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CHAPTER 10

PATTERNS IN RETAILERS' BUYING: SUMMARY OF CHARACTER AND CAUSE

In Chapter 7 we examined statistical records of a number of actions and occurrences involving shoe retailers and wholesalers—their sales, their purchases, their stocks, and their investment in stocks. In Chapters 8 and 9 about the same area was covered, but a different aspect of it—objectives, intentions, and the institutional frame within which the intentions must be pursued. When the business objectives, problems, and opportunities that we found common to shoe retailers or wholesalers are combined with certain external or partly external factors that appear critical, we end with a hypothetical pattern of distributors' shoe buying, stocks, and output of shoes that does not conflict with the one disclosed by the time series. I would like to review the two sets of findings having this contrapuntal relationship.

I phrase the review in the conventional terms of a theory and an empirical test. This phrasing falsifies the true picture. The time series were as important an element in formulating the theory as was logic or information about business procedures. Consequently, relationships disclosed by the time series are not tests; they are part of the brick and mortar of the construction. But just as the study of temporal relationships in the time series guided the search among institutional data and its rationalization, so the resulting theory shapes more specific propositions that may be put to the time series, and these further tests in turn sharpen the theory. The investigation advances along this zigzag course. I review it by starting at the second step—the theory. I then examine the compatibility of the theory with empirical data and ask the few more pointed questions that our studies thus far suggest and the data on shoes are capable of answering. Information on leather and hides makes it possible in later chapters further to sharpen questions and answers.

Dynamics of Retailers' Buying

Because retailers must keep the size of their stocks within defined limits and those of shoe wholesalers and producers are relatively small, the orders retailers place with shoe manufacturers or production itself must broadly accord with the pace of consumer buying.

But in spite of this general parallelism, retailers by no means order each month just what they sell or expect to sell. Typically they order either more or less and, as a result, production schedules and retailers' orders fluctuate more than consumer buying, especially during the shorter movements, subcycles. Reasons for this alternating over- and underbuying converge on two procedures that act as either timing or amplitude accelerators or both. The first involves the provision for expected sales and desired changes in stocks, assuming that conditions in, and expectations concerning, wholesale markets do not fluctuate. The second involves explicit consideration of the proper timing of buying in view of shifting prospects in the wholesale markets.

ACCELERATION DUE TO AN IMPLEMENTED INVENTORY OBJECTIVE

Retailers' buying of shoes is directed first and foremost to the provision of the sorts and quantities of shoes that customers will care to purchase at the prices at which they were bought to sell. This is the source of the general parallelism in the movement of sales and orders or production. But insofar as this objective is held with a precision that strictly limits changes in inventories resulting from mistakes in forecasting requirements, it has the power, under conditions that may be specified, to set turns in retailers' orders ahead and to increase their subcyclical amplitude relative to that of consumer buying. Another way of describing the situation is simply to say that stocks are intended to be kept to a fairly clearly defined and relatively unchanging quantity. Actually, season by season (rather than month by month) retailers probably expect their stock to rise when sales rise and to fall when they fall, though less than proportionately. This may increase the tendency toward acceleration. However, it would be present with a constant but precise and strongly implemented stock objective too.

The critical factors in generating the lead, even assuming a constant rather than a sales-linked stock objective, appear to be the following:

1. A sharp and determined stock objective
2. Orders, for at least a portion of requirements, that must be placed several months ahead of time on

the basis of a guess as to the volume of future sales

3. Correction of the inevitable error (and, of course, correction is necessary to enforce the stock objective) primarily via an adjustment of orders rather than of selling price
4. A bias to the guess about future sales volume that takes the form of linking expected sales to past sales so that corrections tend to have the pattern of the amount by which sales have recently changed
5. Recent changes in sales that tend to reach peaks and troughs before sales proper

Our investigations of retailing practice suggest that the first four conditions apply to retail shoe stores. The fifth is based on the examination of three sorts of time series. (1) First differences in retail sales of shoes are so erratic that generalization concerning their pattern is hazardous; however, the data are consistent with the conclusion that they retard some time before the turns in sales proper and usually sooner for long than for short phases. (2) Consumer income, which was found to have an extremely close association with the monthly patterns of shoe buying, appears to have inflection points prior to the turns in income or shoe buying proper. (3) A hypothetical representation of corrective orders leads retail sales, at least at the major turns.

The correction element in retailers' orders, then, tends to lead retail sales proper. Also, since corrections are typically positive while sales expand (except for the last few months) and negative while they contract, corrections augment the amplitude of subcyclical fluctuations.

The pattern of total orders, as we construct it under stable market conditions, will be a function of the sales forecast on the basis of sales of the recent past plus this corrective element. The strength of the lead in total orders and the amount of the amplification depend on the importance of the corrective element in the total. Orders received by some firms that specialize in rapid deliveries—shoe wholesalers and in-stock departments of manufacturers—are likely to have a large amount of this business. The importance of the corrective element in the total will also depend on the proportion of buying that carries delivery dates of varying term.

Finally, the pattern will depend on whether stocks are intended to go up and down with sales. Insofar as orders are intended not merely to duplicate sales but also to provide for desired increases or decreases in stocks, clearly conceived and strongly implemented, the correction for failure to guess sales right is multiplied by the factor that represents the desired relation between an increment (or decrement) of sales and an increment (or decrement) of stocks. Although little confidence could be put in the figure, there was some suggestion that this ratio might well be about one in retail shoe stores.

ACCELERATION DUE TO SHIFTING MARKET PROSPECTS

The tendency for fluctuations in retailers' buying to be stronger and earlier than those in shoe sales to consumers when market prospects are assumed unchanged appears to be reinforced in retail shoe stores when the timing of buying is shifted in line with changing prospects in the wholesale markets. There is reason to believe that retailers buy a larger proportion of their expected requirements for the season earlier, and a smaller proportion later, than usual at some times than at others. Buying based on shifting market prospects results in alterations in the number of weeks' supply that shoe stores choose to hold on hand and on order (their ownership position). From what could be learned from discussion and statistics, these shifts appear to be predicated on changing expectations about delivery periods, wealth of choice, and changes in shoe prices (the latter may involve general market prices or special prices on specific advance purchases). When business is improving, there seems to be a tendency to extend the number of weeks' supply covered by orders of longer term, and an opposite tendency seems to exist when business recedes. Consequently, orders to increase the advance position augment those to increase sales, thus adding to the amplitude of the rise in buying; the reverse applies to periods of contraction. These shifts appear to respond to quite subtle changes in market conditions, so that the amplitude of minor as well as of major movements is swelled.

Indeed, minor movements are usually amplified more than major ones, for these shifts in market prospects seem rather typically to be of short duration. In part this must be a function of their link to rates of change, since the difference between major and minor swings lies more in the length for which a given direction of change is maintained than in the monthly rate at which it proceeds. Consequently, strong subcyclical patterns are characteristic of first difference series, and it is usually artificial and sometimes impossible to distinguish major from minor waves. In part it results from the self-limiting character of shifts in market position. Retailers seldom can afford to risk buying style merchandise for more than a single selling season, and most shoes (work shoes may be an exception) have some style element in their design. If this limit is observed, it defines the maximum number of months' supply that can be on hand and on order. This maximum position can hardly take long to attain. Once attained, market-prospect-tied buying slacks off. These state-

ments can be rephrased to apply to retrenchment. The end result is waves in buying that possess a strong subcyclical pattern rather than that of the forty-month business cycle.

Market-prospect-tied buying also seems to reverse prior to the turn in sales. The early turns may reflect the impact of rates of change in consumer buying and in hide prices on retailers' views concerning future buying conditions. Rates of change in hide prices, like change in retail sales, lead sales proper. But in part, and perhaps primarily, it doubtless represents a response to all sorts of personal experiences of increasing or decreasing market tensions to which the rate of change in prices may itself respond. In part the self-limiting factors in the dynamics of these shifts (the next chapter affords an opportunity to study them) may sometimes cause them to lead. In any event, what can be assembled by way both of explanation and of statistical description strongly suggests that buying associated with shifting market prospects acts as a timing, as well as an amplitude, accelerator.

In thinking about the two sorts of accelerating mechanisms that apply to a retail shoe store—the one involving the maintenance of proper service stocks and the other involving advantageous timing of buying—a question arises: The first has been said to produce a persistent tendency for turns in orders to lead those in sales only when a quite precise and firm inventory objective has been delineated. Is not the notion that, other things the same, people buy more at a time when prices are expected to rise than when they are expected to fall inconsistent with the notion of a precise and firm stock objective? Do we have two *alternative* mechanisms rather than two *supplementary* ones?

The answer is, I believe, that under most circumstances the two processes do supplement one another. There are two reasons why consideration of the proper timing of buying does not erase the firm and clear stock objective. The first is that the size of *stocks*, as contrasted with the amount of *supplies on order*, is often not involved at all in actions based on changing market prospects. These actions concern only *when* the required supplies (whether for expected sales or intended changes in stocks) should be bought, not *how much* should be bought for the season as a whole. The second reason is that often considerations involving prospects, especially prospects concerning the availability of merchandise and the speed of deliveries, are embodied directly in the formulas for deciding, in effect, the proper size of stock; thus requirements remain just as clear and firm as ever.[1] But though coexistence of the two mechanisms is the rule, there are clear exceptions. They occur at times when a real buying boom is in progress. Certainly in the last few months of 1936, for example, speculative interests superseded other objectives concerning buying and stocks, and this may well also have been true in the early days of the National Recovery Administration; but another example for shoes (though not for leather or hides) probably could not be found between the two world wars. At other times, the two mechanisms do not conflict and therefore tend to supplement one another.

Indeed, it is likely that they often actually reinforce one another. For a single industry, buying associated with service stocks tends to accentuate parallel spurts and valleys in buying associated with changing market prospects through its influence on prices and expectations. Why price changes and expectations concerning them seem to parallel changes in sales will become clearer as analysis penetrates to earlier stages. For industry at large, general and synchronized buying caused by changing market prospects will tend to motivate changes in service stocks via consequent alterations in output, in consumer income, and in consumer buying; however, a study of this possible chain of association lies outside the province of this investigation.

Statistical Evidence

Evidence that both of the accelerating mechanisms are at work was found at several points. Both orders and shoe production have a greater subcyclical amplitude than retail sales. For shoe production (the data for orders do not permit a quantitative judgment), subcyclical fluctuation is about twice as large as for retail sales. A consolidated picture of possible indicators of changing prospects, the market profile, resembles rates of change in hide prices, a series that ought to reflect, as well as cause, changes in evaluations of market conditions. Divergences of shoe output from its usual seasonal patterns seem correlated in the appropriate fashion with factors likely to underlie changing prospects.

The two acceleration mechanisms ordain that, compared with consumer buying, orders placed by retailers (and to a lesser extent shoe production) fluctuate more during subcycles than during cycles. This could result from the role of rates of change of sales and prices in retailers' buying and the short periodicity characteristic of the fluctuations of these difference series. It could also result from a tendency for buying associated with changed market prospects, especially prospects for style merchandise, to have natural limits. The general parallelism, the greater amplitude of fluc-

[1] See Chapter 8, pp. 98–99 for a formula for fill-in orders subject to this sort of alteration of the "stock cushion" and "delivery period."

tuation, and the greater amplification of short than of long movements are clearly evident in the figures.[2]

The two acceleration mechanisms also imply a lead of orders relative to retail sales, which would frequently be short but ought to be quite persistent. The presence of just this sort of lead in shoe and leather orders and wholesale shoe sales is a key observation; no more than three turns for wholesale sales or orders lagged corresponding ones in retail sales. Short persistent leads may reflect the influence of rates of change in sales operating via the firm stock objective. They may also reflect changing market prospects. In any event, leads relative to retail sales characterize the rate of change in hide prices (which may both cause and represent changing market sentiment). Leads also characterize the market profile at those times when an examination of seasonal patterns in production suggests that advance buying is increasing relative to at-once orders.[3]

The association of shoe production and retail sales operates through the intermediary, orders received from retailers. Given the volume of orders on hand (or even expected on the basis of those recently received) and their delivery terms, shoe producers establish their production schedules in a fashion calculated to smooth the flow of output and economize production runs as much as possible. This means that shoes will ordinarily emerge from production floors somewhere between one and two and a half months from the time when orders were written, and this relation appears in such figures as we have.[4] It means also that the subcyclical amplitude of shoe production will be considerably less than that of orders, though how much less we cannot say.[5] The result is a generally synchronous or slightly leading association of output relative to retail sales[6] and a subcyclical amplitude about twice as great.

[2] See Table 27 in Chapter 7. Having delineated the factors mainly responsible for generating the amplification, one would hope to test the theory by correlating, cycle by cycle, the magnitude of amplification with the strength of the causative factors. But unfortunately we do not have the necessary data. Presumably market prospects have a systematic influence on orders (only an indirect one on production), but data related to shoe orders (wholesale sales and shoe and leather orders) are inadequate for cycle-by-cycle comparison of their amplitude with that of retail sales.

[3] The correlations for seasonal patterns (Table 40 in Chapter 9) did not actually measure the time, relative to retail sales, the advance orders start to gain or lose importance. But their correlation with changes in hide prices over the *past three months* would imply some lead relative to retail sales.

[4] Orders lagged production in four of the matched turns (see Table 32 in Chapter 7).

[5] Table 29 in Chapter 7 gives some of the comparisons.

[6] For dollar figures average timing of production compared with sales is —0.6; 7 turns lead, 5 lag, 6 synchronize. For pair figures, average timing is —0.8; 13 turns lead, 7 lag, 2 synchronize.

A few details in the association of the statistics on orders with those on retail shoe sales are worth noting. For whatever it is worth, the time series show a tendency for orders to lead retail sales by longer intervals at major than at minor turns. This is likewise the case for first differences in sales relative to sales proper, and, according to the theory, orders may reflect this behavior. The time series hint, though most obscurely, that orders tend to precede retail sales by longer intervals at peaks than at troughs. There are suggestions of the same characteristic for first differences in retail sales and in hide prices.[7] Partly overlapping these differences is a tendency for leads relative to retail sales to be longer at turns terminating long than at those terminating short phases in retail sales. Though it is clear that short phases cannot have long leads, long phases need not have the long ones that the figures show.[8] They appear for wholesale sales, shoe and leather orders, and likewise for recent changes in retail sales and in hide prices.[9]

Shoe production also shows a tendency to lead more at major than at minor turns, and at peaks than at

[7] Table 32 showed that wholesale sales in pairs have a clear tendency to lead considerably more often and by longer intervals at peaks in pair sales than at troughs; the average timing is —2.6 and —0.1, respectively. A measure of consistency for the difference between peak and trough timing shows an index of 59. (It will be recalled that an index of about zero shows no systematic difference in timing of peaks or troughs and, with no neutral comparisons, an index of 33 means that two-thirds of the comparisons accorded with the thesis.) But though the average lead at peaks is greater than at troughs for the Associated Industries of Massachusetts order series compared with both pair and dollar retail sales, consistency indexes are low (14 and 23). This is also true for wholesale sales in dollars compared with retail sales in dollars (20). First differences in retail sales tend to have a lead about one month longer relative to sales proper at peaks than at troughs for both pair and dollar data, with consistency indexes of 48 and 29, respectively. Change in hide prices, which has an irregular relation to retail sales, leads the SLH reference frame on the average by —4.2 at peaks and —1.6 at troughs with a consistency index of 44.

[8] Since there is some tendency for expansion phases to be longer than contraction phases and those preceding major peaks longer than those preceding minor peaks, it would be desirable to study each of the three variables, holding the others constant. But of course there are not enough observations for this maneuver.

[9] Leads for each series relative to retail sales were averaged for phases in retail sales lasting (1) 20 to 9 months inclusive, (2) 6 or 5 months, and (3) 4, 3, or 2 months. The average number of months' lead (—) or lag (+) relative to retail sales for each of the three durations follows:

	(1)	(2)	(3)
Wholesale sales	—2.6	—2.8	+1.0
Shoe and leather orders	—4.0	—1.2	0
Change in retail sales for the past three months	—4.8	—1.7	—0.3
Change in hide prices for the past three months	—5.2	—0.9	+0.5
Hypothetical stable-market-prospect corrective orders (formula III in Chapter 8)	—4.0	—1.2	—0.3

troughs.[10] This occurs in spite of the tendency for production to lag orders more at peaks than at troughs —a reasonable manifestation of the fact that a reduction in buying may precede a reduction in output by longer intervals when factories are busy and have a large backlog of orders than when they are relatively empty of both orders and work. For production, too, leads tend to be longer when matched with turns terminating long than when matched with those terminating short phases in retail sales.[11]

This difference in the lead of retailers' orders or production at various sorts of turns, paralleled by similar differences in the best representations that we can make of the two acceleration mechanisms, raises the question of whether the association applies turn by turn. This test was made: For each turn in retail sales, the timing relative to retail sales of turns in the order data (independent variable) was correlated with the timing relative to retail sales of turns in recent changes in hide prices and hypothetical corrective orders (formula III).[12] Change in hide prices alone has a correlation coefficient of +.89 for wholesale sales and +.83 for AIM orders. The addition of corrective orders as a second independent variable (with an adjustment for the lost degree of freedom) leaves the first correlation virtually the same (+.88) and the second only very slightly improved (+.86). The reflection of these factors in production schedules tells the same story; though, reasonably enough, the level of correlation is lower: +.70 for change in hide prices alone, and +.68 when corrective orders are added.

It is hard to say how the results of this test should be interpreted. On the one hand, the close association, turn by turn, of the lengths of time by which retailers' orders and hide prices each lead retail sales is an interesting statistic that falls in line with the theory already developed. On the other hand, the absence of a similar association for leads in the rates of change in sales does not thus fall in line; nor does it sharply conflict with the theory. Only turns in actual corrective orders are presumably closely linked to turns in the rate of change in sales. For total orders (even those reflected in wholesalers' sales, for which the corrective element may be large), the power of rates of change to produce turns is a function of the quantitative importance of corrective orders in the total, and of the steepness of the rise or fall in sales and its relation to the amount by which the rate changes as retardation sets in. None of these variables are reflected in the simple timing comparisons used.[13]

The lead of orders over retail sales implies that distributors' stocks of shoes on hand and on order cease rising (or falling) at an accelerating pace prior to a peak (or trough) in consumer buying. The average synchronous behavior of retail sales and of investment in stock on hand only, which the statistics show, could result from the lag of receipts relative to orders. As a matter of fact, our investigations suggest that inventory investment in stock on hand may well have quite a variable pattern relative to investment in stock on order since virtually all of the market-prospect accelerating mechanism and much of the inventory-objective mechanism actually concern when orders are placed rather than when they are delivered, and there is no reason to expect a stable relation between the two.[14]

In the case of wholesalers, the figures suggest that inventory investment lags wholesalers' sales, and is synchronous, on the average, with the reference scheme. Wholesalers probably are not in a position to design and enforce stable market inventory objectives to anything like the same extent as are retailers. Also, insofar as they do, changes in selling prices are often used as well as, or in preference to, alteration in buying. This suggests that one of the accelerating mechanisms that tend to set ahead turns in investment in stocks on hand and on order in retail stores is present in a far weaker form, if at all, in wholesale establishments. But it is also true that the other mechanism—market-tied buying—may be stronger. This raises an interesting point. The time when market-tied buying occurs appears to be a function of portents that appear *at the same time* for wholesalers and retailers. Indeed, this statement, later chapters indicate, may be considerably extended. Since wholesale sales turn before retail sales, buying movements will be later with respect to wholesale sales than with respect to retail sales. In general, it seems reasonable

[10] Shoe production leads retail sales, both in pairs, by an average of −1.3 months at peaks and −0.4 at troughs; the corresponding figures for dollar series are −1.2 and +0.1. The consistency indexes are 38 and 35, respectively.

[11] For phases of the three durations (20 to 9, 6 to 5, and 4 to 2 months), average timing of production relative to sales (pairs) is −2.7, −0.9, and +0.9 respectively.

[12] I am indebted to Geoffrey Moore for suggesting the general form of this test. Corrective orders were selected as embodying recent changes in sales in the most appropriate form.

[13] Simple rates of change in sales, rather than the particular combination of rates combined in our hypothetical corrective order series, were also used in a multiple-regression scheme with the same results as those described above for hypothetical corrective orders. The contrasts drawn in this paragraph are a bit easier to follow when simple first differences in sales are thought of as the second variable.

[14] Having no adequate data on investment in stock on hand and on order, I cannot make the desired comparisons. For whatever it is worth, when the timing of turns in investment in stock alone is compared with retail sales, average deviations are high.

that investment in shoe inventories by wholesalers tends to lag their sales, as the statistics show.[15]

What we have learned of process teaches little about the absolute amplitude of fluctuation of investment in total stocks on hand and on order, or about either part of the total. But it implies that relative to the fluctuations in consumer buying, inventory investment in stock on hand and certainly total commitments will fluctuate more during the slighter waves in buying than during the larger ones. The statistics on inventory investment revealed such a picture.

A decline in the rate of rise of stocks suggests a weakening of the forces making for a rise, or the intrusion of some opposed force making for a fall, or the presence of an absolute reduction in the stock of an increased number of companies. Ordinarily, this situation needs to develop for a few months before the turn in aggregate stocks for the industry occurs. Sometimes it results in only a temporary slowing down of the prevailing direction of change. Consequently stocks (in effect, a progressive cumulation of first differences in stocks) skip many of the minor waves in investment and reach peaks and troughs several months later than retail sales. The lag is understandable when we consider that the desired size of stocks enters into the complex of objectives that determine distributors' buying, and that stocks are probably expected to rise when sales rise and vice versa. The fact that sales are not foreknown means that, at best, the objectives can be realized only with a lag. This would be true even if sales were foreknown if objectives are phrased in terms of tolerable ranges rather than as fairly sharply defined lines. Objectives may be so phrased by wholesalers, or even by retailers, in connection with standards for stocks and sales-stock ratios used as a broad check on merchandising efficiency rather than as a direct guide to buying.

Sales-stock ratios add a few further details to the picture of both effect and cause. Their patterns of subcyclical fluctuation indicate that, by and large, stocks turn more rapidly when sales are rising and more slowly when they are falling. Our studies suggest that this results from the need for a basic minimum stock to do business at all and the presence in most stocks of much slow-moving merchandise that need not increase, and does not decrease, as fast as sales. The need to order on the basis of guesses and the resultant inevitable lag in adjusting stocks to sales contribute further to the positive subcyclical pattern of the ratio.

But just as the typical pattern coincides with what we know of retailers' problems, so does the divergence from the pattern. We have interpreted the occasional tendency for retailers' stocks to start to turn over more slowly while sales are still rising as an indication of the presence of an extension of market position based upon overoptimistic views of market prospects. Similarly, the increase in turnover rates while sales are still falling suggests that an effective movement toward a hand-to-mouth position in buying has gotten under way. Of course, shifts in market positions would not have to be visible in the ratios and, probably, mild shifts often are not. It is interesting to see that, in this connection, the leads appear somewhat more strongly and persistently at the major than at the minor turns.

Other Acceleration Models

How do the findings and formulations based on our study of shoe retailing compare with other analyses of the way in which demand moves from finished to raw materials? In 1917 J. M. Clark[16] pointed out that the need of businessmen to have their stocks bear a fairly constant relation to their sales results in additions to or subtractions from stocks that parallel first differences in sales. Assuming that cycles in sales tend to follow more or less sine-like shapes, their rates of change reach peaks or troughs before sales proper. Demand for less finished goods, "derived" from that for finished goods, is compounded of demand for goods to replace sales and to build up or draw down stocks. The tendency for this second component to lead is imparted, in muted form, to total demand. In addition, an amplitude acceleration results from the fact that additions to stocks are positive when sales rise and negative when they fall. In Clark's model, the capacity to set turns ahead is a function of the wish to maintain a constant sales-stock ratio, though lags in production relative to demand may blur the picture somewhat. This same general idea was used by Simon Kuznets to explain the earlier and greater fluctuation in wholesale, relative to retail, trade.[17]

But our investigation suggests that although shoe retailers probably do require more stock when sales are high than when they are low, the association (except perhaps for a one-to-one incremental relation) is not rigid or enforced month by month or even quarter by quarter. Since sales often reach their most

[15] The lag of inventory relative to wholesalers' sales is especially clear at peaks. One would expect this to be the case when wholesalers' advance orders are still being delivered, at the same time that their customers' advance buying has been abruptly curtailed.

[16] John Maurice Clark, "Business Acceleration and the Law of Demand: A Technical Factor in Economic Cycles," *Journal of Political Economy*, March 1917.

[17] Simon Kuznets, *Cyclical Fluctuations; Retail and Wholesale Trade, United States, 1919–1925*, Adelphi, 1926.

rapid rate of change only a few months before the turn in sales themselves, the objective of maintaining a constant average, or even a substantial incremental, sales-stock ratio could not, in view of the loose character of the association, account for the lead we actually find.

More nearly in accord with our observations are models that include the need to forecast requirements and correct for the error of forecast. Arthur Burns presented such an apparatus in 1935 in an analysis of building cycles,[18] and Lloyd Metzler developed the implication of the necessary error of forecast in a description of self-generating inventory cycles in the economy as a whole.[19] The need to forecast sales means that in order to enforce *any* stock objective—even that of keeping stocks at a constant absolute amount—the inevitable error of forecast, which will be reflected in unintended change in stocks, must be reversed. When the forecast tends to project sales of the recent past, as seems to be the case for shoe stores, error tends to have the pattern of first differences in sales.[20]

Metzler explored the implications of forecasts having other sorts of biases and the implications of stock objectives of several sorts. He utilized a fixed "planning period" in calculating the difference between planned and actual occurrences. My studies have underscored the need to deal with a flexible planning period and outline how this may be done for a retail shoe store. But more important, the work has emphasized a number of particular conditions that must be fulfilled before the timing acceleration can operate. This is an extension of a basic conclusion by Moses Abramovitz.[21] He points out that the behavior of inventories as a whole can only be understood when analyzed as a composite of the divergent behavior of stocks of various sorts of goods under various economic conditions.[22] The relevant conditions, I find, apply to pecuniary as well as to physical problems associated with the maintenance of adequate service stocks.

But I find also that pecuniary conditions enter in another fashion. They involve the appropriate timing of buying. The thought that expectations about the future course of prices influence the size of stocks likewise has a long ancestry. Clark and Kuznets mention it as one of the factors causing stocks to parallel sales in retail stores—merchants try to anticipate changes in prices, and expectations concerning them often go up and down with sales. The role that expectations about prices play in inventory fluctuation enters in the cyclical role assigned to stocks by John Maynard Keynes, particularly in his distinction between working and liquid capital. But here again, the study of a single industry makes it possible to spell out what factors operate, in what way, and under what conditions. It emphasizes that expectations about prices combine with those about speed of delivery and adequacy of selections in motivating changes in the number of weeks' supply on hand and especially on order. It emphasizes also that these shifts in the advanced-order position tend to operate not only to increase amplitude, particularly of short swings in business, but also to set turns ahead. Just how buying associated with changing market prospects can produce this timing acceleration becomes clearer as we study the bearing of changing market conditions on the leather buying of the shoe manufacturer and the hide buying of the tanner. But even then, we can do no more than uncover, and often only partially, aspects of a process that is far too complicated for a single investigation to unravel.

[18] Arthur F. Burns, "Long Cycles in Residential Construction," in *Economic Essays in Honor of Wesley Clair Mitchell*, Columbia, 1935, reprinted in Burns, *The Frontiers of Economic Knowledge*, Princeton University Press for National Bureau of Economic Research, 1954.

[19] Lloyd Metzler, "Nature and Stability of Inventory Cycles," *Review of Economic Statistics*, August 1941.

[20] Clark's model is set up in terms of an immediate response to orders which contemplate actual sales and required change in stocks. He explains that, in actuality, output would respond with a lag. But he did not point out, as did Metzler, that when once the lag was admitted into the picture, a constant stock objective (as well as a constant sales-stock ratio) would introduce a leading element in receipts.

[21] Moses Abramovitz, *Inventories and Business Cycles*, National Bureau of Economic Research, 1950.

[22] Ragnar Nurkse introduced this general notion into a model of the Metzler type by distinguishing between planned and unintended and between finished and unfinished inventory change ("The Cyclical Pattern of Inventory Investment," *Quarterly Journal of Economics*, August 1952).