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# 4

## Automobile Credit

### TIMING DURING BUSINESS CYCLES

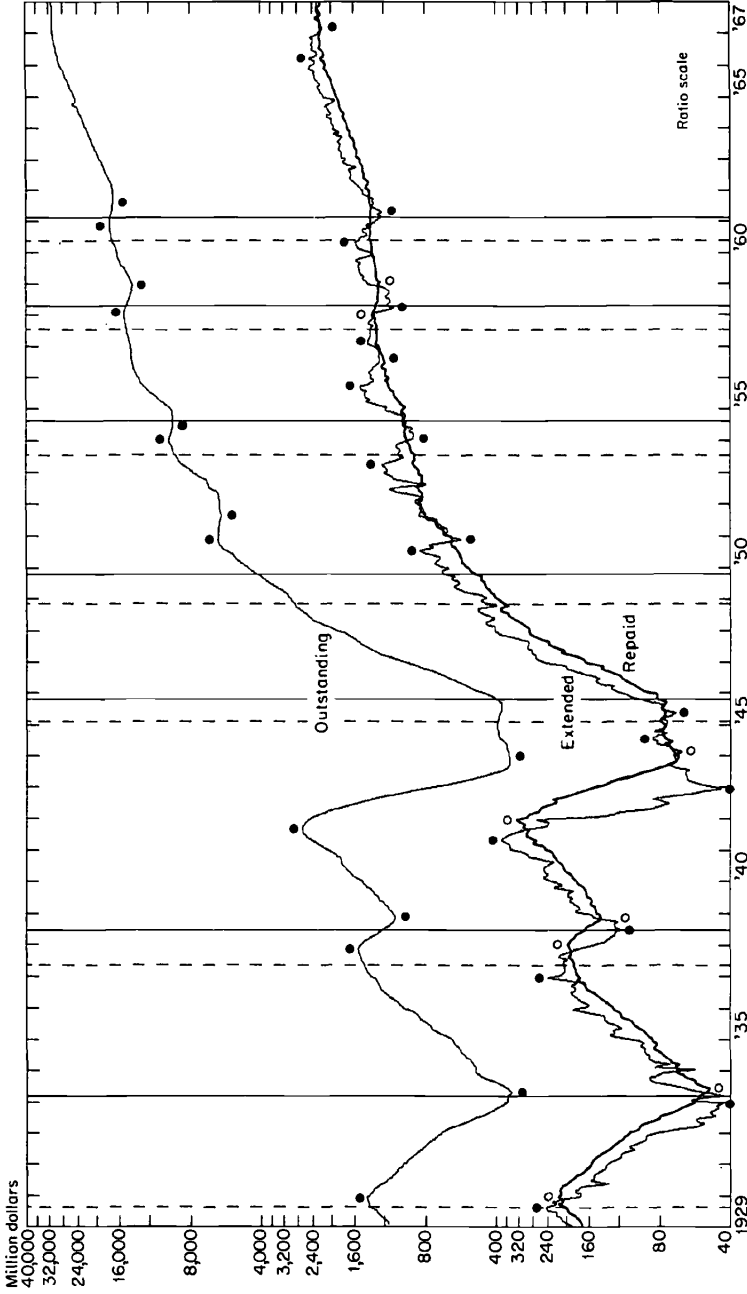
ONE CAN EXAMINE the impact on economic activity of changes in instalment credit more directly by confining attention to the largest single part of total instalment credit, automobile instalment credit. We have already noted that even relative to disposable personal income, which has itself grown greatly, automobile credit is even more important now than during the prewar period.

More importantly, however, one can carry the analysis of automobile credit farther than the analysis of total instalment credit, by relating the turning points in the various measures of auto credit not only to the business cycles but also to several measures of activity in the auto industry. This provides a more direct test of the hypothesis that net increases in credit may stimulate and net decreases depress economic activity.

We begin by examining the basic data. Chart 10 indicates in millions of dollars the pattern of changes of automobile credit extensions, repayments, and outstandings for 1929-67. (Net automobile credit change is charted separately and is shown in conjunction with related auto industry behavior in Chart 13.) A striking characteristic is the quantitative difference in the movement in all three measures of automobile instalment credit in the prewar as opposed to the postwar period. The critical role of extensions is revealed as well.

The *absolute* dollar changes involved in the cyclical movement of extensions and repayments in the thirties were a great deal smaller than during the postwar business cycles. Chart 10 shows clearly, however, that the *relative* volatility was much greater in the prewar period—that is, the cyclical changes represented a much larger per-

CHART 10  
Automobile Instalment Credit Extended, Repaid, and Outstanding, 1929-67



NOTE: Vertical broken lines represent business cycle peaks; vertical solid lines, troughs. Dots (outstanding and extended) or circles (repaid) identify peaks and troughs of specific cycles.

SOURCE: Board of Governors, Federal Reserve System.

centage of the credit outstanding during the 1930's.<sup>1</sup> Care must be taken in interpreting the chart on a dollar-for-dollar basis, therefore, because of the tremendous growth in automobile credit. Compare, however, the dollar decline in outstandings during 1929-33 with the corresponding decline during the mildest postwar recession (1953-54). The absolute dollar decline was far greater in the latter instance. Business cycles in the postwar period have been milder than either the 1929 or the 1937 recession. A comparison of the effect of the relatively sharp recession of 1937-38 on auto credit outstanding with the movement of outstandings during the recession of 1957-58 clearly shows in absolute dollar terms the much greater effect now of a mild recession on this series than in the earlier period.

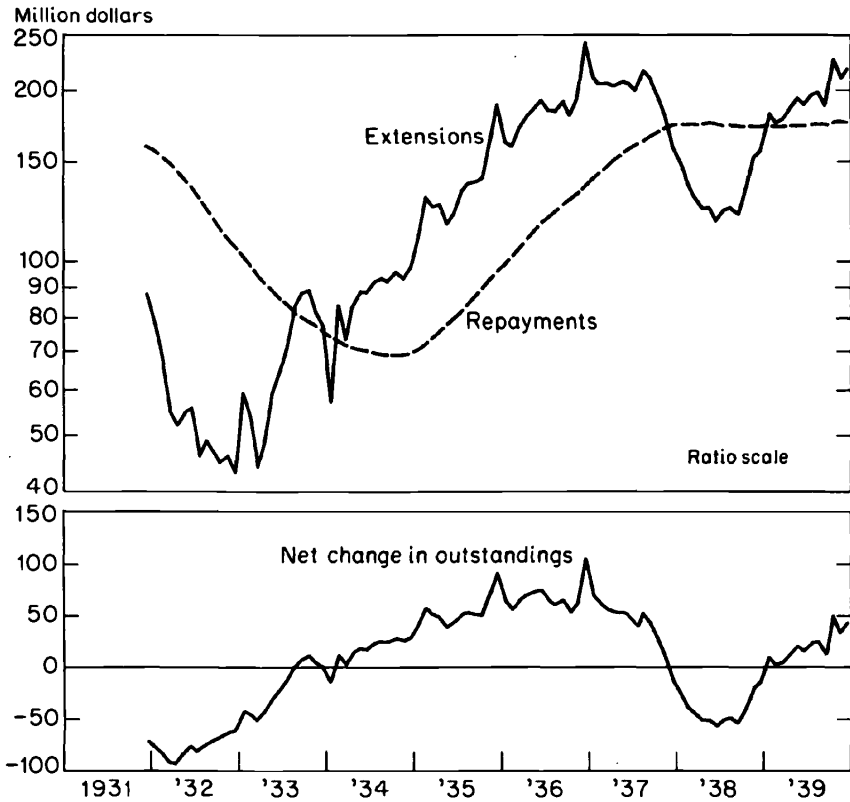
The relative contribution made to the cycles in auto credit outstandings by extensions and repayments discussed earlier shows up in graphic form. Prior to World War II, the cycles in repayments seem, in dollar terms, almost as pronounced as they were in the extensions series. In the postwar period the cycles in credit extensions generally remain whereas in repayments they have almost died out, with the already noted result that it is fluctuations in extensions that now produce the cycles in outstandings.

A major reason for the postwar change in the cyclical relationship of auto extensions and repayments is the increasing length of maturities in the postwar period. In Chart 11, we have assumed that repayments in the thirties were spread over thirty-six months, as they have frequently been in the last two decades. The result of applying this assumption to extensions during the thirties is to smooth out the repayments series relative to the extensions, much as one finds actually to be the case in the postwar period. The net change in auto credit outstanding thus computed reflects the cycles produced by the fluctuations in extensions about the relatively smooth series showing repayments.<sup>2</sup> For all these reasons, the two cycles of the thirties, which would appear to be mild in absolute dollar terms, show up with

<sup>1</sup> The greater relative volatility can be seen by examining the percentage changes during cycle phases indicated for instalment credit in Table 3. The automobile sector exhibits a similar pattern. Chart 10 is charted logarithmically; when the series are charted arithmetically, the greater absolute volatility in the postwar period is very prominent, especially for extensions.

<sup>2</sup> The mathematics of this relationship, which in effect makes repayments a thirty-six month moving average of extensions (centered on the thirty-sixth month), has already been considered.

CHART 11  
 Automobile Credit Extended, Repaid, and Net Change in Outstanding,  
 Based on Repayments Estimated from 36-Month Moving Average  
 of Extensions, 1931-39



dramatic clarity in Chart 10. Indeed, Chart 11 suggests that the 1937-38 recession would not have shown up at all in repayments had maturities been as long as they have been in recent years. The Great Depression is still apparent in repayments. Thus the postwar behavior of repayments is explainable in terms of the longer maturities that have prevailed. But it is clear that the relative volatility in all three series is greatly reduced in the postwar period. In this connection, however, it is well to remember that these changes, though smaller relative to the volume of credit outstanding, are still typically some-

what larger relative to the cyclical changes in disposable personal income.

The pattern exhibited by automobile credit alone is, not surprisingly, very similar to that of total instalment credit except that auto credit appears to be even more sensitive to cyclical fluctuations. The logic of the pattern is, of course, identical. Our principal concern here is to present the evidence so that we may subsequently relate it to activity in the automobile industry.

The pattern of turns in auto credit (Table 7) shows that generally net change in auto credit outstanding turns first and leads reference turns; extensions turn next, customarily with a slight lead; while repayments and outstandings turn last and with a lag. A careful examination of Table 7 will reveal that the degree of variability about the average is no greater and frequently smaller than with total instalment credit. In this connection, however, columns 1 and 2, which are based on the data underlying the relevant part of Chart 13 and deal with net change in automobile credit outstanding, show the importance of examining individual turning points and the degree of variability about the average timing, as well as the average leads or lags themselves. Examination of net change in auto credit outstanding as depicted in Chart 13 suggests that the trough in the 1929-33 recession leads by a longer period of time than for any other recession. We have suggested earlier, however, that there are good reasons why net credit change should turn with a longer lead at peaks than at troughs. While this also appears to be true in Table 7, it is less clearly so than in our consideration of total instalment credit and is not true at all for the two prewar recessions. The problem lies exclusively with the important 1929-33 recession, which, as Table 7 shows, was quite atypical.

Repayments fell sharply during the Great Depression, along with extensions. One of the two factors mentioned earlier in connection with Chart 9 as producing a longer lead in the net credit change series at the peak than at the trough, i.e., the "trend effect" so important in the postwar period, was absent in the thirties. We noted the importance of the rising pattern of repayments during the postwar period (the "trend effect") in the interrelationships among the turning points of the several measures of credit under review. Table 7 indicates how atypical was the timing of the turn for net credit change at the 1929 peak relative to the timing at the 1932 trough. Not only was there no "trend effect" but the fall in repayments was extremely

large. This single episode was clearly a major reason for the failure of the prewar averages in the net credit change series to show a longer lead at peaks than at troughs.<sup>8</sup> Its importance is readily visible by comparing the prewar and postwar pattern of turns in net change in auto credit outstandings.

The average pattern shown by the sequence of turns in these four measures of automobile credit is summarized in Table 7. It is essentially the same pattern we found for total instalment credit. As with total instalment credit one must ask how regularly the sequence of turns indicated in the averages appears in the individual cycles. Examination of Table 7 shows that the order of turns was consistently present at every peak between 1929 and 1967 except that the 1948 cycle is visible only in net credit change. The order is therefore visible at the 1929, 1937, 1953, 1957, and 1960 peaks. At troughs, extensions and net credit change turn together at the 1958 and 1961 troughs, extensions turn before net credit change in 1954, and the 1949 trough is skipped altogether except for net credit change. Therefore, at troughs the pattern is somewhat weaker.

The economic implications of this pattern are, as with total instalment credit, the critical factor; the situation is comparable and the same reasoning may be introduced as a tentative hypothesis. The auto credit industry and potential borrowers together determine extensions. The auto purchasers who utilize credit determine directly the repayment record; the net credit change in outstandings is the result of both, and represents the net impact on the stream of expenditures being introduced into the economy by these two divergent sources. We would therefore argue that the net effect of auto credit has been to depress economic activity by a variable period but by at least something over seven months prior to peaks in the postwar period (though by a somewhat shorter period for the entire period because of the previously noted behavior of repayments in the prewar period). At troughs, the net effect of auto credit has, on the average, tended to stimulate economic activity slightly more than three months prior to postwar business cycle troughs.

Implicit in this argument is the assumption that when repayments do not take place on schedule, or fall in the aggregate (as in the prewar recessions), there is more total purchasing power available to

<sup>8</sup> Contrariwise, we may state simply that the presence of the "trend effect" in repayments may well be a major factor in the postwar period accounting for the longer lead in net credit change at peaks than at troughs.

Table 7  
*Timing Analysis, Auto Credit Outstanding, Extensions, Repayments, and Net Credit Change  
 at Business Cycle Peaks and Troughs, 1929-67*

Bus. Cycle Turn	Outstandings (1)	Lead (-) or Lag (+) (2)	Extensions (3)	Lead (-) or Lag (+) (4)	Repayments (5)	Lead (-) or Lag (+) (6)	Net Credit Change (7)	Lead (-) or Lag (+) (8)
PART A: PEAKS								
8/29	11/29	+3½	8/29	0	12/29	+4	7/29	-1
5/37	10/37	+5½	12/36	-5	12/37	+7	12/35	-17
2/45	8/41	-	4/41	-	12/41	-	4/41	-
11/48	NT	-	7/44	-7	NT	-	NT	-
	NT	-	NT	-	NT	-	3/48	-8
7/53	10/50	-	7/50	-	NT	-	7/50	-
	12/53	+5½	3/53	-4	NT	-	12/52	-7
			9/55	-				
7/57	11/57	+4½	1/57	-6	12/57	+5	3/55	-28
5/60	11/60	+6½	4/60	-1	NT	-	8/59	-9
			11/65	-			7/65	
Prewar Period (1929-38)								
Average		+4.5 (2)		-2.5 (2)		+5.5 (2)		-9.0 (2)
Average deviation		1.0		2.5		1.5		8.0
Postwar Period (1945-67)								
Average		+5.5 (3)		-3.7 (3)		+5.0 (1)		-13.0 (4)
Average deviation		0.7		1.8				7.5



maintain or stimulate economic activity elsewhere and so, to this extent, falling repayments (rising delinquencies) can reduce the severity of a recession. In this sense, variations in the rate of repayments over the cycle can be viewed in part as an "automatic stabilizer." Since repayments, in the short run, are controllable by the consumer using credit, the consumer can partially offset income lost in recession by letting his repayments lapse. While he is thus delinquent, he continues to have the asset he is purchasing on credit quite as if he were making his regular payments, but his payments are freed by him for purchases elsewhere.

How long this can last is difficult to say, but repossession records suggest it cannot last longer, typically, than a few months. Recent recessions have been quite short, however. This reasoning must in any case be qualified. Rising repossessions presumably depress the credit industry; that is, cause them to reconsider their present loan terms to tighten loan conditions or to ease them less rapidly over time. Sharply rising repossessions could result, therefore, in lower extensions, while smaller increases in repossessions might simply reduce the rate of increase in extensions. Rising delinquencies, which can be viewed as postponing the effects of depression on the consumption problem of the consumers who resort to them, also herald to the credit industry that repossessions may soon necessarily increase—and so, as noted, depress the industry. The net effect of these forces on total economic activity is the ultimate determinant of the net effect repayment experience will have on economic activity. Finally, a full assessment of this net impact must necessarily consider the relationship of changes in the credit experience on the behavior of the consumer durable industry that it serves. This question is the major concern of the section to follow.

### **AUTOMOBILE CREDIT AND SALES**

While the argument thus far has suggested that changes in auto credit outstanding, particularly in the prewar period when repayments fluctuated a good deal, could alter general purchasing power and so, in the very short run, make themselves felt in a wide area of the economy, it is clear that the over-all impact of auto credit, especially in the postwar period, must be initially on the automobile industry. If we are correct in assessing the effect of long leads in net change in auto

credit outstanding, these effects should be visible in the activity of the auto industry.<sup>4</sup>

The basic data available for considering these relationships are to be found in Appendix Table B-1 and in Table 8, which indicate the turning points in series dealing with passenger car production and sales, and new passenger car registrations during the period 1929-64.

<sup>4</sup>There have been several recent studies of the demand for automobiles. Daniel B. Suits in his study, "The Demand for New Automobiles in the United States, 1929-1956," *Review of Economics and Statistics*, 1958, pp. 273-280, specifically included automobile credit as a factor influencing automobile demand. In his study for the National Bureau some years ago, *Factors Affecting the Demand for Consumer Instalment Sales Credit*, New York, NBER, 1952, Avram Kisselgoff included it as well. More recently Suits and Gordon R. Sparks in their contribution to the Brookings-SSRC quarterly econometric model attributed demand for automobiles to disposable income net of most transfer payments, the existing stock of new cars, "consumer attitudes and inclinations to buy," plus several other variables. They did not include credit terms in their equation because they believed it was subsumed under "intentions." That is to say, the ease with which credit can be obtained affects intentions to buy. Their equation was predictive rather than behavioral. (*The Brookings Quarterly Econometric Model of the United States*, edited by J. S. Duesenberry, G. Fromm, L. R. Klein, and E. Kuh, Chicago, Illinois, 1965; see particularly pp. 207-210.)

The University of Michigan model presently includes credit terms. Their estimate of the demand for automobiles (new and net used) is as follows:

$$\Delta A = \frac{.238\Delta(Y - T)}{(.033)} - \frac{610.62\Delta\left(\frac{1}{M}\right)}{(134.44)} + \frac{.281\Delta\left(\frac{S_{t-1} + S_{t-2}}{2}\right)}{(.048)} - \frac{.429A_{t-1}}{(.065)} - 2.484$$

$R^2 = .72$

where  $\Delta$  represents first differences in semiannual data;  $A$  = new and net used automobile demand;  $Y$  = disposable income;  $T$  = transfers;  $M$  = number of months to pay, average credit contract; and  $S$  = consumer savings. Lags represent six month periods. The absolute size of the coefficient on  $\Delta(1/M)$  represents the small units in which the variable is measured. (Daniel B. Suits, private communication.)

Michael J. Hamburger has recently suggested that the purchases of consumer durables, including automobiles, are best viewed as investment, and as such are most affected by income, relative prices, and interest rates. He does not stress credit availability per se, although credit cost is obviously related to interest rates. ("Interest Rates and Demand for Consumer Durables," *American Economic Review*, December 1967.)

Finally, F. Thomas Juster has included the maturity on instalment credit contracts (though not downpayments) in the automobile demand model he has developed in connection with a study of the reliability of consumer anticipations surveys as a guide to consumer behavior. (*Consumer Anticipations Surveys: A Summary of U.S. Postwar Experience*, forthcoming paper to be published in the *Proceedings of the 9th Annual CIRET Conference*.)

Table 8  
*Timing Analysis, New Passenger Car Registrations  
 at Business Cycle Peaks and Troughs, 1929-67*

Peaks			Troughs		
Bus. Cycle Peak	New Passenger Car Registrations	Lead (-) or Lag (+)	Bus. Cycle Trough	New Passenger Car Registrations	Lead (-) or Lag (+)
8/29	7/29	- 1	3/33	3/33	0
5/37	8/37	+ 3	6/38	7/38	+1
2/45	5/41	- 4.5 <sup>a</sup>	10/45	10/45	0
11/48	NT	-	10/49	NT	-
	8/50	-		8/52	-
7/53	NT	-	8/54	NT	-
7/57	9/55	-22	4/58	10/58	+6
5/60	NT	-	2/61	NT	-
<i>Prewar Period (1929-38)</i>					
Average		+ 1.0			+0.5
Average deviation		2.0			0.5
<i>Postwar Period (1945-67)</i>					
Average		-22.0			+3.0
Average deviation					3.0
<i>Whole Period (1929-67)</i>					
Average		- 6.7			+1.8
Average deviation		10.2			2.2

<sup>a</sup>Excluded from the averages.

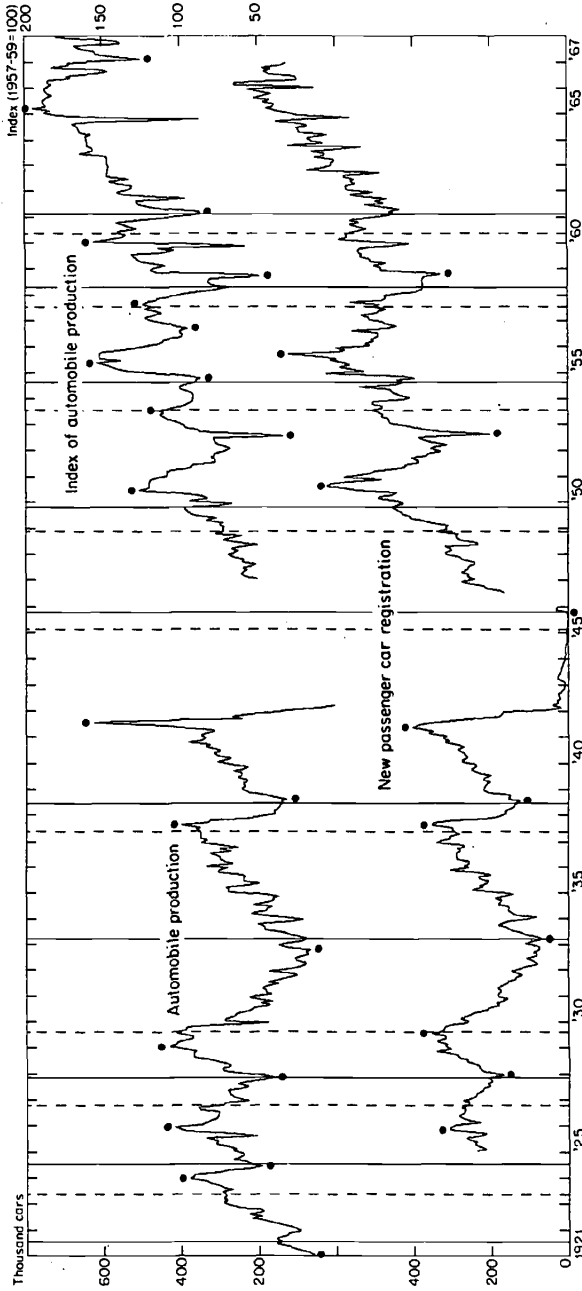
NT = No turn.

NOTE: Leads and lags in months.

SOURCE: Automobile Manufacturers' Association, *Automobile Facts and Figures*, selected issues, collected by R. L. Polk and Co. and used here by permission.

These turning points are derived from Chart 12, which presents the behavior of automobile production and registrations when available for the period 1921-67. It is clear that it is the New Passenger Car Registrations series that is most consistently available during the period for which credit data are available. New car registrations ought to conform closely to new car sales, given the legal requirement that all autos, when purchased, must be registered. New car production might differ to the extent that sales are made out of inventory or, contrariwise,

CHART 12  
Automobile Production and New Passenger Car Registrations, 1921-67



NOTE: Vertical broken lines represent business cycle peaks; vertical solid lines, troughs. Dots identify peaks and troughs of specific cycles. Production and sales are identical for the period 1921-34. For full information see Appendix A.  
SOURCE: *Auto production*—Department of Commerce; *New passenger car registrations*—R. L. Polk and Company.

to the extent that production exceeds sales and so leads to a buildup in inventory.

What does the record show? First, it is clear that auto production declined in every business contraction after 1921 for which data are available. There was a slight tendency for production to lead at both peaks and troughs, though there are exceptions. Second, and most important, the behavior of auto production, auto registrations, and auto sales are closely related throughout. Indeed, in the postwar period the three series are more closely related to each other than they are to the business cycles. Production and sales are directly comparable only for the past few years, but they appear to be so closely geared to each other during this period that we have included only production in the chart. They turn in identical fashion during the last two business cycles.

In short, New Passenger Car Registrations seems to be a reasonably good proxy for activity in the auto industry, and in view of data limitations, we shall subsequently confine our attention to the relations between changes in the credit series and in new passenger car registrations.

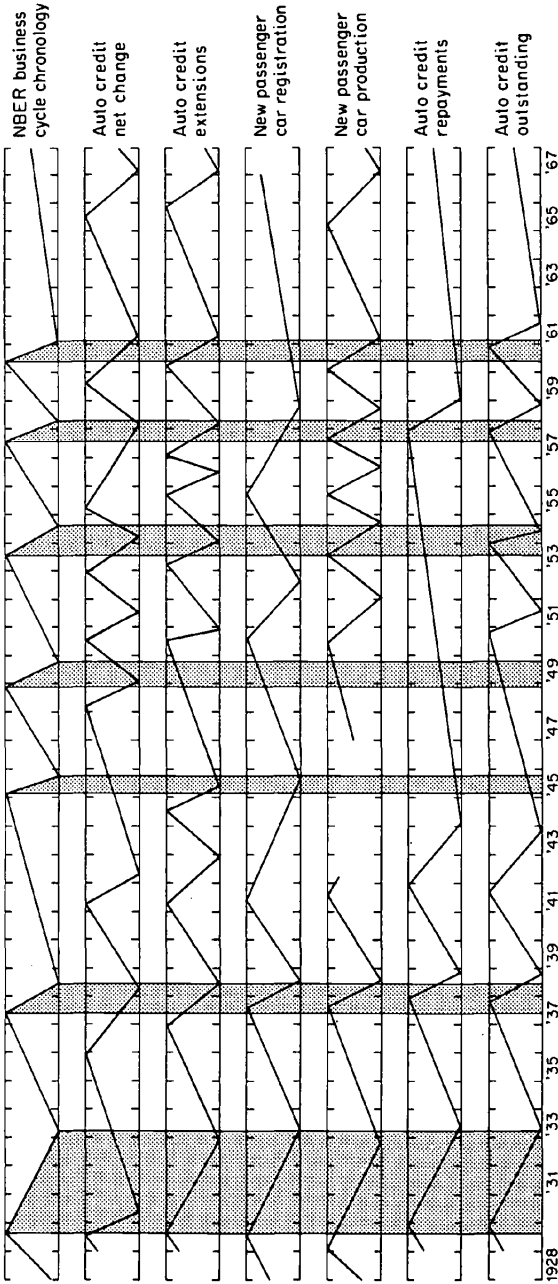
An interesting aspect of the behavior of new passenger car registrations is a slight tendency to lead at reference peaks and to lag at troughs.<sup>5</sup> Thus, it would appear that declining auto activity may typically occur before a peak, but recovery does not usually become manifest until the general condition of the economy is picking up. That is to say, the contractions in registrations are generally longer than the contractions in business activity. One must remember, however, that the timing differences here are not numerous and are small, and there is, moreover, considerable variation.

The relationships among the turns in automobile credit, auto industry behavior, and general economic activity are presented in a schematic way in Chart 13 and in a more detailed form in Table 9.

Chart 13 shows all four measures of automobile credit as well as new auto registrations. It is instructive primarily because it shows that the general conformity of all these series to each other and to the business cycles was quite high during the two critical business cycles in the period 1929-41. During World War II, production activity was drastically curtailed in the automobile industry, terms of sale were controlled by Regulation W, and no cycles are visible. In the

<sup>5</sup> This is to be expected in a series, such as new passenger car registrations, that is not growing as fast as the economy (real GNP).

CHART 13  
 Chronology of Specific Cycles in Four Measures of Auto Credit and New Passenger Car Registrations and Production at Business Cycle Peaks and Troughs, 1929-67



NOTE: Shaded areas represent business cycle contractions; white areas, expansions.

SOURCE: *Auto credit sales*—Federal Reserve Bulletin, selected issues; *Auto sales, registration*—Automobile Facts and Figures (NADA), selected issues, seasonally adjusted by NBER except January 1942 through June 1946; *Auto production*—U. S. Department of Commerce, seasonally adjusted by NBER.

Table 9  
*Leads and Lags in Two Measures of Auto Credit,  
 New Passenger Car Registrations, and Personal Income  
 at Business Cycle Peaks and Troughs, 1929-67*

Bus. Cycle Peak	Peaks					Troughs				
	Auto Net Credit Change	Auto Credit Extensions	New Passenger Car Registrations	Personal Income	Bus. Cycle Trough	Auto Net Credit Change	Auto Credit Extensions	New Passenger Car Registrations	Personal Income	
8/29	-1 (1½)	0 (3½)	-1 (1½)	0 (3½)	3/33	-34 (1)	-3 (2)	0 (3½)	0 (3½)	
5/37	-17 (1)	-5 (2)	+3 (4)	+1 (3)	6/38	-2 (1)	0 (3)	+1 (4)	-1 (2)	
2/45	NT	-7 <sup>a</sup>	-45 <sup>a</sup>	+4 <sup>a</sup>	10/45	NT	-5	0	-1	
11/48	-8	NT	NT	-1	10/49	-9	NT	NT	-3	
7/53	-7 (1)	-4 (2)	NT	+3 (3)	8/54	-5	-7	NT	-4	
7/57	-28 (1)	-6 (3)	-22 (2)	+1 (4)	4/58	-1 (2½)	-1 (2½)	+6 (4)	-2 (1)	
5/60	-9 (1)	-1 (2)	NT	NT	2/61	+2 (Tie)	+2	NT	NT	

(continued)

Table 9 (concluded)

	Peaks					Troughs				
	Bus. Cycle Peak	Auto Credit Change	Auto Credit Extensions	New Passenger Car Registrations	Personal Income	Bus. Cycle Trough	Auto Net Credit Change	Auto Credit Extensions	New Passenger Car Registrations	Personal Income
<i>Averages</i>										
Prewar	-9.0 (1)	-2.5 (2)	+0.5 (3)	+1.0 (4)	+0.5 (3)		-18.0 (1)	-1.5 (2)	+0.5 (4)	-0.5 (3)
Postwar	-13.0 (2)	-3.7 (3)	+1.0 (4)	-22.0 <sup>b</sup> (1)	+1.0 (4)		-3.2 (1)	-2.8 (2)	+3.0 (4)	-2.5 (3)
Entire Period	-11.7 (1)	-3.2 (3)	+0.8 (4)	-6.7 (2)	+0.8 (4)		-8.2 (1)	-2.3 (2)	+1.8 (4)	-1.8 (3)

<sup>a</sup>Excluded from the average.<sup>b</sup>One comparison.

NT = No turn.

NOTE: A - sign indicates a lead; a + sign, a lag. Numbers in parentheses indicate rank, where data permit. The initial turn in each group at each peak and trough gets a rank of 1, and so on.

SOURCE: Credit data—*Federal Reserve Bulletin*; new passenger car registrations—Automobile Manufacturers' Association, *Automobile Facts and Figures*, collected by R. L. Polk and Co. and used here by permission; personal income data—Barger and Klein, Department of Commerce estimates.

postwar period the situation is more complicated. Conformity to the business cycles is still present but less obvious, because it became increasingly clear that there were fluctuations present that were specific to the auto industry (or at least did not involve the entire economy). Moreover, these specific movements are present in all parts of the industry represented. Thus, the Korean War produced declines in three credit series (all except repayments) as well as in new car registrations, but was not associated with a general recession. On the other hand, the general recession of 1948-49 is reflected in none of the auto series except the most sensitive credit series, net credit change; for the rest, the industry was able to ride out the recession on the pent-up demand still being met from the war. The industry generally escaped the postwar readjustment cycle for the same reason. Similarly a set of circumstances unique to the auto industry produced a decline in 1956 in automobile extensions.<sup>6</sup>

In short, the auto industry and its associated credit industry appear frequently to reflect general recessions and so may be said to conform moderately well to the general business cycle. Having said this, however, it is necessary to add that all the aspects of the automobile sector included in Chart 13 would appear to show, in the form of extra cycles, that they are somewhat more volatile than the economy generally and that they respond with cycles of their own to factors that the general economy reacts to less severely if at all. Equally important, most aspects of the auto and auto credit industry move with a high degree of internal conformity.

While Chart 13 indicates the general state of conformity of these series to the business cycles, the details of the timing relationships among the turns at business cycle peaks and troughs, crucial in considering the possible link between changes in automobile credit and changes in auto industry activity, have been shown in Table 9. Table 9 should be viewed in connection with Table 10, which summarizes all the relevant information concerning the timing of automobile credit and automobile registrations that has previously been introduced. The

<sup>6</sup> It should be noted in passing that the auto credit series include credit utilized in the purchase of both new and used automobiles, whereas the registrations series refers *only* to new autos. Turning points in the volume of new and used automobiles have not diverged, although one might expect a shift toward used cars during recession and toward new auto purchases in expansion. If this is the case, it has not and need not logically affect the turning points (see Federal Reserve Board, *Consumer Instalment Credit*, Washington, D.C., 1957, for details of the patterns of turns for new and used autos).

Table 10  
*Summary of Timing, Automobile Credit and Related Auto Series  
 at Business Cycle Peaks and Troughs, 1929-67*

Line	Number of Business Cycle Turns Covered (1)	Number of Leads (2)	Number of Rough Coincidences <sup>a</sup> (3)	Number of Lags (4)	Number of Timing Comparisons (5)	Number of Business Cycle Turns		Median Lead (-) or Lag (+)		Average Deviation <sup>b</sup>			
						Number of Business Cycle Turns Skipped (6)	Number of Extra Specific Cycle Turns (7)	PK (8)	TR (9)	PK (10)	TR (11)	PK (12)	TR (13)
1. Automobile Credit— Net Credit Change 1929-67	14	11	4 (0)	1	12	2	6	-8½	-3½	-11.7	-8.2	7	8.9
2. Automobile Credit Extensions 1929-67	14	9	6 (2)	1	12	2	8	-4 <sup>c</sup>	-2	-3.2 <sup>c</sup>	-2.3	2.2	2.7
3. New Passenger Car Registrations 1929-66	14	3	5 (2)	3	8	6	2	-1 <sup>c</sup>	+½	-6.7	+1.8	10.2	2.2
4. Automobile Credit Outstanding <sup>d</sup> 1929-67	14	1	2 (0)	9	10	4	4	+5½	+4½	+5.1	+3.7	0.9	3.4
5. Automobile Credit Repayments 1929-67	14	0	1 (0)	6	6	8	2	+5	+5	+5.3	+5.3	1.1	2.4

<sup>a</sup>Rough coincidences include exact coincidences (shown in parentheses) and leads or lags of three months or less.

<sup>b</sup>Average deviations have been computed about the mean leads and lags reported in columns 10 and 11.

<sup>c</sup>Excludes the comparison with the February 1945 business cycle peak.

<sup>d</sup>End of month.

NOTE: Entries for averages and medians of different series are not strictly comparable because they cover different turns.

SOURCE: Credit series—Federal Reserve Board; new passenger car registrations—Automobile Manufacturers' Association, *Automobile Facts and Figures*, collected by R. L. Polk and Co. and used here by permission.

questions to which the pattern under consideration in Table 10 is relevant are of considerable importance. Does a major industry such as the automobile industry tend to expand and contract its activities prior to turns in general economic activity and so possibly contribute to their initiation, or does it tend to react to prior turns in economic activity and so merely intensify them? Further, what is the role of credit? Does it expand and contract before, at the same time, or after auto registrations?

The most obvious link between automobile credit and automobile industry activity here is suggested by extensions and new passenger car registrations. That is, extensions must show up almost immediately as new registrations because of the legal requirement that all newly purchased autos be registered with the state bureau of motor vehicles. If credit is indeed a determinant of auto industry activity, extensions might lead registrations (though it might be a determinant and not lead).<sup>7</sup> Table 9 suggests some support for this hypothesis but also that the issue cannot be resolved easily. Viewing the evidence as a whole, extensions lead registrations more often at troughs (all five times) than at peaks (three of five times). Taking all the turns covered there are eight leads, one lag, and one exact coincidence. Table 10 suggests that these leads at peaks and troughs are present, for median timing comparisons, as well as the mean comparisons shown in Table 9.

A comparison of the timing of the turns in auto credit extensions using the registrations themselves as the reference chronology clarifies some of these relations (see Appendix Table B-3). It is clear then that the relation between auto credit extensions and registrations summarized above has been fairly consistent throughout the period under review. Extensions lead in the two troughs in registrations prior to World War II as well as the three comparable troughs since. They lagged registrations in the first prewar peak and at the last postwar peak they turned together. Otherwise, the lead at peaks has been consistent but small since the war. This suggests that in the years when credit was a large factor, it usually expanded well before the industry activity increased. The relation between auto credit extensions and industry activity is therefore more clearcut at troughs than it is at peaks, especially after World War II. On the other hand, the tendency of the turning points in net change in automobile credit outstanding to lead at both business

<sup>7</sup> Moreover, as we have stressed previously, a lead in a series such as extensions can be no more than presumptive evidence of its being a determinant of registrations.

cycle peaks and troughs has already been clearly indicated. Assuming that the net stimulating or depressing effect of credit on industry activity is also relevant to answering the questions previously posed, it is appropriate to determine the relationship between turns in net change in auto credit outstanding and the behavior of the automobile industry. It seems logical to suppose that net credit expansion could stimulate and contraction depress sales, but by how much and after how long an interval of time one cannot say a priori.

We assumed initially that the turns in the credit series might first affect activity in the auto industry, here measured by registrations, which might in turn directly affect general economic activity. We have chosen to measure the latter by personal income (although obviously income must affect sales also). This line of reasoning leads one to expect the series involved to turn as follows: after a turn in net automobile credit outstanding, new passenger car registrations would turn next followed by personal income and the business cycle turn. (The length of time between the net change series turns and the turn in extensions depends, of course, on the behavior of repayments.)

Table 9, despite the ambiguities of the extensions-registrations relationship already mentioned, shows that it is possible to find a pattern in the leads and lags that is suggestive. Because of the importance of this pattern, the table shows not only the average timing at business cycle peaks and troughs, but the actual leads and lags on which the averages are based. Clearly the number of comparisons over the entire period (not to say during the pre- and postwar periods) is still too small to reach clear-cut conclusions, but we are also reminded that auto credit as a force of size and impact in the economy is still very new, and as such its behavior at cyclical turns is of increasing interest. Table 10 covers the behavior of credit over all the cycles during which it has been of significant size.

It is clear that net credit change turned down prior to new passenger car registrations at every peak for which we can make comparisons except (significantly) 1929.<sup>8</sup> It led not only the business cycle peak but (except in 1929) all the noncredit series included. Thus, one can

<sup>8</sup> The behavior of the two credit series, vis á vis new passenger car registrations, is less clear in 1929 than subsequently. It is possible, however, that given the relatively small size of total auto credit in the economy in the early period, movements in credit affected the auto industry less strongly then. In this case the less obvious relationship between them visible in Table 10 for this period might not be surprising.

argue that the decline in the net impact of credit might conceivably contribute subsequently to declines in auto sales (or registrations). All these series turn typically with leads and thus can be viewed as restraining influences setting in before the business cycle peak. Only personal income turns after the peak. One cannot show that the earlier influences are contributory factors to this decline, but the evidence is consistent with such a hypothesis.

The evidence for the peaks shows, therefore, that for the postwar period at least (when credit outstanding was large) net credit change turned down first and with a large lead, while industry activity as measured by registrations turned down several months later but usually also with a lead, and personal income turned down last and with a lag. However, only one turn in registrations has proved comparable since the war.<sup>9</sup>

At troughs the role of credit is also difficult to assess. Net credit change still turns (up) first in all the averages (though there are exceptions in the postwar period). Auto extensions, as noted earlier, appear to turn prior to turns in the auto industry with greater regularity than was the case at peaks. Our measure of auto industry activity turns later—and indeed the evidence suggests that registrations may lag at the trough. But at troughs personal income turns up early. Thus, by the time the industry reacts, both net credit change and personal income have risen. Both factors would tend to strengthen the demand for automobiles; indeed, net credit change and personal incomes are only two of the many forces that have turned up prior to the activity of the auto industry. The lags are generally not long, but their existence suggests that an improvement in the auto industry is

<sup>9</sup> In making timing comparisons such as these, it is clear the extra or skipped cycles can affect the pattern. We have, therefore, compared the turns in auto credit extended, outstanding, and net credit change to new passenger car registrations using the latter as the reference chronology. We have seen in Chart 13 that all measures of credit conform to new passenger car registrations more closely than to the business cycles, particularly for the postwar period. Appendix Tables B-2, B-3, and B-4 indicate the leads and lags for each of these three measures of automobile credit at turns in new passenger car registrations where such comparisons can be made since 1928. Appendix Table B-5 summarizes the average timing at peaks and troughs in new passenger car registrations of these three measures of auto credit. The averages confirm the impression given by the comparisons to the business cycles. The relationship of turns in credit to turns in new passenger car registrations is quite clear both in the prewar and the postwar periods. Net credit change turns before registrations, extensions also show a small lead, while outstandings turn after registrations.

not generally one of the prior factors that make recovery possible.<sup>10</sup>

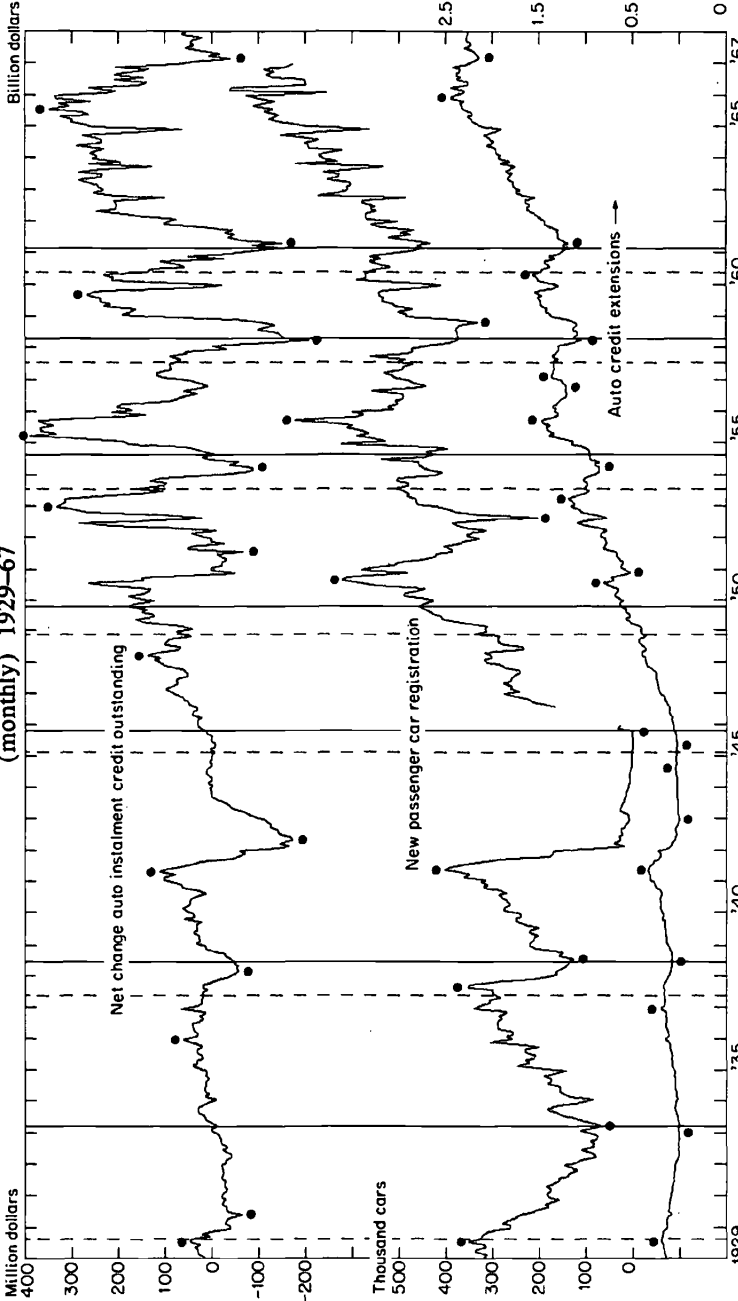
To consider this question further, it is useful to examine Chart 14, which indicates new passenger car registrations, auto credit extensions, and net change in auto credit outstanding for the period 1929–67. It will also be possible with Chart 14 to consider further whether one can determine if turns in auto industry activity are more closely related to changes in auto credit extensions or to the more complex measure of net credit conditions reflected in net change in credit outstanding. Once again the relatively small variation in the change in net auto credit outstanding series in the prewar as opposed to the postwar period stands out. While the turns in the net credit series consistently lead the turns in the new passenger car registrations series (and both lead the business cycle turns), the general pattern of conformity of the two series is far less clear in the prewar period than it has been in the postwar period. There has always been considerable variation in new passenger car registrations over the cycle, though it has perhaps become more pronounced in the postwar period. But in the more recent period the relation of swings in registrations to swings in net credit change has become much more pronounced. The leads in the credit series over the auto series at both troughs and peaks continue to be prominent—if not always long (even during the two periods where there were no reference turns).

Chart 14 shows quite clearly how changes in auto credit subsequently are reflected in changes in automobile sales, both at peaks and at troughs. One cannot say if the effect is causal. The evidence is not inconsistent with the hypothesis that credit is a codeterminant of production and sales, here measured by registrations. The chart also shows how changes in auto sales in turn precede peaks in general economic activity.

<sup>10</sup> This statement needs to be qualified. One cannot adequately answer these questions with an analysis of turns. It is entirely possible that a decrease in the rate of decrease in auto production or sales could improve the general economic environment and so contribute to recovery.

CHART 14

New Passenger Car Registrations, Auto Credit Extensions, and Net Change in Auto Credit Outstanding, (monthly) 1929-67



NOTE: Vertical broken lines represent business cycle peaks; vertical solid lines, troughs. Dots identify peaks and troughs of specific cycles.  
 SOURCE: *Auto credit*—Board of Governors, Federal Reserve System; *New passenger car registrations*—R. L. Polk and Company, used here by permission.