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Volume Author/Editor: Ruth P. Mack

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CHAPTER 14

HIDE SUPPLIES AND THEIR ARRIVAL AT TANNERIES

The groups of business enterprises that supply hides to tanners are composed of highly diverse parts. In Chapter 2, the structure of the industry was described. Here, since we are interested in exploring the dynamics of the supply of hides, it is essential to keep clearly in mind one particular characteristic of the industry as a whole: part of the supply of hides is a simple by-product of the meat and milk industry; part is only secondarily a by-product.

Foremost in the first group are the four large meat-packing companies—Armour, Swift, Cudahy, and Wilson. They provide the lion's share of packer hides, and their subsidiaries or onetime subsidiaries are also important in the Argentine meat and hide industry, from which comes a major part of our imported hides. By-product hides also come from suppliers who range downward in size to small intrastate packers and butchers.

The second group is composed largely of specialists in transactions involving hides—hide dealers or importers—or of marginal hide producers—the small farm that sells the hides of slaughtered or fallen cattle, the village junk man, or the small local dealer or feed store. From farms or villages, hides move toward the central markets of the country through a sequence of small and large dealers or tanners' agents, who scour the foreign and domestic markets for advantageous purchases. Finally, there is the open-market exchange, which, since 1929, has brought together the buyer and seller of hide future contracts as well as of actual hides.

Where the business in hides is an automatic adjunct of the production of meat or other food products, sales of hides follow a very different course than in companies where the buying and selling of hides is a major branch of work. For the first, the number of hides handled depends primarily on conditions in the milk and, more particularly, beef industries; the demand for, or price of, hides is not an important determinant of the number of animals slaughtered. But for the second, the demand for hides and their price play an important part in the volume of buying and selling. If the demand is not strong enough and the price too low, farmers do not bother to skin fallen cattle; local junk men, to collect the poorer hides; local dealers, to send them on to central markets. The price they are offered—if indeed they have offers—is too low, after each intermediary has taken his cut, to make the operation worthwhile. Likewise, in the case of foreign hides, the flow to domestic markets must be enticed by a price that is high enough to defray the high delivery costs as well as to outbid the competition of other countries.

Thus, though in one sense the total hide supply is a by-product of other industries (with the exception perhaps of supplies from Hindu countries), in another sense this statement fails to catch the true emphasis. In connection with a substantial section of the actual flow of hides to central markets, the total reservoir of hides that is tapped is more like unmined ore in the earth than the supply visible at mine portals or at smelting or processing plants.

We saw in the previous chapters that when the two sources of hides are added together (the true by-product and the market-responsive segments), the total supply moving to tanneries is highly sensitive to tanners' sales or other indications of changing demand. How this flexibility comes about is the problem this chapter tries to explore. We find that the three segments that can be distinguished statistically—packer hides, country hides, and imported hides—behave distinctively. Studying each in turn, they appear to respond to somewhat different aspects of the total situation and in somewhat different ways. The role of price is central throughout, but the several segments play variations on the central theme.

Total Hide Receipts and Its Subdivisions

Chart 41 shows the major sources of hide supply for which monthly statistics are available: the largely by-product supply of hides from federally inspected slaughter, the largely elective supply of imported hides, and the half-breed of hides from "uninspected" slaughter. The three sources (which are the true basis of the statistical differentiation) correspond roughly to three kinds of hides: packer, country, and imported hides; and we shall use these simpler though less accurate designations. The flows are depicted at the point of entrance into tanneries, since this is the only

way in which substantial consistency among the series can be achieved.[1] Packer hides were the largest segment. On the average, they contributed 52 per cent of the total in the interwar period; country hides, 34 per cent, and imports, 14 per cent.

However, the three segments followed distinctive courses. In consequence, the contribution of each source to the total must have undergone considerable variation from time to time, which the averages hide. The monthly contribution of each to total receipts ranged widely. To exclude the extreme months, I give figures for the tenth from the lowest and the tenth from the highest month: packer, 39 and 65 per cent; country, 23 and 45; imported, —1 and 35.

Chart 41 suggests systematic differences in the movement of the components, both with respect to timing and amplitude. Subcycles in receipts of packer hides seem to reach peaks and troughs first, and the amplitude of imports is far greater than the rest. Table 55

[1] Packer hides (hides from "movement into sight" of federally inspected slaughter) are simply the number of cattle slaughtered under federal inspection. For country hides, hypothetical movement into sight is available prior to 1932. It was obtained from information on tanners' receipts of hides from slaughter not subject to interstate federal inspection, to which was added the month-to-month change in appropriate hide stocks of packers, dealers, and butchers. But since the latter reports are likely to be sketchy, the estimates of movement into sight for the early period are poor. After 1932 they are not available, so that tanners' receipts of uninspected hides is all that is recorded. Imports are substantially tanners' receipts, since the majority of imported hides are bought for tanners' accounts. Thus tanners' receipts can be computed (with the aid of information on packers' and dealers' stocks) for each source of hides, and movement into sight for only some.

TABLE 55

Timing and Amplitude Measures for Subcycles in Tanners' Total Hide Receipts and Its Components, 1921–1940

1. TIMING: REFERENCE FRAME IS TANNERS' TOTAL HIDE RECEIPTS (26 TURNS) [a]

	NUMBER OF TURNS					TIMING (*months*)		MONTHS IN UNLIKE PHASE AS % OF ALL MONTHS [b] *Timing That Maximizes Correspondence*	
		Matched Turns [c]							
	All Turns (1)	*Total* (2)	*Leading* (3)	*Lagging* (4)	*Synchronous* (5)	*Mean Lead (—) or Lag (+)* (6)	*Average Deviation* (7)	*Lead (—) or Lag (+) (months)* (8)	(%) (9)
Tanners' hide receipts:									
Packer (108)	32	20	8	4	8	—1.0	2.1	—1	37
Country plus imported (109)	31	23	3	8	12	+0.7	1.3	0	21
Country (107)	30	21	11	9	1	—0.8	3.4	—1	44
Imported (105)	33	17	5	9	3	+0.5	2.1	+1	39

2. AMPLITUDE: SPECIFIC FLUCTUATION PER MONTH [d]

	AS % OF AVERAGE VALUE OF EACH SERIES			AS % OF AVERAGE VALUE OF TOTAL RECEIPTS		AS % OF AMPLITUDE OF TOTAL RECEIPTS DURING SUBCYCLES OR CYCLES IN TOTAL RECEIPTS	
	All Subcycles (1)	*Major Cycles* [e] (2)	*Ratio of Cycles to Subcycles* [f] (3)	*All Subcycles* (4)	*Major Cycles* [e] (5)	*All Subcycles* (6)	*Major Cycles* [e] (7)
Tanners' hide receipts:							
Total (103)	2.45	1.26	0.51	2.45	1.26	100	100
Packer	3.55	1.98 [g]	0.47 [h]	1.85	1.03	19	30
Country plus imported	5.15	2.07	0.40	2.47	0.99	81	70
Country	3.75	1.57 [g]	0.47 [h]	1.28	0.53	27 [i]	3 [i]
Imported	18.42	6.61	0.36	2.58	0.93	52 [i]	72 [i]

[a] Series 103 in Appendix B.

[b] See Appendix A, sec. 14.

[c] See Appendix A, secs. 10a, b, c, and d. In making the calculations for (109), monthly data were used although the curve in Chart 41 depicts the centered, three-month moving average prior to May 1932.

[d] See Appendix A, sec. 16 and note c above. The calculations underlying the figures in columns 6 and 7 are, in effect, reference amplitudes, using the dates of turns in total receipts as the reference frame (see Table 41 and Appendix A, sec. 15).

[e] Specific-cycle amplitude was computed using only those specific-cycle turns associated with the SLH cycle chronology (see Appendix A, secs. 9 and 10e).

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

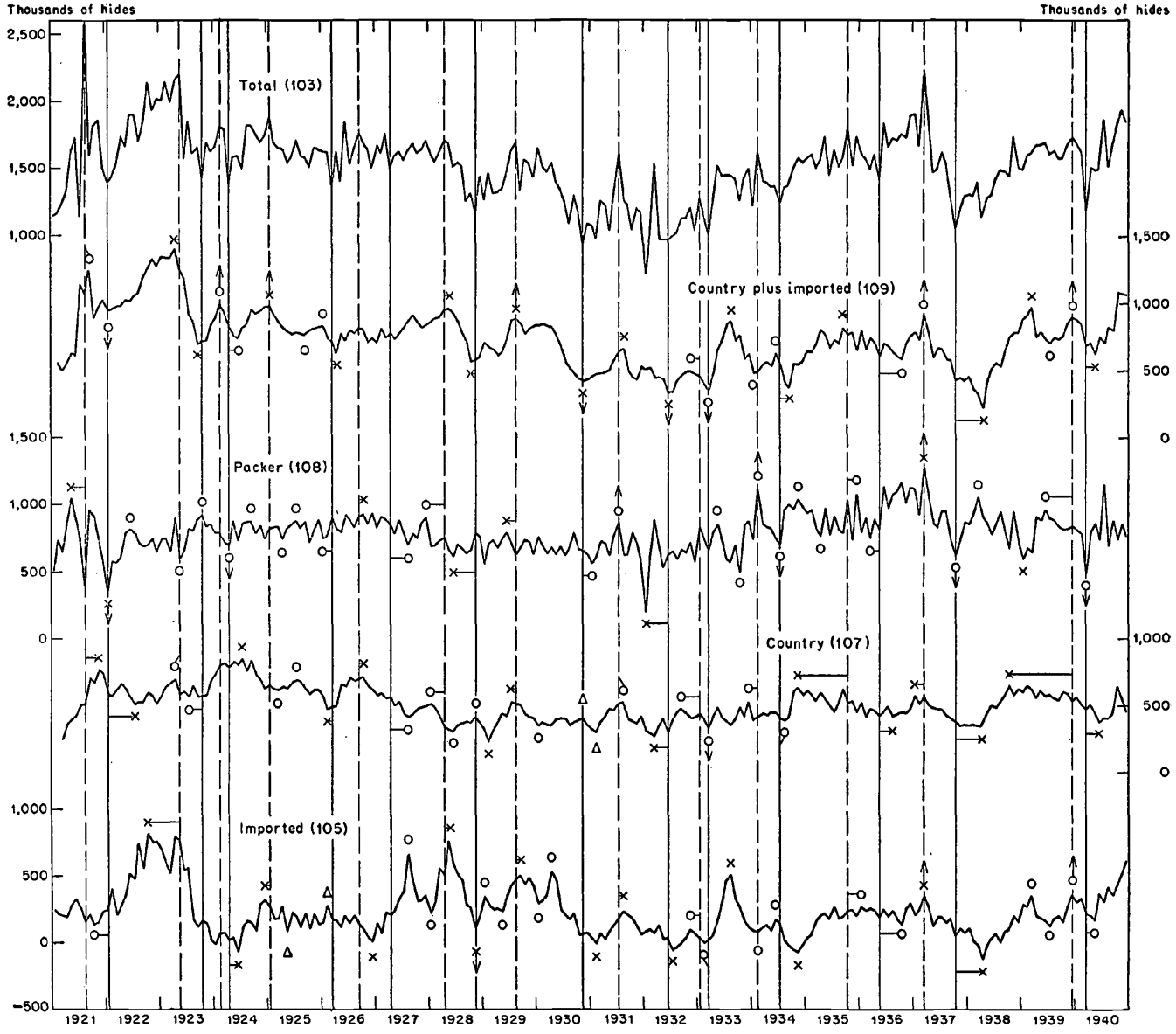
[g] 1929–1939 only, since the 1923–1924 cycle turns were unmatched.

[h] Subcycle amplitude for only the period for which cycle amplitude was available, 1929–1939, constituted the denominator of the ratios rather than the figures in column 1.

[i] Receipts of country and imported hides before May 1932 do not sum to country plus imported hides largely because of the way in which the seasonal correction was handled. Consequently, the figures given in the table likewise do not sum to the totals.

CHART 41

Tanners' Total Hide Receipts and Three Components, 1921–1940



Specific-subcycle peaks and troughs (broken and solid vertical lines) in *total receipts* (series 103 in Appendix B) are used as reference frame. For the other series, specific-cycle turns are marked by ×, specific-subcycle turns by O, and retardations by △. When a specific turn is matched with a turn in the reference series, a horizontal line or vertical arrow indicates the association.
Series 107 and 109 prior to May 1932 have been smoothed by a centered three-month moving average; see text note 1 and series descriptions in Appendix B.

gives some of our familiar measures. We see (in section 1) that there are fewer lagging turns for packer hides and fewer leading ones for country-plus-imported hides. Though both show many synchronous turns, recourse to the chart (the vertical grid marks peaks and troughs in total receipts) indicates that now one group and now another appears to define when peaks and troughs in total receipts appear; the sum of country and imported hides is especially important in determining when peaks occur. The behavior of this group is quite stable in its association to the total (notably more so than the equally large packer-hide segment), as the small average deviation and low percentage of months in unlike phase indicates.

The amplitude measures show the vastly greater relative fluctuation of hides from foreign markets compared to domestic ones. This gives some notion of the impact on foreign markets of changes in American needs. It is interesting, too, as the ratios indicate, that the minor movements are more important relative to

major ones for imports than for the other two branches of total supplies. In order to see the absolute contribution of each subdivision to fluctuation (including the portion that cancels out in the total), the specific amplitude measures are converted to ones in which total receipts provide the base rather than receipts of each type of hide (section 2, columns 4 and 5). Apparently, even after allowing for the average size of the series in this way, imports still show the greatest subcyclical instability.

The fact that the amplitude of the three components greatly exceeds that of the total shows that much of the instability does cancel out, because maxima and minima are reached at different times by the several components. To get the entire picture, it is necessary to combine timing and amplitude characteristics for each series. To this end, the last set of columns has been prepared. With the specific turning dates in total receipts used as a reference chronology, the fluctuation of each of the components during these reference phases was calculated. Clearly, increases and decreases in the country-plus-imported hides group count for most of the variation in total receipts between peaks and troughs of subcycles.[2] Packer hides fluctuate less; moreover, they have already started to decline (or rise) when the total reaches peaks (or troughs). It is imports, rather than the domestic market-responsive group, that is the key to flexibility in the tanners' total hide supply. This is especially true of those major movements in total receipts associated with business cycles. But even for subcyclical fluctuation, during the interwar period, over 50 per cent of the amplitude in the total (as it moved to tanners' yards) was a function of hide imports, which, on the average, provided only 14 per cent of the total supply.

Why do the several segments behave as they do?

Packer Hides.

Statistics are available on the cattle slaughtered by large interstate packing houses subject to federal inspection. These are, in effect, a record of their hide receipts, since the animals are flayed immediately after slaughter, and the hides placed in cure in packers' hide cellars. A virtual record of hide shipments is also available for these same houses.[3] For this group of companies, then, we have figures on approximate shipments (sales) of finished goods (hides) and receipts of raw materials (cattle) analogous to those used for the other stages in the shoe, leather, hide sequence; they are presented in Chart 42.

It is not surprising that cattle receipts should be a relatively smooth series. The number of cattle brought to market depends on the number killed. Slaughter, in turn, depends on the age distribution of cattle, conditions in the meat and milk industry, and, as in the drought of 1934, acts of God. Demand for hides is not likely to have much of an influence on the size of the slaughter, since hides constitute, on the average, only a little over 10 per cent of the value of a carcass. It is said that packers fix the price they will pay for beef after taking into consideration the price that can be obtained for raw hides as well as for dressed beef. But it seems unlikely that variation in the value of hides is sufficiently important, or sufficiently predictable for the relevant periods of time, to have any substantial influence on the supply of cattle or even on the size of the slaughter. Fundamentally, then, packers' cattle receipts trace a pattern that is not substantially influenced directly by conditions in the shoe and leather industry, though responsive to some of the same general business conditions.

Not so the hide shipments by packers to tanners. The figures show that packers do not dispose routinely of their current receipts but instead permit their stocks to rise or fall. During the interwar period, packers' stocks averaged about two and a half months' supply. But the ratio must have varied widely as a result of large fluctuations in stocks and small ones in slaughter. Stocks varied from lows of about 1.5 million hides to highs of over 2.7 million. And this excludes the drought months of 1934, when the figures reached a peak of 3.6 million before government warehouses took over much of the burden as stocks rose another million hides.

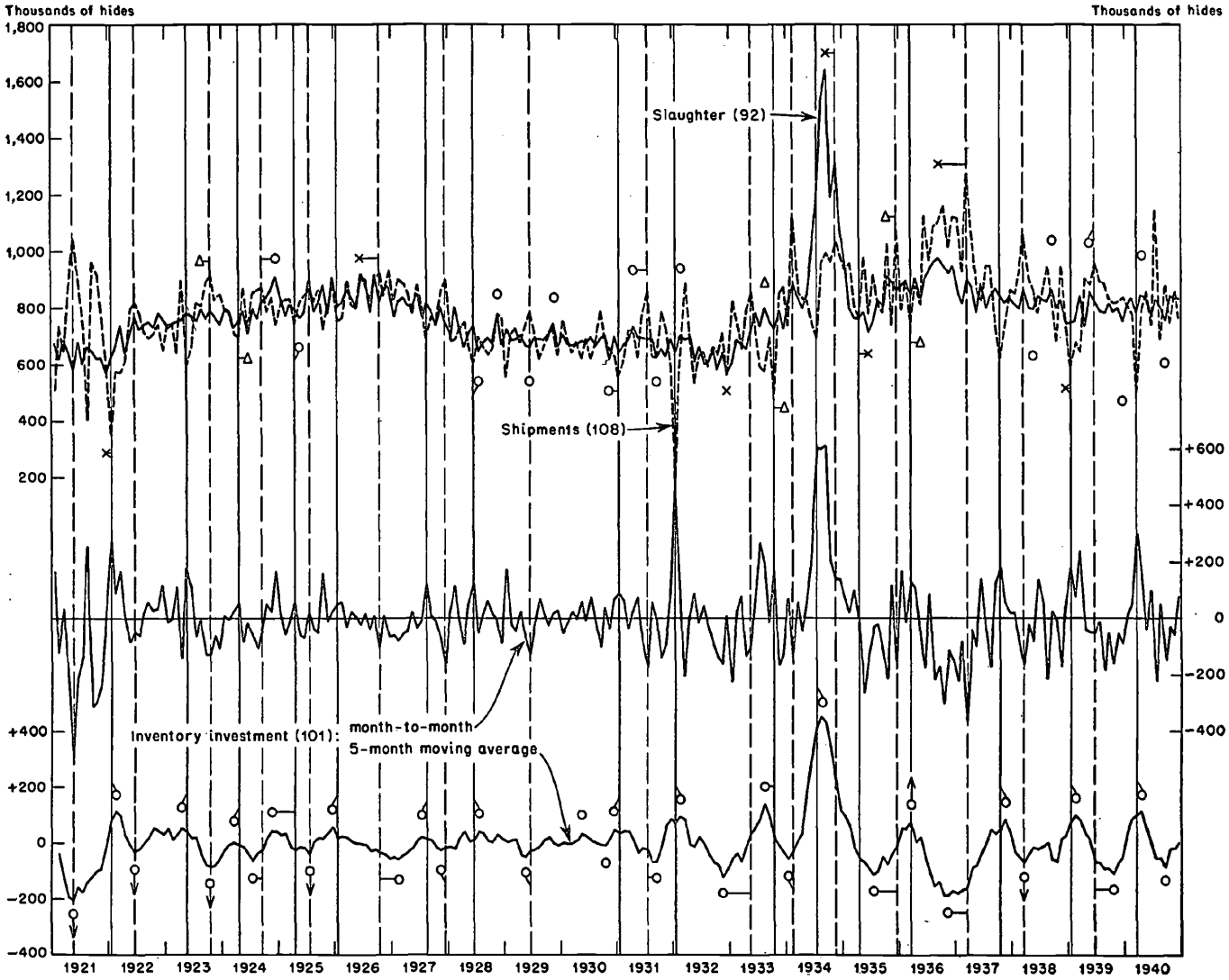
Inventory investment (month-to-month change in physical stocks) seems to fluctuate in a moderately systematic way; the waves of alternating inventory investment and disinvestment to which we have become accustomed in other contexts are apparent. On the average, at peaks or troughs of these specific subcycles, stocks increase or decrease by about 80 thousand hides when measured by centered five-month averages of the monthly figures. Since the monthly packer slaughter averaged about 750 thousand, at peaks, around a tenth of the current supply each month was added to the current flow to tanneries, and, at

[2] This statement would also apply if we used the reference chronology set ahead one month, instead of measuring fluctuation between dates marked by specific subcycles in total receipts. Packer hides contribute 17 and 19 per cent of the subcycle and selected cycle amplitudes respectively of total receipts during the SLH reference phases. The corresponding figures for country-plus-imported hides were 83 and 81. The lead of one month was selected since it maximized the amplitude of total hide receipts.

[3] The figures actually apply to receipts of packer hides by tanners; but since most packer hides are held by packers prior to sale to tanners, and time in transit is not highly variable, the difference between packers' shipments and tanners' receipts cannot be large.

CHART 42

Packers' Slaughter, Shipments, and Inventory Investment in Hides, 1921–1940



Specific-subcycle peaks and troughs (broken and solid vertical lines) in *shipments* (series 103 in Appendix B) are used as a reference frame. For other series, specific-cycle turns are marked by ×, specific-subcycle turns by O, and retardations by △. When a specific turn is matched with a turn in the reference series, a horizontal line or vertical arrow indicates the association. The moving average is centered and its turns are related inversely to the reference frame; specific peaks are matched with reference troughs and specific troughs with reference peaks.

troughs, around a tenth of the current supply was held back. Differences of this order—and these are averages for five months not maximum figures—cause the pattern of hide shipments to diverge materially from the pattern of cattle receipts.

Arithmetically, fluctuation in the rate at which packers' hide stocks accumulated could be primarily a function of fluctuating cattle receipts. For hides must be put in cure as soon as they have been removed from the carcass. The process of assembling and curing hides takes about six weeks. If slaughter varied greatly, so would, necessarily, inventory investment; its size would be a lagged function of the rate of change in slaughter. But as Chart 42 shows, the cattle receipts series is quite smooth. It is in opposite phase with inventory investment 44 per cent of the time. Its first differences have little pattern. For the rationale of packers' inventory investment, we must look elsewhere.

Where to look depends on where the causally effective relations may be, and this we cannot say on a priori bases. Accordingly, it is useful to examine time series that represent points where decisions may focus. We study the association of three sorts of materials with the data that needs to be explained—packers' stock: (1) the time series that reflect tanners' needs, and for this choose their investment in leather stocks or ship-

ments of leather; (2) hide prices or their rate of change (these may be associated with packers' stock as either cause or effect); and (3) differentials between the prices of packer and of other hides.

The first section of Table 56 suggests that the associations of none of these data with change in packers' stocks is especially promising, with one possible exception (the last line is presented in a different context). The association of change in hide prices and packers' investment in stocks seems to be quite close except during the worst years of the depression of the thirties and during the period following the drought of 1934. It seems reasonable that, during both of these periods, when slack supply may well have substantially reduced the influence on the market that packers' decisions ordinarily exercise, associations between packers' stocks and hide prices might diverge from their usual patterns. We shall find similar sharp differences occurring elsewhere, where the same logic applies. Consequently, the figure of 26 per cent in unlike phase, when change in packers' stocks and in prices are matched inversely with these two periods excluded, is not without interest. Also of note in this context is the slackening rise in inventory investment a month or so *before* prices slacken their fall and vice versa.

But it may be that, to reproduce the figures packers use in determining their inventory and sales policy, we ought to concentrate on hides ready for sale (this excludes those in cure, except under the unusual circumstances when sales are made in short cure). To do

TABLE 56

Timing of Subcycles: Packers' Hide Stocks Compared with Selected Data, 1921–1940

		NUMBER OF TURNS					TIMING (*months*)		MONTHS IN UNLIKE PHASE AS % OF ALL MONTHS [b] *Timing That Maximizes Correspondence*		
			Matched Turns [c]								
	TYPE OF ASSOCIATION [a]	*All Turns*	*Total*	*Leading*	*Lagging*	*Synchronous*	*Mean Lead (−) or Lag (+)*	*Average Deviation*	*Lead (−) or Lag (+) (months)*	*% of All*	*Omitting 2 Periods* [d]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. REFERENCE FRAME: FIRST DIFFERENCES IN PACKERS' HIDE STOCKS (35 TURNS) [e]											
First differences in hide prices (23) [f]	Inverse	36	26	4	16	6	+1.1	1.8	+2	34	26
Hide prices proper (23)	Direct	31	24	19	2	3	−2.7	2.0	−3	32	30
First differences in tanners' leather stocks (72) [f]	Direct	33	24	8	15	1	+0.6	2.4	+2	37	29
First differences in tanners' leather shipments (89) [f]	Inverse	36	25	7	13	5	−0.2	2.0	0	38	35
Hide price ratio (26) of country plus Frigorifico to packer	Inverse	34	24	13	7	4	−0.2	2.0	−1	42	38
Hide price ratio (24) of packer to Frigorifico	Direct	40	28	19	5	4	−1.2	1.7	−2	35	[g]
Tanners' receipts of packer hides (108)	Inverse	32	32	10	15	7	+0.6 [h]	1.7	0	26	24
2. REFERENCE FRAME: DISCRETIONARY PACKERS' HIDE STOCKS (33 TURNS) [e]											
Hide prices proper	Inverse	31	29	16	6	7	+0.7	1.9	+1	27	23
First differences in tanners' leather stocks [f]	Direct	33	19	9	8	2	−0.8	2.0	−1	45	[g]
Ratio (86) of tanners' leather shipments to stocks	Inverse	35	30	8	15	7	+0.2	2.2	0	33	32
Hide price ratio of country plus Frigorifico to packer	Inverse	34	15	11	2	2	−1.9	1.9	−3	39	[g]

[a] When the association is inverse, specific peaks are matched with reference troughs and specific troughs with reference peaks.

[b] The method of calculating the percentage of months in unlike phase is given in Appendix A, sec. 14. Comparisons cover June 1921 to December 1940 except for price ratios, which cover January 1922 to December 1940.

[c] For the rules used in relating subcycle turns in two activities, see Appendix A, secs. 10a, b, c, and d; see also Appendix A, sec. I.

[d] Exclusive of the months January 1930 to December 1932 and September 1934 to September 1936.

[e] The two packers' hide stock series are 101 and 102 in Appendix B.

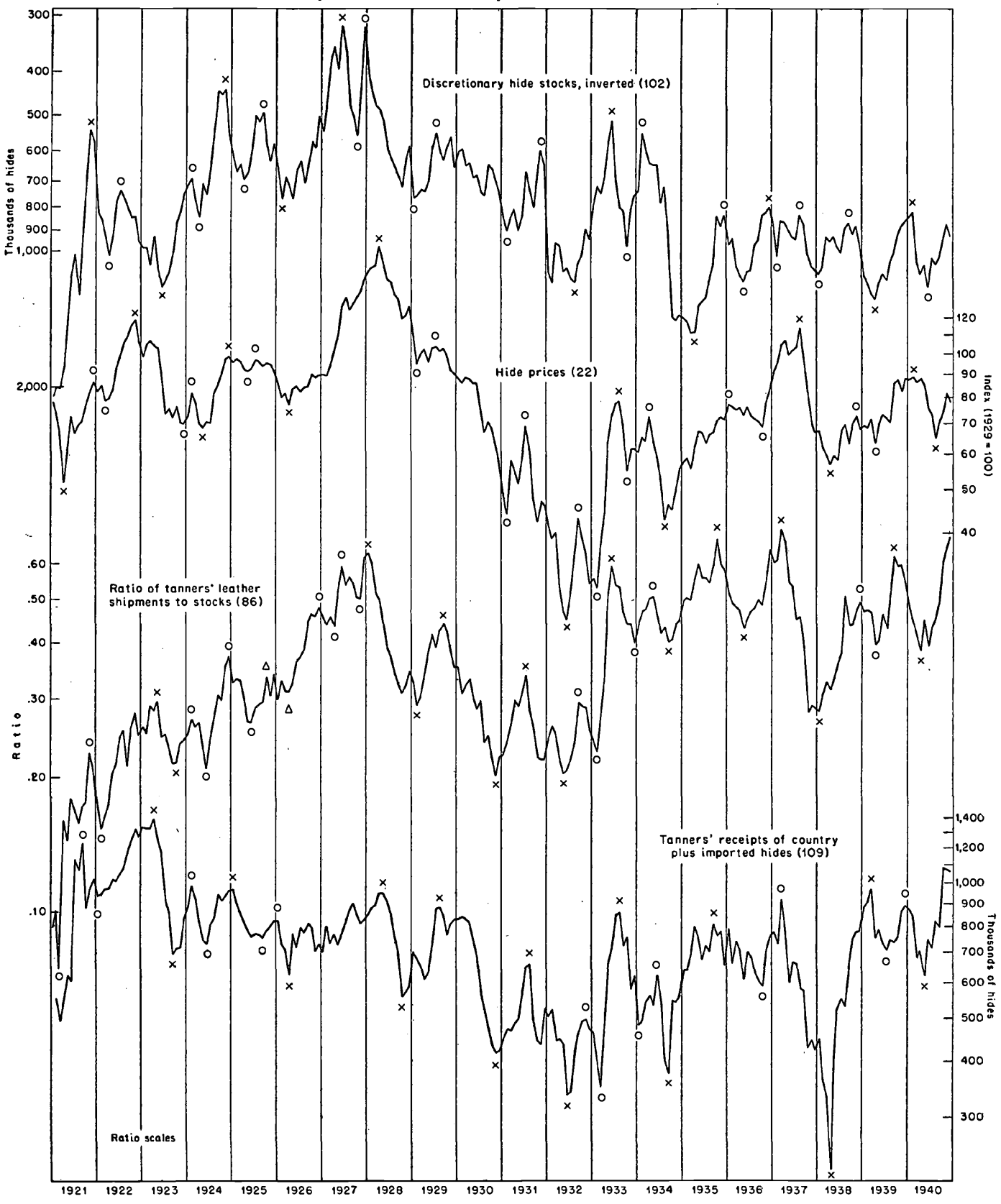
[f] First differences are centered five-month moving averages of month-to-month change.

[g] Percentage not improved by omission of the two periods.

[h] In making the calculations, the roles of the reference and specific series were reversed (see Appendix A, sec. 10d).

CHART 43

Packers' Discretionary Hide Stocks Compared with Selected Series, 1921–1940



Specific-cycle turns are marked by ×, specific-subcycle turns by O, and retardations by △.
Series 109 prior to May 1932 has been smoothed by a centered three-month moving average; see text note 1 and series description in Appendix B.

this, we assume that the previous six weeks' slaughter is in preliminary or actual cure, and subtract this amount from the total of packers' stocks, calling the residual "discretionary hide stocks" on the assumption that they could be sold at a price.[4] Discretionary stock is drawn on Chart 43 with the scale inverted (stocks are smaller, the higher on the chart) in order to facilitate visual comparison with other data.

The absolute size of this immediately available first-quality segment of the hide supply appears to vary widely; and this is an interesting fact in itself. One is also struck by the parallelism between packers' discretionary stocks and hide prices and between these stocks and the turnover of tanners' leather stocks (ratio of leather shipments to leather stocks).[5] When these stocks are used as reference frame in Table 56, the timing measures show that subcycles in hide prices bear a substantial similarity to those of packer stocks with, again, prices lagging slightly. In other words, packers feed out stock as prices rise and build them up as they fall. This process would seem to have a logical relation to tanners' buying endeavor, which may be as well represented by the turnover ratio for their finished stock as by any other single statistic. But the visual association between the ratio and packers' stocks that the chart seems to display is not borne out in the timing associations for the subcycles. Though a very large number of turns are matched, neither the average deviation nor the percentage in unlike phase is notably small.

The logical link and the unclear empirical association between packers' stocks and tanners' buying endeavor (as represented by the ratio) suggest that it may be useful to observe the process one step closer to tanners—their receipts of packer hides. Short-term fluctuation in packers' shipments are, at an arithmetic level, largely the result of changes in packers' stocks rather than in cattle slaughter. Inventory investment and shipments (matched inversely) are in nonconforming phase only 26 per cent of the months. Thus, in a sense, by explaining tanners' receipts (packers' shipments), we explain a large part of the fluctuation in inventory investment, or vice versa. We have learned that receipts of packer hides fluctuate less than of country-plus-imported hides and reach turning points a month or two earlier. What is the reason for the distinctive pattern? Table 57 and Chart 44 associate tanners' receipts of packer hides with activities that may have explanatory value. Since we deal here with an activity that responds early, we compare it with early indicators of market demand or prices.

The rate at which tanners' stocks of finished leather change is one such indicator. Matched inversely (ex-

[4] This is the concept introduced in the previous chapter. The justification for incorporating it in the analysis here is simply that, in this case, processing must start the minute hides are received and continue without interruption until completed.

[5] Though the exclusion of stocks hypothetically in cure sharpens the associations upon which I comment, the story would be substantially the same were total packer stocks in hands other than tanners' used instead of discretionary stock.

TABLE 57

Timing of Subcycles: Tanners' Receipts of Packer Hides Compared with Selected Data, 1921–1940

Type of association [a] (1)	Number of turns: All turns (2)	Number of turns: Matched turns [c] Total (3)	Leading (4)	Lagging (5)	Synchronous (6)	Timing (months): Mean lead (−) or lag (+) (7)	Average deviation (8)	Months in unlike phase as % of all months [b], Timing that maximizes correspondence: Lead (−) or lag (+) (months) (9)	% of all (10)	Omitting 2 periods [d] (11)
Reference frame: tanners' receipts of packer hides (32 turns) [e]										
First differences, tanners' leather: [f]										
Stocks (72)	Inverse	33	26	7	18	1	+0.7	1.6	+1	31	21
Shipments (89)	Direct	34	25	11	9	5	−0.9	2.3	−1	38	29
Hide price ratio (26) of country plus Frigorifico to packer	Direct	34	21	14	5	2	−0.7	2.1	−2	37	40
First differences in hide price average, all hides (23) [f]	Direct	36	28	5	19	4	+1.0	1.1	+1	26	18

[a] When the association is inverse, specific peaks are matched with reference troughs and specific troughs with reference peaks.

[b] The method of calculating the percentage of months in unlike phase is given in Appendix A, sec. 14. Comparisons cover June 1921 to December 1940 except for the price ratio, which covers January 1922 to December 1940.

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

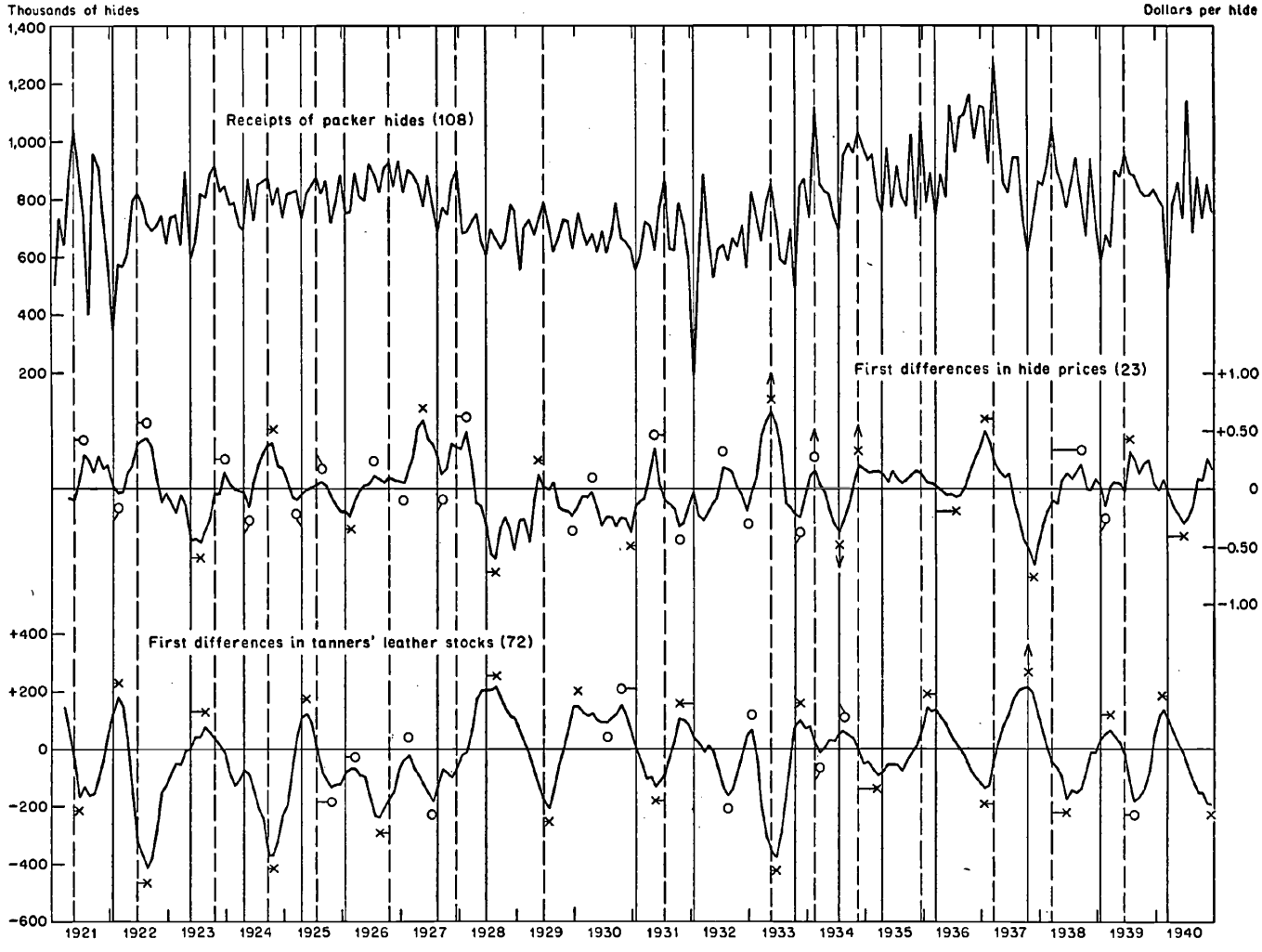
[d] Exclusive of the months January 1930 to December 1932 and September 1934 to September 1936.

[e] Series 108 in Appendix B.

[f] First differences are centered five-month moving averages of month-to-month change.

CHART 44

Tanners' Receipts of Packer Hides Compared with Selected Series, 1921–1940



Specific-subcycle peaks and troughs (broken and solid vertical lines) in *tanners' receipts of packer hides* (series 108 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. First differences in tanners' leather stocks are a centered five-month moving average of month-to-month change; they are related inversely to the reference frame; specific peaks are matched with reference troughs and specific troughs with reference peaks.

pansions matched with contractions), 31 per cent of the months are in unlike phase after allowing for a lag of a month. But many of the nonconforming months appear to occur either during the deeply depressed years of the thirties, when the usual distinctions between availability of packer and of other hides might not have applied, or during the period directly following the drought of 1934, when they certainly did not apply because of the huge supplies held in federal warehouses. If these years are omitted, only 21 per cent of the months were in unlike phase. But these associations occur after an allowance for a one-month lag of investment relative to receipts. If the former is to be interpreted as causing the latter, cause must operate through some leading variant of stocks such as unsold stocks. The rate of change in tanners' shipments may come as close to reflecting alterations in unfilled orders as any available series; it synchronizes with receipts of packer hides, and the association is fairly close, at least when the depression and drought years are excluded.

These figures raise provoking questions. The lead of packer-hide receipts relative to country-plus-imported hide receipts, and the fleeting similarities in the contours of this choice and rapidly available element of the hide supply with the contours of factors that may represent more immediate need, is reminiscent of facts we encountered earlier. At-once orders of shoe retailers

seemed to have a tendency to lead the rest of shoe orders, and they may share a few elements with packer-hide receipts, which are also virtually orders because of the short delivery period. But there are important differences. Tanners hardly need to correct for errors in ordering in the way that shoe retailers do; therefore orders placed with packers will not feature the corrective element, which is partly responsible for the lead in shoe retailers' orders placed with wholesalers or in-stock departments of manufacturers. Further, packer hides are a most desirable portion of the hide supply; one would expect that tanners would continue to buy them in preference to most other sorts of hides so long as this was advantageous. But advantage may shift.

The relationship between the price of packer hides and of other hides may cause the purchase of packer hides to grow relatively more or less advantageous. We can view this in the form of a ratio of the average of the prices of a common type of country hide and an imported hide to the price of a packer hide. But Table 57 shows that this ratio displays a negligible association to receipts of packer hides.[6] The absence of similarity does not mean that price differentials have nothing to do with the matter. It may mean just the contrary—they have so much to do with it that they are wiped out by agile shifts in buying the minute they threaten to appear. In this case, the movements the ratio actually shows may reflect primarily a quality or desirability differential rather than a true price differential.

But the table has something else to say about prices. The flow of packer hides into tanneries bears a provocative similarity to fluctuations in the rate at which hide prices are changing. The rate lags slightly, though it displays very early turns relative to the industry as a whole. With an average lag of price change of just a month, the average deviation is only 1.1 months for 28 matched turns. For the whole period, after allowing for the lag, 26 per cent of the months are in unlike phase; many of the nonconforming months occur during the depression of the thirties when first differences in hide prices had several additional movements. Omitting three depression years (1930–1932) and the two after the drought of 1934, only 18 per cent of the months were in unlike phase.

The four following facts seem related to one another: (1) the large majority of packer hides are sold by four companies; (2) the operations of these companies are watched by other traders and have a strong influence on hide prices generally; (3) hide stocks of packers fall at an increasing rate as hide prices accelerate and vice versa, stocks proper are low when prices proper are high and vice versa, and in both cases stocks lead prices; and (4) receipts of packer hides turn early relative to other hides and are closely associated with the rate of change in prices. Read together, the facts suggest an explanation. As packer stocks fall at an increasing rate and grow absolutely low, packers, loath to reduce them further, may insist on a price that increases so fast that tanners feel they can better it elsewhere. But the resultant shift of trading from the narrower to the broader market may mean that a given amount of buying has less of an impact on prices than it would if concentrated in the packer markets. Because of the sensitive arbitrage among various sorts of hides, this causes the rate of rise in all hide prices (packer as well as others) to slacken off. The argument is symmetrical with respect to a fall in prices and a rise in packers' stocks.[7] If this explanation has merit, it raises the further question of whether the slackening rate of change tends to convert into a reversal of direction.

Country and Imported Hides

Statistics on tanners' receipts of hides from two sources other than domestic interstate packers were pictured in Chart 41. For the most part, the supply of these hides moving to the central markets of this country responds more clearly to market conditions than is the case for the true by-product supply of the interstate packers. Unfortunately, some by-product hides, in the sense the word applies to packer hides (federally inspected), are included in the country totals. They come from large packing houses that are not subject to federal inspection, since they confine their selling to one state; sometimes they may even be subsidiaries of the big four. The country hide group, then, is a mixed one, in which both by-product and market-sensitive supply combine. Imported hides—whatever their basic character may be in the country of export (the Argentine Frigorifico hides are a high-quality product of large packing houses)—arrive here in response to market conditions that cause their purchase to be deemed advantageous.

Neither of these major supplementary sources seems to show a marked conformity with either specific or general affairs in the industry,[8] but the two together do.

[6] This holds when receipts of packer hides are expressed as a ratio of those of country-plus-imported hides and compared with the price ratio.

[7] As the rate of rise of packer stocks increases, prices fall at an accelerating rate. As stocks finally reach a level that is deemed too high, packers grow more willing to sell at a price that is advantageous relative to the rest of the field. Though the first impact of the drop in price may be a faster rate of decline, the resultant shift in demand from the broader to the narrower market has a tendency to firm prices.

[8] The percentage of months in unlike reference phase is 32 (+1) for imports, and 40 (−2) for country hides. For country hides, peaks and troughs differ. The average timing of peaks is

Apparently, when tanners start to range beyond the Chicago stockyards for increasing portions of their hide supplies, they sometimes find the bulk of their additional requirements in this country and sometimes abroad, depending on where supplies are more plentiful and, considering quality, cheaper. What governs the response of the total supplementary supply? What causes the shift from packer to other hides? What then determines the choice between country and imported hides?

TABLE 58

Timing of Subcycles: Tanners' Receipts of Country plus Imported Hides Compared with Selected Data, 1921–1940

Type of association [a] (1)	Reference	Number of turns: All turns (2)	Matched turns [c]: Total (3)	Leading (4)	Lagging (5)	Synchronous (6)	Timing (months): Mean lead (−) or lag (+) (7)	Average deviation (8)	Months in unlike phase as % of all months [b]: Timing that maximizes correspondence: Lead (−) or lag (+) (months) (9)	(%) (10)
Reference frame: tanners' receipts of country plus imported hides (31 turns) [d]										
SLH-subcycle reference chronology [e]	Direct	31	29	8	11	10	+0.2 [f]	1.2	0	21
Tanners' leather:										
Ratio (86) of shipments to stock	Direct	35	31	17	7	7	−0.9	1.5	−1	23
Stock (72)	Inverse	29	27	11	13	3	−0.2	1.7	0	23
Shipments (89)	Direct	37	29	21	4	4	−1.9	1.9	−2	29
First differences in stock [g]	Inverse	33	26	24	0	2	−3.4	2.0	−2	32
Wholesale shoe sales, dollars (34)	Direct	27	27	20	5	2	−1.9	2.1	−1	27
Market profile [h]	Direct	22	15	14	1	0	−3.0	1.7	−3	27
Hide prices:										
Ratio (26) of country plus Frigorifico to packer	Direct	34	16	2	13	1	+1.4	1.6	+2	40
Prices (23)	Direct	31	29	13	12	4	+0.1	2.1	0	28
First differences in prices [g]	Direct	36	25	22	2	1	−3.0	1.6	−3	28

[a] When the association is inverse, specific peaks are matched with reference troughs and specific troughs with reference peaks.

[b] The method of calculating the percentage of months in unlike phase is given in Appendix A, sec. 14. Comparisons cover June 1921 to December 1940 except for the price ratio, which covers January 1922 to December 1940, and the market profile, which covers July 1926 to July 1940. Exclusion of the months excluded in the last column of Table 57 did not materially improve the percentages given in column 10.

[c] For the rules used in relating subcycle turns in two activities, see Appendix A, secs. 10a, b, c, and d; see also Appendix A, sec. I.

[d] Series 109 in Appendix B. The monthly data were used for the whole period 1921–1940.

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

[f] In making the calculations, the roles of the reference and specific series were reversed (see Appendix A, sec. 10d).

[g] First differences are centered five-month moving averages of month-to-month change.

[h] See text, Chapter 9.

TOTAL SUPPLEMENTARY SUPPLY

Table 58 provides comparisons between receipts of country and imported hides and the factors that may be responsible for their behavior. Receipts of these market-sensitive supplies appear to conform rather neatly to the fluctuations in industry affairs summarized in the subcycle reference chronology. Other lines of the table make this general statement more specific. The very strong association with that best single statement of the pressure of tanners' needs, the turnover ratio of finished leather stocks, is distinctly worthy of note. Twenty-three per cent of the months are in unlike phase, after an allowance for a lead of one month. (Chart 43 also indicated a similarity in the amplitude of many movements.)

The changing pressure of need—positive or negative—seems to push hide buyers farther afield or draw them nearer home, and one cannot help wondering where in the vertical sequence this pressure starts to build up. In the table the question is referred to such data as we have on the pressure of buying at later stages—wholesale sales and the market profile. There is some indication that the rhythms established in the shoe market reappear as the first processor seeks his raw materials. They appear at the earlier stage several months *after* they do at the later one, which suggests a causal association that moves from a tightness in the shoe and leather markets back toward the hide markets. But one cannot feel too confident about this in-

—3.1 months and of troughs —0.3 month, with a consistency index for the lead of peaks of 53; but even if an allowance is made for these peak and trough differences, the per cent of months in unlike phase is still about the same. The two series likewise fail to show a noteworthy association with any of the factors that have seemed to express tanners' needs or buying endeavor.

ference so long as the chain of causation also seems to move in a wider loop—through early changes in tanners' requirements, to tightness in packer-hide markets, to accelerating price change, to a shift in buying toward the supplementary sources of hides.

The ratio between packer and country-plus-imported hide prices displays no more influence on receipts of country-plus-imported hides than it did on packer hides. Hide prices do seem to have an association—a mild one in the table—which is somewhat reenforced by a similarity in the extent of the several movements shown in Chart 43.[9]

By and large, the empirical evidence falls in line with what the theory or knowledge of process implies. It does not, however, supply a test. The difficulty is that the conformity between receipts of country-plus-imported hides and affairs in the industry as a whole is so close that any activity flowing in the industry currents will tend to display similar fluctuations.

The logic of the associations between tanners' requirements, hide prices, and receipts of country-plus-imported hides ties in with what we know of the hide market in general. The total hide supply consists of high quality by-product hides plus an almost indefinite actual or potential supply of additional hides, usually of poorer or less reliable quality or with higher marketing costs. When demand is strong, it can only be satisfied by reaching fairly deep into the supply of hides arrayed by cost per unit of quality. At such times, holders of standard grades can demand a relatively high price for their products. The stronger the demand, the higher the price necessary to attract the required supply; that is, hides are supplied along an upward sloping supply schedule. However, the marginal properties of the schedule cannot be stipulated—I do not know whether the slope is constant, increasing, or decreasing.

By and large, this means that at least the supplementary section of the hide supply will roughly parallel hide prices. Obviously the parallelism can only be exceedingly rough, for many factors besides price must help to determine the volume of country or imported hides that move to tanneries.[10] In any event, empirical materials do not gainsay, and logic points toward, a triple association between pressure of tanners' demand, the level of hide prices, and tanners' receipts of country-plus-imported hides.

COUNTRY VERSUS IMPORTED HIDES

But why is the primary source of the supplementary purchases sometimes country hides and sometimes imports, and how does the choice between the two sources come about? Although there are qualitative differences that make some hides more advantageous for some purposes than others, in most cases additional fabricating expense will overcome the qualitative preference. This is why the various branches of the hide market seem to be welded into one by arbitrage, which prevents most differentials from becoming substantial. This is certainly why the price ratios that we have studied thus far do not seem to be associated with the choice between packer and other hides.

But the singleness of the market must depend on a sharing of the same pool of buyers and sellers. The notable exception to this condition is foreign hides that tap an international market, yet provide competition in this country to domestic hides that do not. In this case, price differentials may well develop that would serve to channel American buying toward the more advantageous source of supplementary supplies.

This situation seems to apply to country and imported hides. The ratio of the price of country heavy cows to Argentine Frigorifico steers undergoes substantial alteration. Furthermore, there appears to be a marked parallelism in the pattern of this ratio and of one expressing the relation between the quantity of hides obtained from foreign and domestic sources.[11]

Chart 45 shows the two ratios, one for price and one for quantity. Similarities in the extent of their movements as well as in their timing seem fairly clear. Table 59 shows that 26 per cent of the months are in unlike phase and the average deviation for 21 matched turns

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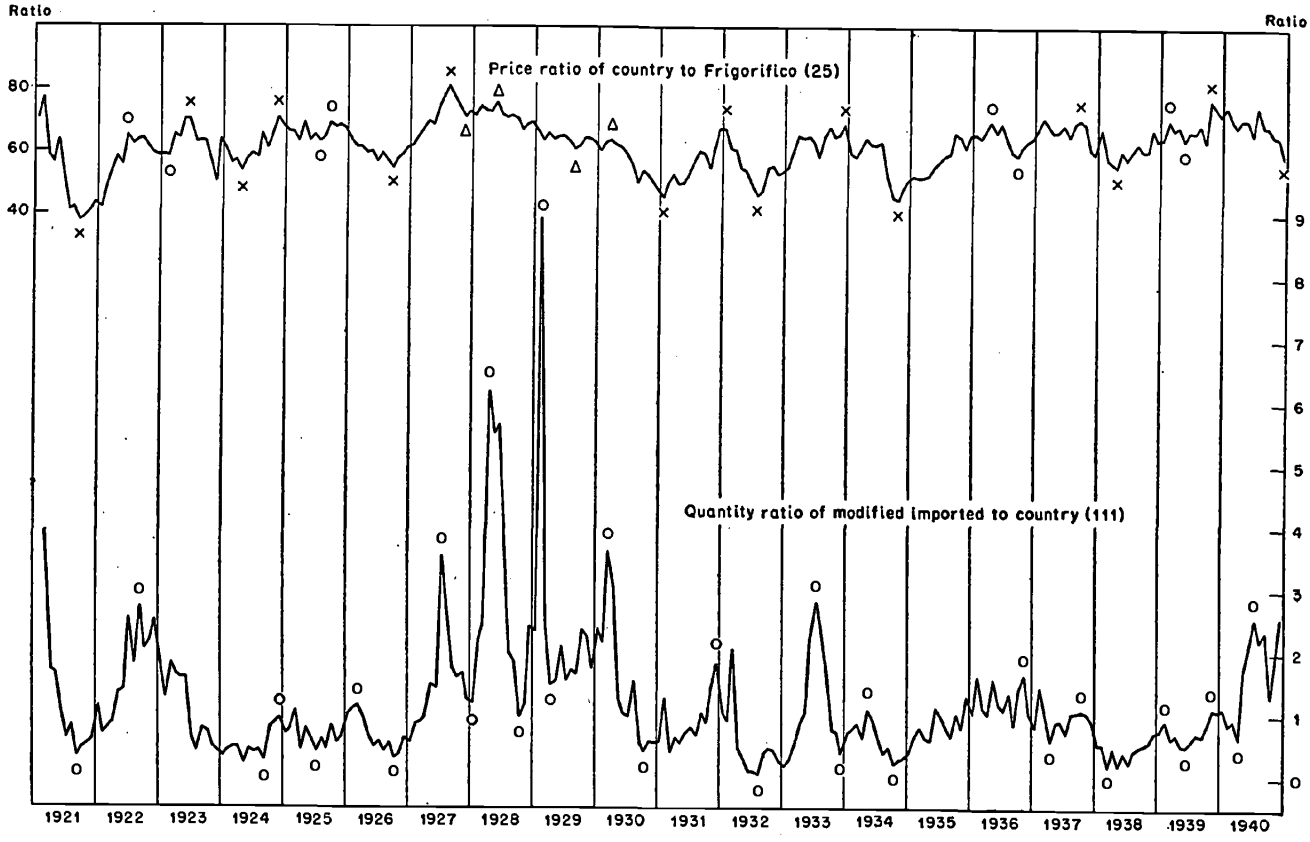
[9] First differences in prices three months earlier bear as close an association to receipts of country-plus-imported hides as do current prices proper. Price changes lead more at peaks than at troughs. The consistency index for the difference is 48. This might be explained by the fact that imports, which take longer to eventuate in receipts, are a more important part of the market response to changing prices at peaks than at troughs, discussed below.

[10] There is one marked departure from parallelism of the two series—the failure of supplies to spurt up in 1927 and early 1928 in response to the very rapid rise in hide prices. The cattle cycle reached a trough in 1928 and was, in 1927, only two points above the trough. (Cattle population was estimated at 44.8 million in 1928; it had been 52.8 million in 1921 and rose to 56.5 million in 1934. *Livestock, Meat, and Wool Market Statistics and Related Data, 1944*, Dept. of Agriculture, 1945, p. 4 [population excluding calves]). The combination of low domestic supplies of all sorts with severe drawing down in packers' hide stocks (Chart 43 shows packers' discretionary stock at its absolute low in July and December 1927) must have caused an intense desire to buy and a marked deficiency in available supplies. Though foreign markets responded with vigor, prices skyrocketed.

[11] In an endeavor to make the comparison at the time the choice is made, imports the previous month were used as the numerator. The denominator is total tanners receipts of country hides less a portion that may have come from relatively large intrastate packers. When country hides were at their all-time low, about two-thirds of the total were assumed to be of this sort. This figure was then interpolated backward and forward by a twelve-month moving average of federally inspected slaughter on the assumption that supplies of large intrastate packers would parallel those of interstate packers.

CHART 45

Price and Quantity Comparisons for Country and Imported Hides, 1921–1940



Specific-cycle turns in the price ratio (25) are marked by ×, specific-subcycle turns by O, and retardations by △. For modifications in the components of the quantity ratio, see text note 11. For this series, major turns could not be usefully distinguished from minor ones.

TABLE 59

Timing of Subcycles: Proportion of Supplementary Hides Derived from Imports Compared with Hide Prices, 1921–1940

Type of association [a] (1)	Number of turns: All turns (2)	Matched turns [b]: Total (3)	Leading (4)	Lagging (5)	Synchronous (6)	Timing (months): Mean Lead (−) or Lag (+) (7)	Average Deviation (8)	Months in unlike phase as % of all months [a]: Timing That Maximizes Correspondence: Lead (−) or Lag (+) (months) (9)	(%) (10)
1. Reference frame: ratio of hypothetical import orders to price-flexible country hides (30 turns) [c]									
Hide prices, three sorts (22)	Direct	31	18	11	5	2	−1.5	2.4	−2	38
Hide price ratio (25) of country to Frigorifico	Direct	29	21	10	6	5	−0.4	1.5	0	26
2. Reference frame: net imports of hides (33 turns) [d]									
Hide prices, three sorts	Direct	31	26	14	4	8	−1.2	2.1	−1	30
Hide price ratio of country to Frigorifico	Direct	29	27	15	7	5	0	2.2	−1	29
Hide price ratio (24) of packer to Frigorifico	Direct	40	31	21	1	9	−1.3	1.1	−1	25

[a] The method of calculating the percentage of months in unlike phase is given in Appendix A, sec. 14. Comparisons cover June 1921 to December 1940.

[b] For the rules used in relating subcycle turns in two activities, see Appendix A, secs. 10a, b, c, and d; see also Appendix A, sec. I.

[c] Series 111 in Appendix B; see also Chapter 14, note 11.

[d] Series 105.

is only 1.5 months.[12] Since the quantity ratio is virtually dominated by its numerator (imports), it is important to isolate the association of imports with explanatory factors. The second section of Table 59 shows that the timing associations of imports with a ratio of prices of packer to Frigorifico steers (the direct comparison that would presumably motivate the purchase of these Argentine packer hides) are very close; the average deviation is especially low. But the over-all contours of the two series are not impressively parallel. Actually there is nothing conflicting about these several bits of evidence since they all reflect the same set of influences: they portray how buying flows to various sources—those most easily accessible—when the pressure of domestic demand raises the price level of the local preferred market.

But diversion of buying from the domestic to the foreign sectors of the market may itself have an influence on prices as well as be influenced by them. If supplementary hides are obtained abroad rather than in this country when the difference between the prices of foreign and local hides makes it advantageous to do so, then the lower foreign prices are relative to domestic ones, the higher are imports, other things the same. In placing an order for imports, a tanner would like to be able to compare import prices today with domestic prices a month or two hence—the time when the imports will actually become available to him. This he cannot do. Instead, he must guess at future domestic prices, and it may well be that the underlying bias of the guesses of many people will be that of current prices. (Starting with the current level, some guess that prices will rise and others that they will fall, and, on the average, guesses cluster around the present level.) If this is the case, then guesses, on the average, will err by the amount that prices change over the next few months. If the relative volume of orders for imports was some appropriate function of the relationship between foreign and domestic prices at the time the order was placed, actual imports will be too high (or too low) by that function times the amount that domestic prices have fallen (or risen) while imports were on their way.

Will the error have any influence on the domestic markets? It seems likely that it will, especially when imports are large, and errors may involve sizable quantities of hides. Errors, if they are recognized by hide buyers, tend to be corrected by appropriate alteration in current buying. The knowledge that too much was recently bought abroad and that it would have been better to buy it here, later, or not at all, must exert a depressing influence, other things the same, on the domestic market. Conversely, a stimulating influence would result if regrets were common that more had not been bought abroad. All of this would be true if errors in buying resulted from errors in anticipating the relevant market condition at any point in the industry. The peculiar part of its influence at this point is that the hide markets are more sensitive than most markets to any sort of misjudgment (because of the delicate adjustments of prices) and, more significantly, that the correction of the error is likely to have an uncommonly precise association with the actual rate of change of hide prices.

Because, then, the decision to purchase foreign rather than domestic supplementary hides seems to have a sharp relative-price component, and because some time is required for a purchase to materialize in receipts, there may be a tendency for this segment of buying to exert a weakening influence on hide prices after they have ceased to rise at an increasing rate. Conversely, imports may strengthen prices at the end of a retardation in their decline; though, at this stage of the price cycle, the influence may be weaker because imports tend to be small. In other words, the influence may tend to convert a retardation in the rise of prices into a fall; whether it also would tend to convert a retardation in the fall of prices into a rise is more problematical.

[12] If instead of using hypothetical orders for imports, we used actual imports (the current figures rather than those one month previous), and if instead of price-flexible country hides we used all country hides, 29 per cent of the months are in unlike phase with the price ratio (the actual figure is 28.6 as contrasted with 26.4 for the other ratio). The average deviation is higher—2.1 months instead of 1.5. Thus, though worsened, the association is not eliminated; moreover, the over-all contours of the price and flow ratios are more similar for the unadjusted than for the adjusted flow ratio.

Summary

The association between buying and selling of packers, butchers, and dealers seems to have a pattern and rationale quite different from those of the other stages in the shoe, leather, hide industry. The difference is soon apparent. The student is not tempted here, as elsewhere, to focus on selling (to tanners) as one boundary of the sequence to be studied, and buying (by packers or dealers) as the other. Neither boundary can be thought of as independent of price, which fundamentally conditions the amount bought or sold. Though this is true to some degree at all the stages, at this one it is central.

The total supply of hides, though we have no data on it, must conform very poorly to business cycles, much less to the shorter subcycles in the shoe, leather, hide industry. This is certainly true of our one set of data on current supply—federally inspected slaughter. Though the actual appearance of hides in the small farm com-

munities of this and other countries may be somewhat more responsive to demand, a nonconforming or poorly conforming pattern is bound to apply to true gross additions to world hide stocks.

Tanners' receipts of hides, on the other hand, conform reasonably well to subcyclical fluctuations in the shoe, leather, hide industry. The basic reason is simply that more hides are attracted to central markets of this country when prices are high than when they are low. The firms that supply these hides align themselves into several groups with distinctive roles, and fortunately they can be roughly isolated statistically.

The preferred, largest, and most readily available segment of total hide receipts comes from the large federally inspected packers. It seems to respond to early changes in immediate needs. But these patterns of buying appear to be associated with patterns in prices—on the average, hide prices reach their maximum rate of rise or fall a month after the buying of packer hides starts to decline or rise. This may be caused in part by the fact that the short-period flexibility in tanners' purchases is achieved by inverse alterations in packers' stocks; perhaps packers are harder traders when stocks are low and falling rapidly than when they are piling up.

As demand stiffens and prices start to rise at a high rate, tanners achieve the short-period flexibility in their buying in other ways—by turning increasingly to back-country or foreign markets. Their receipts of these hides reach maxima and minima after packer hides do and have a far greater subcyclical amplitude of fluctuation. Their monthly course seems to reflect such indications as may be found of the level of tanners' requirements and of their buying endeavor. Indeed alternating expansion and contraction of market positions all the way back to the finished shoe may even be reflected, though with a lag, at this earliest stage.

Within the total of supplementary hide receipts, shifts occur between back-country and foreign hides. Hide imports are especially variable: though they constituted on the average only about 14 per cent of the total supply, they provided over a half of the subcyclical and even more of the cyclical variability. The shift as between domestic and imported supplies is influenced by relative price advantage. This is visible in the figures because of the existence of broad international markets where American buying has a diluted impact on prices, so that price differentials are not immediately corrected by the buying that they attract or repel.

Indeed, it may be that the difference between foreign and domestic markets in the impact on prices of a given absolute amount of American buying may have its counterpart in the packer and country sections of the American market. Our data suggest that very shortly after buying of packer hides starts to fall, as that of other hides continues to increase, the rate of rise in prices ceases to climb, the same is true of the shift at the trough. These observations are consistent with the notion that a given amount of buying does not have the same impact on the diffuse country markets where it taps a hazily defined aggregate source of hides as it does on the highly concentrated packer markets, where the total hide supply at a given time is sharply concentrated and delineated. This may tend to cause the rate of change in prices to level off when once the shift in the emphasis in buying away from packer hides has taken place.

But, dimly visible in this process, there may also be a tendency to bring the actual rise in price to a close, other things the same. For hides, imported on the basis of a guess which, turning out to have been in error in proportion to the amount prices have recently changed, exert a depressing influence on the market as soon as prices cease to rise at an increasing rate; it thus tends to convert a turn in the rate of rise in prices to a turn in prices proper. The investigations of this chapter, then, hint that prices themselves may add a group of endogenous reciprocating mechanisms to the list that previous chapters have developed.

One thing in any event is clear: Hides appear to be attracted to central American markets along, in effect, an upward sloping supply schedule—other things the same, more are supplied at higher prices than at lower ones. At this earliest stage in the shoe, leather, hide sequence, then, our eyes have been persistently directed toward the price mechanism and its role in the marketing process.