces of information would be available in the same month—the one when prices proper turned; consequently differences would tell it first for all but the synchronous turns. For the three-month averages, the information plotted in, say, April is actually average change in monthly hide prices for February through May [6] and thus would not be known until one month after the turn in prices proper in April; consequently first differences would only supply advance information at turns when leads of two months or more had occurred. If a still longer time were the basis of the judgment—such as the five-month average—only turns with leads of three months or more would carry the required information. The number of turns conforming to these required leads are given in one section of Table 60. For the three-month average—probably a good practical compromise between the two other series—the lead of at least two months would have occurred in about half of the turns. Study of the chart indicates that most of the more important peaks in prices would have been included. The table indicates that news in advance of the SLH reference turns would have been on hand a little more frequently.

I conclude that, for the period studied, hide prices move in sensitive conformity to fluctuations in the industry as a whole. Major banks fail to exhibit any regular shape. For minor ones, there appears to be a tendency for points of maximum rates of rise to precede the absolute peaks; and similarly for the falls. This retardation may often be observed in the recent history of price differences, both before actual turns in hide prices themselves or in industry affairs as a whole occur.

CAUSE OF PRICE CHANGE: THE ANALYTIC PROBLEM

How then, may the history of hide prices be explained? Two general insights prescribe the course of study. First, prices in the whole vertical sequence—prices of shoes, leather, and hides—are closely and complexly interrelated. What tanners are willing to pay for hides is rigidly circumscribed by what they can get for leather, and vice versa; though there are many gears in the association between leather and shoe prices, these also depend significantly on one another. Secondly, at each stage the sorts of factors that bear on prices are highly diverse. The pricing process is conditioned by basic supply and demand factors that are, of course, subject to change; in addition, it bears the imprint of brief and often evanescent alterations in actual market conditions as well as expected ones.

To trace the design of these varied elements is a perplexing problem. In endeavoring to attack it, I evoke the notion of a schedule—the quantity that would be supplied or demanded at each possible price, had nothing else changed. It helps to separate conceptually the pure association of price and demand from the other things that do in fact change.[7]

The story is found to deal almost entirely with this matter of how the other things do change. Indeed, there seems to be little to say about the shape of the industry demand curve, though the supply curve doubtless has an upward slope. Thus the major explanation of the course of hide prices over time involves the way shifting demand schedules of uncertain shape intersect an upward-sloping supply schedule (which also undergoes shifts, though lesser ones). The point of intersection (where the amount sellers try to sell is equal to the amount buyers want to buy) roughly determines the price toward which trades are likely to gravitate in the short run. However, so little is known about the shape of the aggregate schedule (much less about its marginal characteristics) that the equilibrium tendencies of the system cannot be specified. This failure, is one of the least of our troubles, for the shifts in the demand and even in the supply schedules are so strong and so frequent that any drift of prices toward an equilibrium position can at best constitute a very small part of the actual course of hide prices in this fickle environment.

A far more damaging obstacle in the way of developing a simple and useful model for change in hide prices, which might be put to an empirical test, is the usual two-way causality. Shifts in demand and supply schedules cause changes in the price at which hides sell; but price and its rate of change influence expectations, which, in turn cause shifts in the schedules.

Obviously, then, it would be foolish to attempt any strict quantitative formulation of the factors that operate on hide prices. In a relaxed frame of mind, we endeavor to construct a crude model of the process of change by analyzing the factors that play on hide prices with the help of that venerable notion, the schedule. Using time series that approximate the requirements of the model, we attempt to test it, however inadequately, by means of multiple correlation.

[6] Obviously a turn in prices cannot be safely located during the first month after the peak. But whatever delay is required to make sure of the turn in prices proper, it would also be superimposed on the delays already discussed that are necessary to ascertain the turn in first differences in prices. The *relationship* between the differences in prices and prices proper should remain approximately the same.

[7] Alternatively, the factors generating shifts can be thought of as additional dimensions of a multidimensional schedule complex —or even as occasioning the construction of new schedules applying to conditions that have altered in specified ways.

Model for Change in Hide Prices

To focus what has been learned about the factors that influence prices, we ask three major questions. How would changes in supply and demand respond to alterations in price under the artificial assumption that nothing else had changed—what, in other words, is the shape of the industry supply and demand schedule? What conditions of basic supply and demand cause substantial shifts in the amounts that will be demanded or supplied at a given price, other things the same? What immediate and short-lived conditions likewise cause such shifts?

SHAPE OF SUPPLY AND DEMAND SCHEDULES

In the previous chapter we discussed at length the various components of the hide supply—the part that is a largely automatic by-product of the meat-packing industry and the part that tends to move more freely to central markets of the country when prices are high enough to defray costs of shipment and several intermediate handling costs and profits. The need to utilize these high cost supplies when demand is high means that total demand can be satisfied only at a relatively high price for the final units—a high marginal price. The higher the price, the larger the number of hides that are offered at central markets. Thus the industry supply curve slopes upward to the right, other things the same. This is the conventional, textbook picture of supply schedules. As to the marginal properties of the schedule (the pattern of its first differences), we cannot say. It may well be that the slope increases somewhere around the middle of the range as additional increments draw more and more on supplementary sources and less and less on the domestic wholly by-product supply, but this is mere conjecture.

Turning to the basic price-quality aspects of demand, the first question is where in the vertical sequence should the demand for hides be considered. The answer seems to be, at the point of consumer demand for leather goods made of cattle-hide leathers. For only when the final user makes his decision is it possible to distinguish between the underlying or finally determining association between price and demand, as distinct from the innumerable factors that cause intermediate demand schedules to shift in response to other basic, as well as market-linked, phenomena.

The regression analysis of consumer shoe buying in Chapter 6 indicated that consumer demand for shoes may be sensitive to change in price. In Chapter 11 we learn that retailers behave as if it were, at least with respect to explicit change (rather than change disguised by quality change). How great the sensitivity actually is cannot be ascertained. But whatever it is, the impact of the price sensitivity of final consumer demand for shoes on the demand for hides will certainly be greatly muted as a result of the latitude, especially for shoe manufacturers, between input and output. In general, it seems likely that the total demand for hides, all other things strictly the same, will be smaller when hide prices (and consequently shoe prices) are higher. But departure from the vertical of this fundamental demand curve for hides (a reflection of the curve for shoes) is probably small within experienced ranges; we really know very little about it. Any significant impact of consumer markets on demand for hides must result from *shifts* in the fundamental demand schedule. As to the marginal properties of the schedule we know nothing at all.

SHIFTS IN SCHEDULES: BASIC FACTORS

Factors that, conceptually, cause shifts in schedules —supply as well as demand—occur all along the line. The price at which one commodity sells is not independent of the value of the dollar—the price at which all other commodities sell. This affects supply and demand at every level. In addition, many factors within the industry have a more particular incidence.

First, as to the fundamental supply of hides: It seems probable, other things the same, that packers and hide dealers will supply more hides at a given price when the current domestic kill is high than when it is low. Substantial variation in the size of the kill takes place both in response to broad swings in the size of the cattle population and to changes in the proportion killed at a given time. The estimated size of the cattle population at the beginning of each year (1921–1941) varied between a maximum in 1934 of 112 per cent of the average for the whole period and a minimum of 89 per cent in 1928—a range of 23 percentage points. Similarly computed, cattle slaughter reached its high point of 118 per cent of the average in 1941 (the next highest was 114 in 1936) and its low of about 86 repeatedly in the period between 1928 and 1932—a peacetime range of 32 percentage points.[8] If it were true that those hides obtained as a simple by-product of the meat and milk industry might be supplied for less (considering their quality) than the rest of the supply,[9] one would expect that alterations in the slaughter of this

[8] *Livestock, Meats and Wool Market Statistics and Related Data, 1944*, Dept. of Agriculture, 1945, pp. 4 and 17.

[9] Pricing procedures in the industry may tend to counteract this influence, at least partially. A large part of the strictly by-product supply is in the hands of the "big four" packers. It seems likely that these strategically placed sellers estimate, in effect, the marginal price at which the current demand is likely to be filled, in view of the rising supply schedule and its current level, and offer hides at this price, at least in the first instance. Such a procedure may tend to put the by-product supply on a par with the rest.

order of magnitude might cause an upward shift in supply schedules when slaughter was small (as in the late twenties and early thirties) and a downward shift when it was high (in the middle thirties and before the war).[10]

The most obvious factor making for shifts in final demand is changes in consumer income. This point was certainly underscored in our study in Chapter 6. However, the work also raised a question as to the representativeness of the 1929 to 1941 period; other factors may play a more notable part in determining the number of shoes consumers buy in periods when income does not undergo such severe change. We also found evidence that drastic changes in consumers' expectations about prices and fear of scarcity may cause shifts in demand. Finally, changes in the price at which other consumer goods sell must influence the willingness of consumers to spend money on shoes. For present purposes, however, the pattern of consumer buying, whatever its cause, may be read as depicting one group of factors making for fundamental shifts in the demand for hides.

As consumption-based changes in demand move toward earlier stages of fabrication, the physical requirements of efficient work flow often dictate corresponding changes in procurement. As they impinge on tanners' hide buying, these changes ought to be thought of as shifts *associated* with those caused by changing consumer demand. We found that there probably was a tendency for retailers to need somewhat larger stocks when sales were high than when they were low. Shoe manufacturers likewise doubtless changed their in-process leather stocks in accordance with changes in output; also, the level of output and its changes was at least one of the many factors bearing on the size of their raw stocks of leather. But when it came to tanners, the association between stocks and output was, if anything, inverse. As buyers try to increase their stocks, finished stocks of suppliers are drawn down. This and other factors cause shifts in supply schedules all along the line that are associated with shifts in demand curves of each set of buyers. The net effect is that shifts in tanners' demand for hides that may properly be thought of as linked to shifts in consumer buying of products made from cattle-hide leathers, are doubtless somewhat larger than fluctuations in consumer buying itself. However, it seems likely that they are not as great as commonly supposed if we mean, as is proper in this context, changes associated with the physical requirements of efficient production under hypothetically stable market prospects.

[10] This could also be viewed as a change in the shape of the supply schedule. For the upward slope of the schedule is mainly the result of the need for larger total quantities of hides to be supplied in increasing proportion from hides other than the true by-product group. As the current slaughter decreased, the steeper section of the supply schedule might move to the left.

A more convenient way to measure the impact on price of relative changes in by-product supply might be to calculate a ratio of current slaughter to leather consumption in finished leather goods. My impression is that the industry does tend to think in these terms and to study these figures in formulating their expectations about prices.

SHIFTS IN SCHEDULES: MARKET FACTORS

Short term shifts in demand schedules cause the retailer, wholesaler, or manufacturer of shoes, or the leather tanner to wish to buy more of the shoes or leather that he expects to need in the next span of months earlier rather than later; shifts in the opposite direction cause him to buy less. In consequence, the amount he is willing to buy at a given price rises or falls. The grounds for these changing judgments include the volume of a firm's sales and its rate of change, the constitution of orders with respect to their stage of completion and delivery terms, the size of stocks of the firm in question, and those of its suppliers and customers, expectations about prices and delivery conditions and the assurance with which they are held, profit margins, liquidity requirements, and the availability of capital, to say nothing of other prices, conditions in other commodity markets and general business. In the last analysis, considerations involve *actual* market conditions and *expectations* about conditions in the relatively near future.

Similar considerations affect the willingness of sellers to dispose of their wares at each possible price and thus cause short term shifts in the supply schedules of sellers at each stage. The correspondence in the reasons for which both supply and demand schedules shift is, in part, a simple response of the attitude of buyers to those of sellers, and vice versa. In part, both sets of judgments are based on similar considerations of the sort just listed. As we shall see in a later section, however, the reactions do not necessarily cause symmetrical shifts in supply and demand.

At any one stage, judgments at all other stages, embodied in a sale, an order, a price, a change in stocks, affect judgments at all other stages, especially at earlier ones in the vertical chain. Our studies suggest that these market-prospect-based alterations in the willingness to buy and sell tend to take place in the same direction and at the same time all through the vertical series of operations. Thus, shifts in tanners' demand schedules are a type of résumé of changing opinions of buyers and sellers all along the line.

Representation by Time Series

Can these insights aid in explaining the course of hide prices over the years in quantitative terms? In the final analysis, the answer hinges on whether the more

important factors bearing on prices can be represented by time series, so that their several impacts may be roughly measured. It hinges also on whether adequate expression can be given to the two-way causality inevitably involved in a problem of this sort. I shall not try to find a solution for either of these final problems and thus to represent the interaction of supply, demand, and price. Instead, I want simply to utilize what we have learned about conditions of supply and demand, and how these conditions change, to select certain readily available time series in the industry that have a statistical association with the course of prices. Inevitably, the causal association underlying the statistical one is complex. Nevertheless, the calculations are, I believe, instructive.

The preceding discussion suggests that conceptually, the bulk of actual changes in hide prices will result from shifts in the demand schedule for hides and movement along the supply schedule. There is little reason to believe that demand, in the industry as a whole, were other factors really held constant, is highly sensitive to small changes in actual prices, whereas there is every reason to believe that many other factors do, in fact, change most substantially over long as well as short periods of time. Supply, on the other hand, appears to be sensitive to the price offered, other things the same; and other things, though they certainly do change, probably do so somewhat less than in the case of demand. Consequently, a very substantial portion of the change that actually takes place in the number of hides supplied at each price may be attributed, schematically, to movement along the industry hide-supply curve.

The preceding discussion also suggests that shifts in demand schedules for hides start with the general price level, changes in consumer income and the other factors affecting consumer buying except shoe price itself. But as demand moves toward earlier stages, changes in the quality of the product blur the extent to which shifts in consumer buying impinge on the demand schedules of retailers, shoe manufacturers, and tanners. Two other important sorts of alterations take place. The first results from elective changes in inventories that for certain of the productive agents are necessary to maintain efficient production at varying levels. The second results from the extremely complex set of factors subject to frequent and quite drastic change that involve the character of expectations about market conditions, price, and actual stocks, and determine the relative eagerness of buyers and sellers. These constellations influence the extent to which demand and supply schedules at each market stage shift. The trades take place in the light of these and other factors; the resultant level of buying, price, and other circumstances influence in turn how demand and supply schedules shift at other points along the way from consumer to the hide markets.

In attempting to find time series to represent these several factors, we have an option as to how far back toward the finished product it is worthwhile to go. Because of the elusive character of the link between demand for shoes and for cattle-hide leather, it seems preferable to start at the point of leather-goods manufacturers' purchases of cattle-hide leathers. I select the time series on leather receipts of leather-goods manufacturers to represent the basic shifts in sales in the light of which tanners' demand for hides must be formulated.

This leaves the problem of representing shifts in supply and demand schedules in the hide markets and in the course of tannery operations. The relevant judgments of businessmen are based on almost anything in the economic environment and thus can hardly be impersonated by a time series. The *results* of the judgments, however, often seem to involve short-term shifts in stocks on hand and on order. As opinion grows optimistic, producers try to lengthen their market position; as it grows pessimistic, to shorten it. This alternating lengthening and shortening of the position of buyers of leather or hides (shoe manufacturers and tanners) is associated with an alternating shortening and lengthening of the stocks of sellers (leather stocks of tanners and hide stocks of packers or hide dealers).

But these shifts in the stocks of buyers of leather and of hides relative to those of sellers not only reflect a complex set of judgments, they also themselves provide the basis for further judgments. The prospect for rising prices and tight deliveries improves when sellers' finished stocks are known to decline and when buyers are known to be extending their market position; conversely, knowledge that stocks of sellers are rising and those of buyers falling causes people to expect falling prices and plentiful supplies. What is more, the hide buyer and seller are likely to take into consideration not only their own stocks but those at later stages. The relative sizes of buyers' as compared with sellers' stocks of hides and of leather, and perhaps even of shoes, both reflect and actually constitute a wide range of factors that are considered in deciding how many hides to buy or sell at a given price, other things the same. As the size and relationship among these stocks change, demand and supply schedules for hides would presumably shift in response to shifting market prospects.

To represent the shifting relationships between buyers' and sellers' stocks, we ignore changes in shoe stocks [11] and calculate the ratio of leather in the hands

[11] Even if we had adequate data on shoe stocks, I would hesitate to include them because of the considerable involuntary element in their size, especially at certain times. But the in-

of leather-goods manufacturers and of raw and in-process hides in the hands of tanners—stocks of buyers—to finished leather in the hands of tanners and hides in the hands of packers, butchers, and hide dealers—stocks of sellers. We call this series the stock-location ratio.

These two time series, then—receipts of leather by leather-goods manufacturers and the stock-location ratio—are taken to represent primarily the shifts in the amounts of hides that would be bought at a given price as the result of shifts in demand schedules. Unavoidably, some movement along the schedules will slip in. Also, the representation of shifts is not even theoretically complete. For though the effect of shifts in demand and supply schedules for shoes and leather on the volume of sales in each of the markets is covered, in some sense, in our statistics on shipments and stocks, the effect on the prices of shoes and leather is not. In view of the inflexibilities in the two markets, especially in the former, it is possible that not only do the earlier prices in the sequence have the obvious effect (through costs) on the later ones, but the later prices have an influence on the earlier ones; this influence needs to be represented in order to explain the course of hide prices. Since it is not represented, the importance of the omission will have to be checked. Another major omission which needs to be studied along with this one is the influence of the price level itself.

Finally, some short-term shifts in the supply schedule are represented by the stock-location ratio. Even certain more fundamental shifts in the supply schedule caused by variations in the cattle population and the kill may be implicitly represented by the time series. For buyers and sellers all along the line are highly aware of changes in the size of the kill and its relation to change in requirements, and such awareness helps to form their expectations with respect to prices and other market conditions. Actions with respect to stocks thus may also comprehend these shifts in what we have called underlying supply factors. The statistics as well as the logic of the case seem to suggest that this may be the case.[12]

In general, then, we picture a gently upward-sloping supply schedule ("gently" because of the considerable price sensitivity of supply) that is subject to some short-term shifts. The points at which it is intersected by the extensively shifting demand schedule for hides will presumably be the sequential levels toward which prices gravitate in the short run.

Multivariate Analysis of Hide Price

As a rough and ready check on the eligibility of the formulation and on what it implies about behavior, we resort to multiple-regression analysis in which the monthly course of hide prices (1922–1939) is "explained" by leather shipments and the stock-location ratio. The resulting calculations are pictured in Chart 47.

Certainly the over-all impression conveyed by the chart is that of a rather startling power of these two variables to reproduce the course of hide prices. There is virtually not a movement in actual hide prices that does not have a counterpart in the estimated ones, and this is true not only of cycles and subcycles but of fluctuations too small to be marked even as subcycles. Furthermore, the relative importance of the several fluctuations are more or less alike in the two series. These impressive similarities suggest that causal factors that actually influence the course of hide prices are represented in the two independent variables. But it is important to bear in mind that there is certainly some causal association that flows in the reverse direction—from hide prices to the stock-location ratio. For we have seen how expectations about hide prices influence the size of inventories, whereas expectations about prices seem to be predicated in part on actual prices and their rates of change. It does not seem likely, however, that the primary association portrayed by the chart runs in this reverse direction, since it is current, not earlier prices, that are associated with current stocks,[13] and even so, the estimates lead actual prices at a considerable number of turns. Realizing, then, that there must be some two-way causality represented by the calculation, we proceed to concentrate on what is probably the major direction—the impact of the two variables on hide prices.

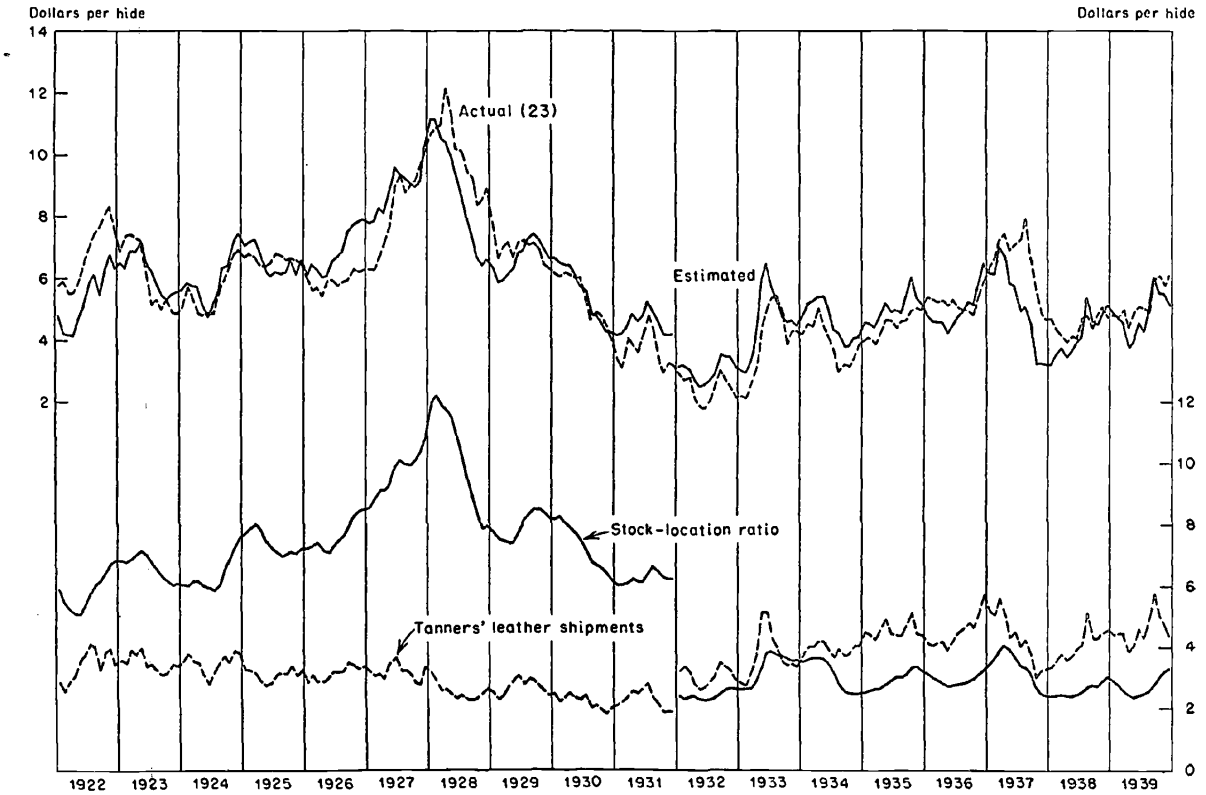
adequacy of the available statistics add a further reason for not including them in the multiple-regression scheme. We shall, of course, need to check the unexplained residuals for possible traces of their influence.

[12] The best indicator that I can devise for changes in the size of the automatic supply relative to total requirements is the ratio of domestic consumption of cattle-hide leather to federally inspected slaughter (changes in the latter series would presumably parallel those of the meat industry in general, though the absolute size would differ). Fluctuations in this ratio seem to bear more than a passing similarity to those of our stock-location ratio. Twenty-four turns are matched in the two series, and their average deviation from the average lead of 0.6 month is 1.6 months. Allowing for a lead of one month for the flow relative to the stock-location ratio, 29 per cent of the months, 1921 to 1940, are in unlike phase.

[13] If orders were influenced by the expected change in prices (the measure of monetary advantage from ordering ahead or waiting), and if expected change was based on actual change for the past three months, then additions to stock on order and actual prices (which lag rates of change by about three months) could be synchronous at turns. But in Chapter 12, we seemed to find that the growth of confidence plays an important part in determining when people act on whatever expectations they have started to hold, and this factor will operate more slowly—probably waiting on the course of prices proper.

CHART 47

Contribution of Each of Two Variables to the Estimation of Hide Prices, 1922–1939



For the two estimating equations, 1922–1931 and 1932–1939, see the text.

The following equations were developed by the method of least squares:

$$1922\text{–}1931: P = -3.98 + 6.089R + 1.657S$$
$$1932\text{–}1939: P = -2.46 + 2.534R + 2.443S$$

where P is price per hide in dollars
R is the stock-location ratio
S is leather shipments in millions of equivalent hides

Reference to the average value of these variables in the first three lines of Table 61 may help to give meaning to the figures.

The first point of interest about the equations expressing the association of these variables to one another is the fact that there are two of them. Preliminary study of the data suggested that the relative importance of leather shipments and of the stock location ratio changed in the course of the period under review. The latter was less important after the severe depression of the thirties than before. This statistical phenomenon would mean that shifting market prospects (the chief factor represented by the ratio) exerted a stronger influence on hide prices relative to the demand factors represented by leather shipments in the earlier period than in the later. People in the industry seemed to be in general agreement that "speculative factors" had diminished in importance all along the line, and that the first impulse in this direction, given by the calamitous break after the World War I boom, took firm root during the 1929 to 1932 depression. Consequently, the stretch of years was interrupted at the close of 1931 and equations were fitted to each period separately by the method of least squares.

The calculations confirmed the preliminary observations and the trade chronicles. The β-coefficients shown in Table 61 indicate that whereas prior to 1932 the stock-location ratio had explained almost three times as much of the total variation in hide prices as did leather shipments, after that date the volume of leather shipped was the more important. In both periods, however, as the relative standard errors of their regression coefficients suggest, both variables played a significant part.

What that part was can be read from the equation. However, it is important to remember that the figures are at best extremely rough approximations. Their approximate character is not merely a function of their statistical reliability, even were this properly measured

TABLE 61

Hide Price Regression: Supplementary Information, 1922–1939

	1922–1931	1932–1939
Average value of each variable:		
Price per hide, dollars (23)	$6.55	$4.58
Stock-location ratio (121) [a]	1.24	1.16
Leather shipments, millions of hides (89)	1.80	1.68
Coefficient of multiple correlation	.86	.81
Standard error of estimate:		
Dollars	$0.92	$0.72
Percentage of average hide price	14.0%	15.7%
Number of times regression coefficients exceed their standard error of estimate:		
Stock-location ratio	18.3	5.9
Leather shipments	6.6	8.8
Elasticity coefficients at average value of the series: [b]		
Stock-location ratio	+1.2%	+0.6%
Leather shipments	+0.5%	+0.9%
β-coefficients: [c]		
Stock-location ratio	+.84	+.39
Leather shipments	+.30	+.57

[a] The size of the ratio is a function of its five components; I give their average values for, roughly, 1923 to 1940, in millions of hides or equivalent hides of leather:

Numerator of the ratio:	
Leather of leather-goods manufacturers	2.64
Raw hides of tanners	1.60
In-process hides	4.93
Total	9.17
Denominator of the ratio:	
Finished leather of tanners	4.68
Hides of packers, butchers, or dealers	2.82
Total	7.50

[b] At average values for all variables, the coefficients give the percentage change in the dependent variable associated with a 1 per cent change in each independent variable.

[c] β-coefficients give the proportion of the standard deviation of hide prices that is "explained" by the standard deviation times the regression coefficient of each independent variable; thus:

$$\beta_{12\cdot34} = b_{12\cdot34}\frac{\sigma_2}{\sigma_1},\ \beta_{13\cdot24} = b_{13\cdot24}\frac{\sigma_3}{\sigma_1},\ \text{etc.}$$

by the coefficients given in the table.[14] The further difficulty will appear later when we see that at least one other factor, shoe prices, should doubtless have been added; consequently, failure to have done so biases all of the coefficients.

The equation can be interpreted as implying that, at average levels, when tanners' shipments of leather rose hide prices rose by almost the same percentage amount in the later period and by about half as much in the earlier period (Table 61). Though we cannot put much stock in the actual size of these figures, the general positive association falls in with our hypothesis.

[14] I refer to the fact that the requirements of correlation theory are most inadequately fulfilled by most time series, especially seasonally corrected monthly ones.

The equation also indicates that, at average levels, when the relative amount of stocks of hides and leather in the hands of people waiting to process it rose relative to the amount in the hands of people waiting to sell it (say by 1 per cent at its average level) hide prices rose over half as much in the later period and by as much or somewhat more in the earlier one. The economic meaning of the positive association was discussed in formulating the hypothesis.

Though the two variables seem to explain a good portion of the monthly course of hide prices, neither the logic nor the evidence suggests that much does not remain to be explained. For one thing, peaks and troughs in the estimates now lead and now lag those in actual prices—there are 10 leads, 10 lags, and 8 synchronous turns, with the average timing virtually synchronous. But ignoring leads or lags of a single month, the difference between the two series seems more marked; the estimates lead at 8 turns by two months or more and lag at 4. Reference to the chart suggests that the leads occurred primarily at times when the lethargic price of cattle-hide leather shoes had been spurred into motion. Comparison with Chart 46 indicates that the leads occurred also at times when the rate of change in actual prices had retarded.[15]

A difference in the timing of actual and anticipated prices may be thought of as one of the ways in which faulty estimation manifests itself. Another way is in different intensities of fluctuation. Both are combined when we simply subtract anticipated from actual prices. This series (unexplained differences) is shown in Chart 48; it has, incidentally, been extended on the basis of the formula to two additional years, 1921 and 1940.[16]

[15] As the first section of this chapter brought out, rates of change typically retard before hide prices proper turn. The leads occur without exception, and tend to be longer at the turns in actual prices at which estimated prices turned down ahead of time. The number of turns having specified timing associations with respect to turns in prices proper are given below for three series combined—month-to-month differences, centered three-month and centered five-month averages; they are classified on the basis of the timing association between estimated and actual hide prices, given in the parenthetic figures in the stub:

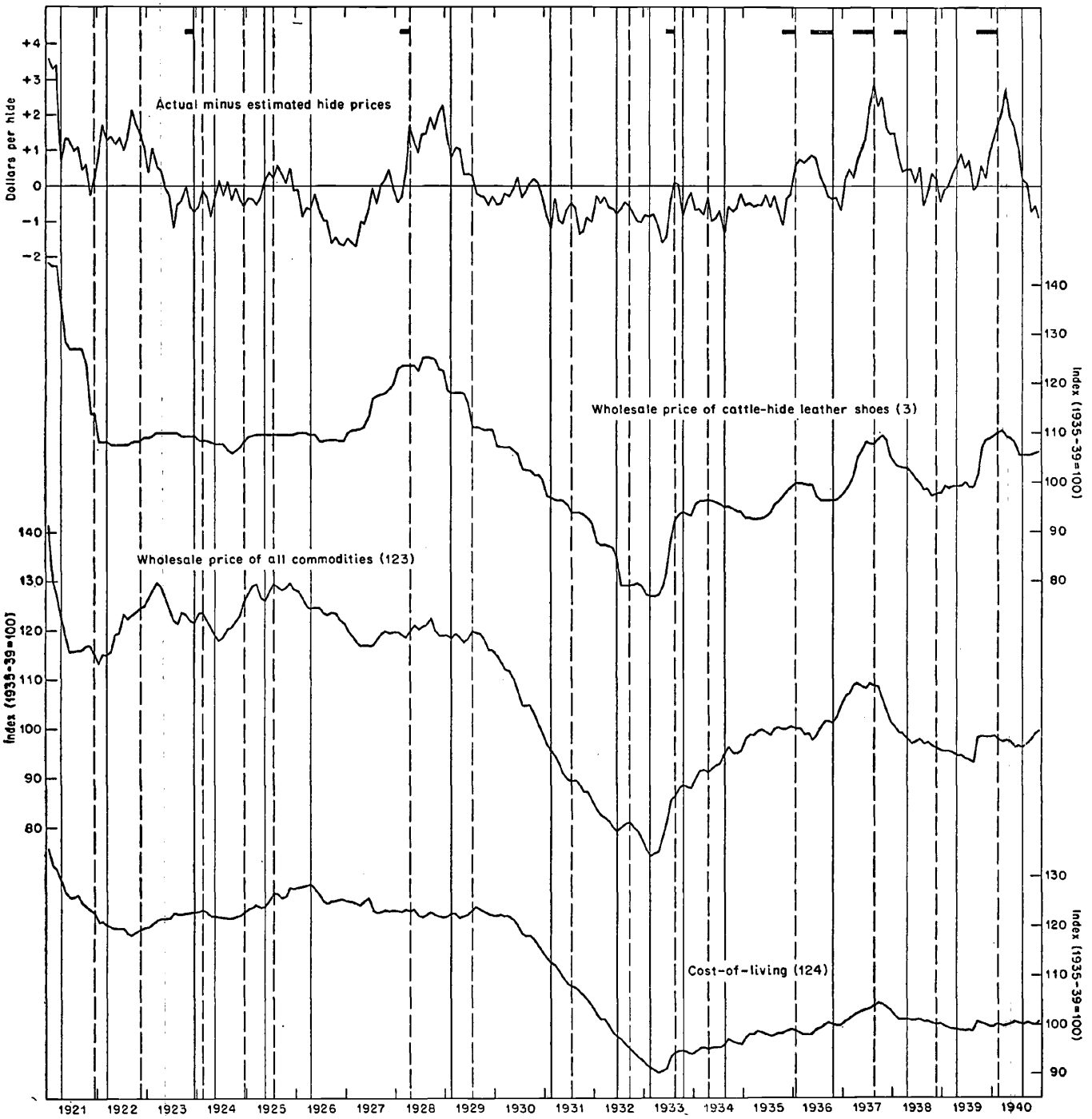
ESTIMATED PRICES COMPARED WITH ACTUAL PRICES	FIRST DIFFERENCES IN PRICES (THREE SERIES) COMPARED WITH PRICES PROPER: *Lead by Two Months or More*	*Lead by One Month, Synchronize, or Lag*
Lag (10)	9	19
Synchronize (8)	13	10
Lead (9)	25	1

Note: The comparisons cover the period 1922 to 1939 only. In two cases, turns in first differences in one of the three series cannot be matched with prices, and consequently the figures in each line sum to less than three times the parenthetic figures in the stub.

[16] For 1921, the formula fitted to 1922 to 1931 was used; for 1940, the one fitted to 1932 to 1939.

CHART 48

Actual minus Estimated Hide Prices Compared with Selected Series, 1921–1940



Specific-subcycle peaks and troughs (broken and solid vertical lines) in *actual hide prices* (series 23 in Appendix B) are used as reference frame. Bars at top indicate the lead of turn in estimated over related turn in actual hide prices.

Does examination of the deficiencies of the estimates help to suggest how to improve them?

Although many subtleties of the process of hide-price formation have not been taken into account by the two variables, the most vexing omission is that of prices other than of hides. For certainly, no one price is independent of other closely related prices or of the price level as a whole. Other finished-goods prices influence consumer demand for shoes, and the same may be said of other wholesale prices and the demand for leather

and hides. Other wholesale and open-market prices also influence market-prospect-tied demand for leather and hides. Shoe prices may influence the price at which hides can be sold. At least part of several of these influences ought to be caught by the time series that have been used to explain hide prices: receipts of leather should reflect the impact of differences between the course of shoe prices and other prices that consumers must pay; the stock-location ratio should respond to the influence of other wholesale prices on market prospects. But it is possible that the representations are not adequate, and besides, important factors are left out. The empirical evidence may help to specify the probable extent of the error and how to correct it.

To see what the regression analysis has to say on this point, the residuals are compared to other prices in Chart 48. The series selected are wholesale prices of cattle-hide leather shoes, wholesale prices of all commodities, and the Bureau of Labor Statistics' index of living costs. Of the several series, the price of cattle-hide leather shoes shows the greatest similarity to the residuals. This is evident at the times when shoe prices move dissimilarly to the general price data—1926 through 1929 and 1934 through 1936. The bars at the top of the chart indicate the periods when estimated prices turned down or up ahead of actual hide prices. These areas certainly seem to occur when shoe prices persist in a previously established course of change and thus may have tended to support or depress hide prices (though not without hide prices undergoing retardation) after the other factors covered by the two explanatory series had turned down or up, respectively. The empirical data indicate, then, that the addition to the regression formula of a price index, especially one of cattle-hide shoes, would improve its power to estimate hide prices.

Certainly it seems sensible that this should be the case. Other prices condition the value of the dollar in terms of which hide prices are quoted and thus must play some part in the history of individual prices. Nevertheless, the active causal links between the price of hides and of other finished commodities may well operate most directly through the price of the finished good, shoes, which, in turn, both reflects the price level as a whole and shares many causal factors with it. In addition, there is every reason to believe that explicit changes in shoe prices will occasion shifts in demand and even supply schedules for hides.[17] Considerable change in hide and leather prices can actually occur without corresponding change in the price of shoes. Because shoe prices are hard to change, alterations in cost are ordinarily parried by the exercise of timing options in buying, changing input, changing product mix, and permissive changes in margins per unit of output. When overt price changes are undergoing resistance, shoe manufacturers, in all probability, are harder traders in a rising market and easier ones in a falling market than when their own changes in cost can be more readily reflected in prices to their customers. It seems likely that such resistance manifests itself in a slower rate of change of hide and leather prices than would otherwise apply. If this is the case, hide prices will be higher, other things the same, when an overt rise in shoe prices is taking place and lower when the shoe price index is falling.[18] Considerably less directly, the same argument would apply to the wholesale-price level as a whole or to retail prices as reflected in the cost of living. Both these prices and the factors that play upon them are important determinants of shoe prices. These several considerations serve to rationalize the suggestion in the empirical data that shoe prices bear more strongly on hide prices than the retail or wholesale price level as a whole.

In any event, both on theoretical and empirical grounds, cattle-hide shoe prices, or perhaps one of the general price indexes, ought to be included as a third explanatory variable in the hide-price regression. But it seems wiser to refrain from taking this step now. From what I have heard, it is likely that the relative contribution of the forces represented by the three variables—leather shipments, the stock-location ratio, and shoe prices (or general prices)—would differ before and after World War II, just as the contribution of the two variables utilized differed before and after the depression of the thirties. Telling explorations should therefore include the postwar years and these lie outside of the scope of this study. In addition, the problem invites experiment with equation systems.[19]

A search for traces of other neglected factors in the residuals from the regression analysis yielded only negative results. None of the large number of time series chosen to represent such factors showed timing associations that seemed to suggest that a direct im-

[17] This impact of shoe prices on hide prices should not be confused with the reverse process—the impact of hide prices on shoe prices. The importance of leather in the cost structure of shoes and the association between hide and leather prices make it clear that shoe prices must respond to major changes in the price of hides, though with a substantial lag. The empirical observation to be explained is not a lagging association between hide prices proper and shoe prices but the largely synchronous association that seems to exist between major turns in the unexplained element in hide prices and shoe prices.

[18] The same argument might be repeated for leather prices were it not for the fact that leather prices typically change in supple association with hide prices, with causality running definitely in two directions. Consequently the cost of leather prices cannot be identified as a separate element in the analysis.

[19] See comments above and in Chapter 12 on the effort to measure the impact of hide prices on inventory investment of shoe manufacturers.

pact on prices, other things the same, might be present.[20] Whether this would still have been the case had shoe prices been included as a third independent variable before the residuals were computed, we cannot say.

Hide Prices and the Process of Fluctuation

Throughout earlier chapters of this book we have seen how prices, and expectations concerning them, influence business decisions affecting buying or output; in this chapter we have seen how these decisions appear to influence prices. Clearly, the association between hide prices and fluctuation in the shoe, leather, hide industry is highly complex. It operates at many levels: at the level of each of the several vertical stages and at the level of overt action or of underlying judgment. It operates in two directions: as cause and effect.

But in spite of this awkward complexity, it will be worthwhile to take a moment to consider whether, and if so how, prices contribute either amplitude or timing acceleration to the process of fluctuation in the hide and leather industry. Some of the doubtful elements of the story are included, together with the more reliable ones without embarrassing the description by constant reference to their speculative character. Even more than most others in this book, this section should be read as providing a very tentative hypothesis, the value of which will lie in its power to stimulate rather than to inform. It will be profitable to discuss first the impact of prices on the amplitude and then on the timing of fluctuation.

HIDE PRICES AND THE AMPLITUDE OF FLUCTUATION

The association between hide prices and output comprehends relationships that mute as well as amplify subcyclical and cyclical fluctuation in output. They mute fluctuation partly because more goods tend to be supplied and less demanded if the price is high, other things the same. Fluctuation in prices and in demand both parallel general business conditions. Consequently demand is less high in prosperity than it would be were prices also not high at the same time, and less low in depression when prices are low.

On the other hand, there are a set of influences causing fluctuation in prices and output to reinforce one another. Thus prices act as an amplitude accelerator for business fluctuation. This group of influences operates primarily through expectations about prices and other matters that govern how timing options in buying and selling are utilized. Expectations about prices and the confidence with which they are held are based, in part at least, on the level and recent history of prices and of change in prices. Furthermore, expectations about other matters, such as delivery periods and selections, may likewise be influenced to some extent by the course of prices. Conceptually, these expectations occasion short-term shifts in demand and even in supply schedules. When markets are expected to tighten, more shoes, leather, and probably hides are bought, and at a higher price than would otherwise be the case, other things the same. The additional buying tends to validate the expectations, which consequently are thereby reinforced, at least as to the firmness with which they are held, thus activating further market extension. When slackening markets are expected, fewer shoes, leather, and probably hides are bought, and at a lower price than would otherwise be the case, other things the same, and expectations tend to fulfill themselves. These tendencies for price both to mute and to amplify fluctuation in output occur at each of several vertical stages. Our studies suggest that the muting influence would be somewhat more important in the buying of consumers and tanners and the amplifying influence more important in the buying of retailer and shoe manufacturer.

But the vertical sequence of prices themselves seems to have some bearing on the character of the association between fluctuations in output and price. On the one hand, the tolerable limits within which buying and selling prices may differ probably place some sort of limitation on fluctuation and thus tend to mute its amplitude. We noted in Chapter 12 that the differences between the relatively inflexible price of shoes and the flexible price of leather seemed to move only within certain bands of variation. Together with other considerations, this suggested that transgression of these bands tended to reverse the course of change. In connection with the association of leather and hide prices, corrective measures seemed intimately incorporated in day-to-day procedures.

On the other hand, the studies recounted in this chapter hint that hide prices may be higher, other things the same, when shoe prices are high and lower when they are low. In other words, the amplitude of price fluctuation at the earliest stage is probably increased by parallel fluctuation at the latest stage. This is not the obvious statement that the course of prices of finished goods must to some extent parallel those of their major materials. It means that in a given institutional setting, the amplitude of fluctuation in hide prices is augmented

[20] The ratio of cattle-hide leather consumption to movement into sight from federally inspected slaughter was one of the first variables compared. Several other ratios of flows of differing degrees of automaticity were studied. Relationships between leather and hide prices, between leather and shoe prices, and among hide prices were compared. Stocks of shoes, leather, or hides individually and together were likewise studied, as well as stock-turnover ratios.

by conditions that make possible a parallel price change for the finished consumer good.

The characteristic impact on long and short movements may differ for the two major ways in which price and output interact to mute or amplify fluctuation. The direct association between price or expected price and activity may well exercise a quieting tendency on major business fluctuation and an exciting one on the shorter swings, which respond to alternating optimistic and pessimistic expectations. In the case of the indirect reaction through the price chain, the muting influence probably operates over brief rather than longer time periods; action is taken to prevent margins from getting too far out of line as the steep and often short fluctuations of materials prices cause inverse movements in margins. The amplifying influence of parallel movements of finished and raw materials prices, on the other hand, moves with the viscosity of finished-goods prices, which chiefly reflect long, strong changes. Because the first set of influences may well have a more powerful impact than the second, it seems likely, though it would certainly be hard to prove, that price tends to have a stronger amplifying impact on the minor than on the major fluctuations in the industry.

HIDE PRICES AND THE TIMING OF TURNS

It has become a commonplace in this study to find all sorts of mechanisms deep in the grain of business practice that amplify major and especially minor fluctuations in consumer buying as successive manufacturing and marketing operations are performed; now price has been added to the roster. More interesting, however, than the processes of amplification are those involved in effecting reversals in the direction of change. Is there a tendency for considerations involving prices or the actual behavior of prices to exert a downward pressure toward the close of expansion and an upward one in the final stages of contraction?

According to the standard National Bureau techniques of analysis, hide prices characteristically anticipate business-cycle turns; our studies attribute this propensity to the patterns of buying and selling in the industry—patterns that for one reason or another are reflected in prices. The regression analysis, for example, indicates that prices, if anything, lag rather than lead turns in industry buying. This is suggested by the fact that the estimates of prices based on the influence of shipments and stocks lead actual prices on a number of important occasions. The lag would doubtless have been emphasized could we have substituted for data on shipments and actual stocks those on orders and stocks on hand and on order, to which the logic of the association applies.

This lag in hide prices relative to buying could easily result from inertia. When prices are rising, sellers are unwilling to reduce them at the first signs of market weakness, and quoted prices remain firm for some time even though few trades may actually take place. When the market starts to firm after a decline in prices, buyers are loath to pay more and thus force a continued price decline, though the amount of trading at this price may be thinned by unwillingness of sellers. Inertia applying to hide prices is reinforced by many contributing factors in the price of leather and shoes. In addition, the deficiencies of leather and shoe price statistics themselves introduce a spurious lag.

But the fact that an actual change in prices, as evidenced by subcyclical turns in reported hide prices, typically appears after a turn in leather and probably in hide buying does not necessarily mean that the price mechanism is free of the capacity to accelerate the timing of turns. For processes may originate in considerations involving price that tend to retard or even reverse trends in buying though unable to bring on a turn in prices themselves.

One factor capable of operating in this way has already been mentioned: the behavior of margins between buying and selling prices may damp the amplitude of fluctuation. Insofar as this damping effect tends to strengthen as prosperity or recession continues, it tends to bring on the turns in buying. We noted in Chapter 12 that it seems likely that at least one way that it may do so is by helping to reverse expectations about the future course of prices and other market conditions.

A second factor worth considering in this context is the difference among the several stages of the cycle in the increase or decrease in buying that will be inspired by a given expectation of price change held with a given degree of firmness. After market positions have been expanding for some time, the risk attached to a further expansion grows heavy, and shoe and leather buyers hesitate to add further to stocks on hand and on order. At the same time they may be perfectly willing to pay higher prices for the same amount of materials that they previously purchased. Thus if the short-term demand curve is pictured as sloping, it moves up (or to the right) but not by as much as it would if buyers were willing to pay a given number of cents more not only for the same quantity but also for a larger quantity. But for supply schedules, the reaction is just the reverse: they are likely to shift *more* at this stage of the cycle than they would have done a little earlier. For, suppliers' stocks of goods awaiting sale are likely to be low, and suppliers consequently are ready to hold out for a higher price on the same or a decreased volume and are loath to increase the volume of sales without very substantial price increase.

The consequences of shifts of this sort—a greater

shift in supply than in demand—can be a new point of intersection of the supply and demand schedules that lies directly above or even above and to the left of the previous one. In this case, increases in output may cease or turn into decreases though price continues its rise.[21] Contrariwise, as recession continues and buyers achieve a hand-to-mouth position, their stocks grow dangerously low, so that a given expectation of decrease in prices is likely to produce less and less willingness to contract buying; consequently the amount that demand schedules shift, other things the same, declines. Suppliers, on the other hand, have stocks that have grown dangerously high, so that their willingness to sell at each price increases—that is, their short-term supply schedules shift downward in response to expectations of softening markets by more now than they did earlier in the recession. At this stage, then, the point of intersection of the new supply and demand schedules can lie below and to the *right* of the previous ones, so that sales can begin to increase though price is still declining.

The tendencies indicated by this general line of logic may receive a special fillip when supply is segmented, as in the case of hide markets, and the impact of a given demand on price may differ in degree depending in which segment it falls. The possibility was suggested in connection with the early turns in sales of packer hides and their association with the rate of change in hide prices. We can merely ask the question, for a study of other markets would be required to answer it.

A third way considerations affecting prices may contribute toward reversing the direction of change is found in the relationship between expectations about prices and the course of actual prices. So far as buying prices are concerned, the amount by which prices are expected to change between the earliest and the latest possible purchasing dates (the period of option) is critical to a decision on whether the number of weeks' supply on hand and on order should be extended or contracted, and by how much. One of the factors helping to formulate the guess about probable future change might be the recent changes of the past. Were this a contributing factor, there would be a tendency for this pseudo-speculative buying to reach a standstill as soon as the *rate of change* of hide prices over the previous few months started to reach a standstill or decline. Furthermore, a decline in the expected amount of the price rise (predicated on a decline in the rate of change of actual prices) might mean that the current market position (predicated on earlier and higher rates of change) is deemed too high, so that some actual retrenchment is also indicated. Were businessmen to act in accordance with this logic, there would be a tendency for price-prospect-tied buying to decline as soon as some combination of first and second differences in prices for recent months reached its peak.[22] This statement may be rephrased to apply to troughs.

But though some tendency in this direction may be present, at least at some times, Chapter 12 suggested that the account in the previous paragraph is unrealistic. For there is a serious question whether price-based buying is not at least as dependent upon the accumulation of confidence as it is upon the estimate of expected increase or decrease; confidence accrues with the repetition of optimistic prognosis and thus follows more nearly the course of prices proper than of their rate of change. Indeed the inertia of group opinion might retard the turns still more were it not that the signal may well be the *uncertainty* that increases will continue, not necessarily the expectation of a decline; just as, in view of the depleted character of stocks, the signal for the resumption of price-tied buying may be uncertainty that the decline will continue.

Finally, there was one place in the sequence of operations studied where both the error in buying and its correction may have a pattern that tends to anticipate turns. In imports of hides, there does seem to be a fairly sharp linking of buying to a price relationship and an error that is also clearly a function of the rate at which domestic prices have been changing over the period that foreign purchases are on their way to this country. In this case, then, the recognition of over- or underbuying does tend to occur prior to the turns in prices or in industry affairs at large; and, other things the same, the resulting decrease or increase in current buying of a corrective nature tends to set turns ahead.

Apparently, then, shifts in price-tied buying may occur before prices themselves or other basic conditions have reversed. Thus, prices have, in the framework of business practices in this industry, the capacity, which

[21] Because we can say so little about the shape of the short-term demand schedule, this proposition cannot be phrased with precision. It is quite possible that the quantity demanded is unaffected by price within actual ranges of choice—the schedule in other words may be vertical and of limited extension. In this case, if demand did not change, neither would the amount traded, though the price would increase in accordance with the extent of the upward shift in the supply schedule. A fall in buying would wait upon an actual backward shift in the demand schedule—that is, upon the wish actually to decrease the market position, other things, including the volume of sales, the same.

[22] Under the assumptions given, the volume of price-prospect-tied buying would be a function of first differences in prices. The error would be a function of the advantage expected and that which actually accrued—the difference between the rate of change in prices of the recent past, on which expectations about price change over the period of option were based, and the rate of change that actually applied over the period of option, on which the advantage of early buying depends. The error in buying would be a function of the difference between actual and expected price change (second differences in prices) though what sort of function is hard to say.

is not necessarily exercised, to provide a timing acceleration. Very typically they convey a tendency to increase the amplitude of short waves.

Summary

Hide prices are subject to strong cyclical and subcyclical fluctuation that conforms closely and synchronously to fluctuation in industry affairs as a whole. Characteristically, the rate of rise slackens some time before subcyclical peaks in prices proper, and the rate of fall, before the troughs. The same may be said (with underscoring for peaks) concerning the lead of first differences in prices relative to the industry chronology.

The cause of these patterns involves an intricate and two-way association between hide prices and other aspects of the shoe, leather, hide industry. In analyzing them, we make the usual conceptual separation and examine how the demand and the supply of hides for the industry as a whole would vary with price, were other things unchanged (the shape of demand and supply schedules), and how in fact other things do change (shifts in the schedules).

The supply of hides seems to increase when higher prices are offered as more of the outlying hides move to central markets (the supply schedule slopes upward in conventional fashion). About the pure association of demand and price, other things the same, little can be said. In any event, other things do change markedly. Changes in the shoe and leather markets—both those associated with basic consumer demand and with physical efficiency in supplying it, and those associated with changing market prospects—affect conditions of supply and demand of shoes and leather and funnel into the hide markets; they manifest themselves as shifts in the demand and even in the supply schedules for hides. These elaborately shifting demand schedules intersect the upward-sloping supply schedule (also subject to some shifts) at very different points from one month to the next, thus accounting for the volatile character of the hide prices of history.

Regression analysis reproduces the actual monthly course of hide prices in the interwar period with striking faithfulness. The variables with which prices are associated are the physical volume of leather shipments to leather-goods manufacturers and the proportion of total stocks of hides and leather in stock piles awaiting sale compared with those awaiting further processing. There is a suggestion, too, that the addition of the price of cattle-hide leather shoes would improve the calculation. The equation achieves only the very roughest sorts of measurements of the relative importance of the several variables. For one thing, retail shoe prices were not actually included in the calculation, though it seems clear that they should be. Also, the equation makes no effort to reproduce the three-way association of demand, supply, and price. The success on a statistical level of the explanatory variables in reproducing the course of price may, in part, indicate that price influences the variables; in the main, however, it probably indicates that the selected series reflect, however inadequately, important underlying factors that influence price. Shipments are interpreted as depicting shifts in demand for shoes or leather, including changes in consumer demand as well as short-term shifts in demand for shoes and leather. This set of factors appears to have become more important over the years. The stock-location ratio may be interpreted as depicting both the effect of, and a basis for, market-prospect-tied shifts in demand and supply schedules all along the line as they impinge on the demand for hides (and, to a lesser extent, on supply schedules). This set of factors appears to have grown less important over the years. The suggested residual influence of shoe prices fits into the scheme as a reflection of shifts in demand for hides associated with changes in the value of the dollar and judgments that focus primarily on the price at which the later markets sell, over and above the amount that they sell (which is picked up by the other two series).

The influence of industry affairs on hide prices has an opposite—the influence of hide prices on industry affairs. Two aspects of the latter influence deserve special attention—the power of prices to increase the amplitude of fluctuation and to set ahead the turns. On the first score, I conclude that though prices in their several impacts on buying and business judgments have power to damp as well as to amplify fluctuation, the latter is doubtless the more powerful, at least for the short waves in business.

On the second score, the power of prices to act as a timing accelerator has an interesting facet. For the statistics show hide prices reaching peaks and troughs, on the average, no earlier, and often substantially later, than the basic buying and selling in the industry, and this might suggest that these prices, though classed as "sensitive," have no power to initiate change. But careful scrutiny suggests several ways in which the behavior of prices, in the institutional setting that characterizes the industry, can tend to accelerate turns in buying and output. Price must, accordingly, be added to the list of timing accelerators. Four specific mechanisms may be present:

1. When limits to the inverse movements in margins that are deemed tolerable are reached, they may affect buying by influencing primarily expectations about the future course of prices.
2. Short-term supply and demand schedules may shift asymmetrically at various stages of the cycle because of the opposite movements in prospective

buyers' and sellers' inventories of the material in question.

3. Uncertainty, as distinguished from the actual expectation of a reversal of price trends, may play some part in reversing the course of price-linked buying.
4. Matters associated with imports may tend to weaken the demand for domestic hides as soon as the rise of prices retards.

All of these mechanisms may be thought of as contributing to an explanation of the early turns that seem to characterize market-prospect-linked buying.