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III. THE BEHAVIOR OF SECTOR VELOCITIES

VELOCITY BY GEOGRAPHIC SECTORS

From the beginning of the deposit turnover series in 1919, the Federal Reserve System has published separate estimates for New York City, other leading centers, and all other reporting centers.⁹ The principal value of this crude three-sector breakdown is that it permits partial isolation of the influence of financial activity and of large corporate accounts. For instance, deposit turnover rose much more in New York than in the other two sectors during the 1920's, because the intense securities speculation of the period generated a particularly large volume of debits against New York checking accounts.¹⁰

Examination of Chart 2 and Table 1 (part B) reveals a similar phenomenon for the period since World War II. Deposit turnover rose nearly twice as fast in New York as in the "six other centers" and "other centers" during 1946-58. Aggregate deposit turnover rose at a slightly higher rate than turnover in these last two categories, but at a much lower rate than in New York. New York deposit turnover rose even during the war and at about the same rate as it has since 1946, while the turnover in the "other centers" sector fell sharply. Chart 2 illustrates another significant point. New York deposit turnover has been more than twice that of the "other centers" sector since 1954, and about one and two-thirds that of the "six other centers" sector.

These relationships between sector and aggregate changes have been influenced by substantial shifts in weights since 1943 (Table A-4). As mentioned in Section I, weights are the fractions of the total money stock held by each sector.¹¹ The effect on aggregate de-

9. The estimates for 1919-41 (*Banking and Monetary Statistics*, p. 254) are not entirely comparable with those for 1943 to date. The earlier series include, while the later series exclude, federal government debits and deposits. Furthermore, for 1919-41 "other leading centers" means the 100 cities (other than New York) included in the weekly reporting member-bank series, and the "all other reporting centers" turnover rate is an estimate of demand deposit velocity at all other banks. Since 1943 the former has been replaced by a "six other centers" series, and the latter by a "337 other centers" series. See also notes to Table A-3.

10. The behavior of deposit turnover series during this period is discussed in considerable detail in James W. Angell, *The Behavior of Money* (New York, 1936), chap. iv.

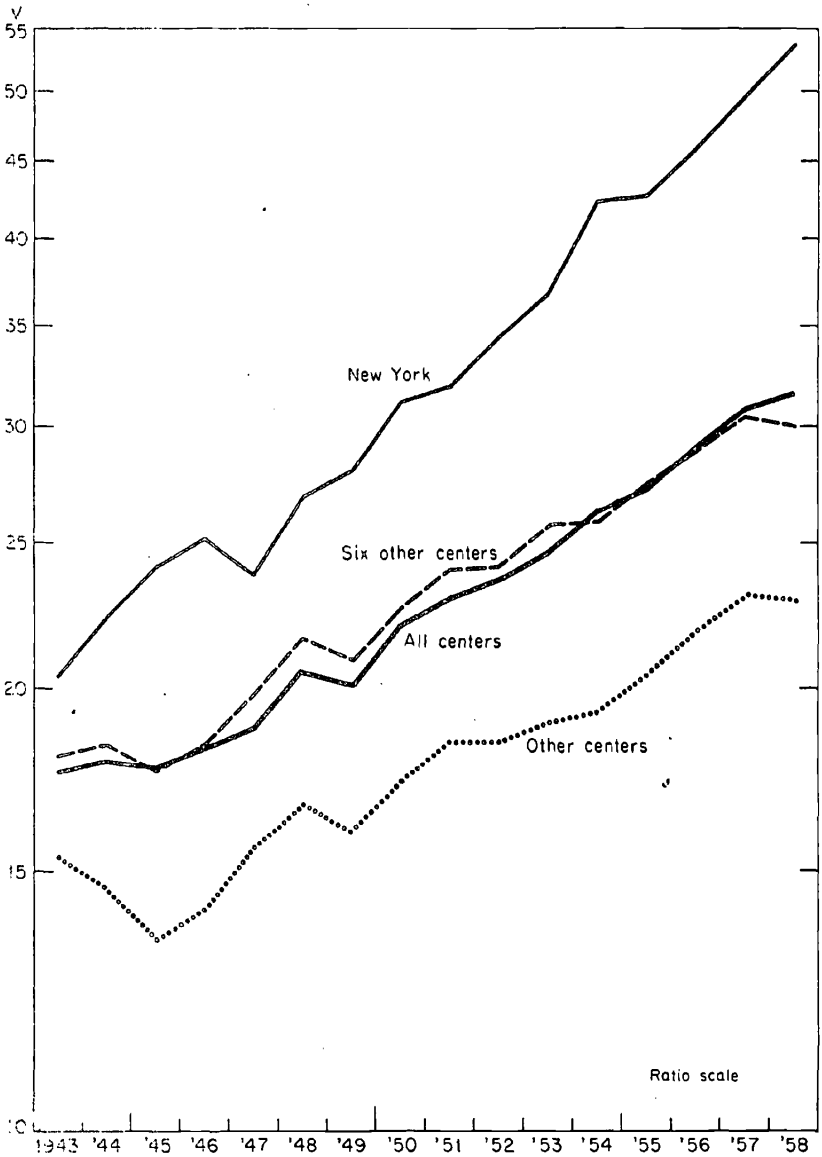
11. This can be demonstrated as follows:

$$V = S/M = s_1/M + s_2/M + \dots + s_n/M^1, \quad (1)$$

where V is aggregate velocity, S total spending by all sectors, s_i spending by the i th sector, n the number of sectors, and M the total money stock. Multiplying the numerator

CHART 2

DEMAND DEPOSIT TURNOVER RATES, AGGREGATE AND BY GEOGRAPHIC SECTORS, 1943-58*



* Source: Tables A-3 and A-4.

posit turnover of New York's sharp rise in turnover was partly offset by the steady fall in the fraction of bank deposits held in New York. This fall was absorbed mostly by a rise in the fraction held in "other centers." The fraction in the "six other centers," category, which fell slightly during the war, has been virtually constant since 1946. If there had been no shift in weights since 1946, the observed increases in sector turnovers would have raised aggregate turnover to a level 4.8 per cent above its actual 1957 level.

Taken by itself, this geographic breakdown of deposit turnover tells little about the forces responsible for the postwar velocity rise. It does make clear, however, that the rise in turnover has been broadly based, rather than confined to one or two sectors, and that shifts in weights have tended to retard, rather than to intensify, the upward trend. True, deposit turnover rose more rapidly in New York City than elsewhere, but the more general problem remains: Why did velocity rise in *all* sectors?

VELOCITY BY FLOW-OF-FUNDS SECTORS

In 1956 the Federal Reserve System, building on Copeland's pioneering work at the National Bureau of Economic Research,¹² published a new set of social accounts giving estimates of sources and uses of funds for the entire economy, by major transactor groups. These flow-of-funds accounts are now available for the period 1939-56.¹³ The inclusion of sector year-end cash holdings in these accounts makes computation of sector velocities a simple matter.¹⁴

The sector velocities shown in Chart 3 are ratios of annual non-financial uses to averages of beginning- and end-of-year demand de-

and denominator of each term in equation (1) by the relevant sector money holdings (m_1, m_2, \dots, m_n), we obtain

$$V = (s_1/m_1 \cdot m_1/M) + (s_2/m_2 \cdot m_2/M) + \dots (s_n/m_n \cdot m_n/M). \quad (2)$$

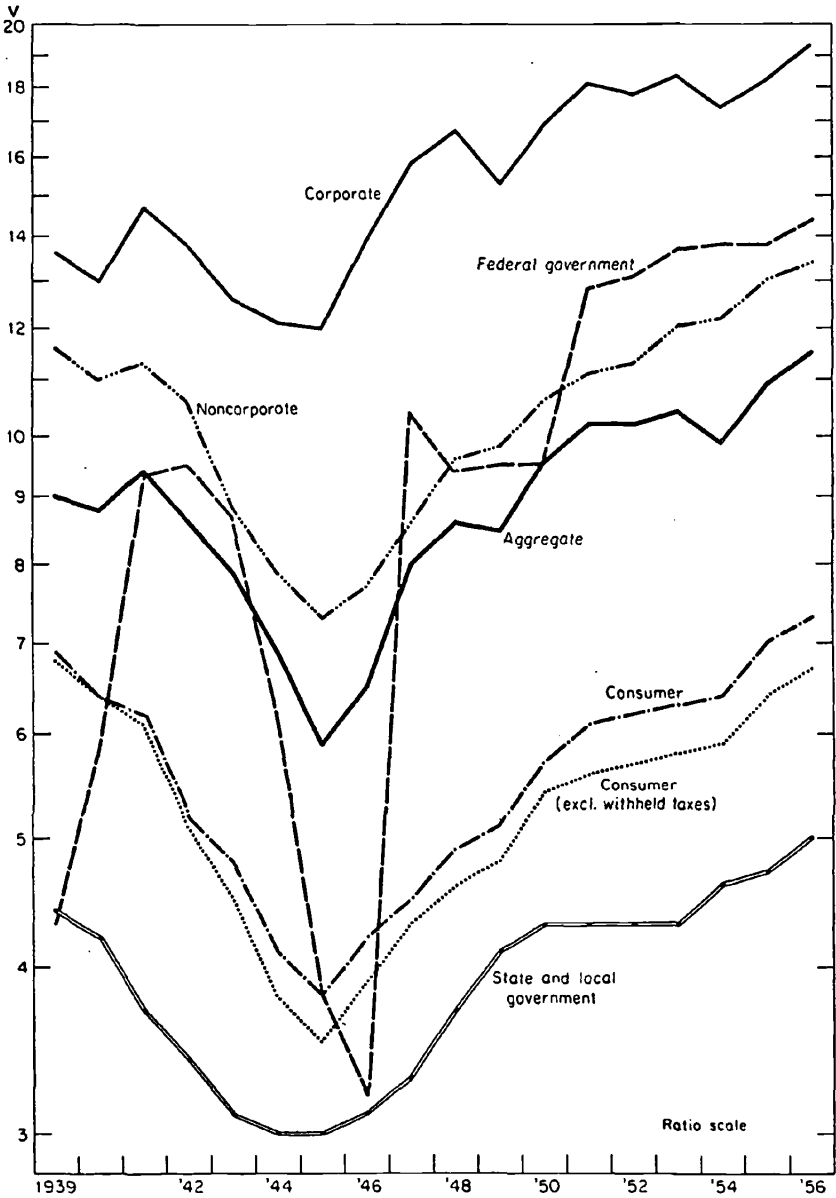
Each term of equation (2) consists of the product of a sector velocity (s_i/m_i) times its weight (m_i/M).

12. *Op. cit.*

13. It appears that the Federal Reserve will not extend the annual gross-flow accounts (which are necessary for velocity analysis of the kind presented here) beyond 1956; quarterly net-flow accounts have been prepared for the period 1952 to date (see "A Quarterly Presentation of Flow of Funds and Saving," *Federal Reserve Bulletin*, August, 1959).

14. This does not mean that these velocities are beyond reproach statistically. The year-end sector cash holdings, particularly by the non-corporate business sector, can be taken only as rough estimates; and the velocity numerators vary greatly in degree of grossness, as well as in reliability.

CHART 3
 FLOW-OF-FUNDS SECTOR VELOCITIES, 1939-56*



* Source: Tables A-3 and A-5.

posits and currency for each sector.¹⁵ I have excluded the "banking" and "rest of world" sectors and have combined the "farm" and "unincorporated business" sectors. This leaves the following seven sectors: consumer, corporate business, non-corporate business, federal government, state and local government, insurance, and other investors. The latter two have been omitted from the chart. As indicated in Section II, the ratio of non-financial uses of all sectors to total money is an aggregate velocity measure designated as non-financial velocity; this also is plotted in Chart 3. Table 1 (part C) gives annual growth rates for these sector velocities in the postwar period.

The chart brings out strikingly the contrast between wartime and postwar velocity movements already evident in Chart 1. From 1939 to 1941 velocity rose in some sectors and fell in others; after 1941, falling velocity became the order of the day. The declines were much sharper for the federal, consumer, and non-corporate sectors than for the corporate sector. State and local velocity also fell substantially, though not so much as consumer velocity.

The postwar period, on the other hand, has been characterized by a pronounced upsurge of velocity. For every sector, the 1939-45 peak value had been exceeded by 1955 and as early as 1947 for the corporate sector.¹⁶ Except for other investors, whose velocity reached a postwar peak in 1950, and the federal government, whose velocity has moved erratically, the rises have been remarkably steady throughout 1946-56. Even federal velocity has not been far out of line since 1947 (see Table 1), and its extremely low value in 1946 is largely the result of the huge sums obtained through the Eighth War Loan in December, 1945. This confirms the finding of the preceding subsection that velocity has risen throughout the economy since the end of the war—in business, household, and public sectors alike.

The most obvious differences among sectors are in velocity levels.

15. Two variants of consumer velocity were computed. One takes total non-financial uses for this group of transactors, while the other deducts withheld federal income and social insurance taxes. The latter seems clearly the more appropriate concept, since withheld taxes do not constitute payments of a sort that give rise to the holdings of cash by consumers.

E. T. Weiler has computed sector velocities from flow of funds. See his "The Flow of Funds and Monetary Theory," in American Statistical Association, *Proceedings of the Business and Economic Statistics Section, 1955-56*, pp. 52-58. In addition, the Federal Reserve Bank of Chicago, in a forthcoming velocity study, presents flow-of-funds sector velocities for 1950-56.

16. For the consumer sector the statement in the text is correct only when withheld taxes are included in the velocity numerator.

In 1956, for instance, corporate velocity was 1.34 times federal velocity, 1.44 times non-corporate velocity, 1.87 times insurance velocity, 2.88 times consumer velocity (excluding withheld taxes), 3.86 times state and local velocity, and 6.89 times velocity in the other investors sector. Another difference is in the degree of cyclical variability of sector velocities. Although both consumer and non-corporate velocity experienced reduced rates of growth in 1949 and 1954, the decline in aggregate velocity during these recession years resulted solely from sharply falling velocity in the corporate sector. The fall in velocity during World War II, on the other hand, occurred in all sectors (except insurance) but was much more severe for consumers (especially when withheld taxes are excluded) than for corporate business. Finally, the corporate and other investors velocities have been lagging since 1946, their rates of increase being only about half those of the consumer and non-corporate sectors.

Among flow-of-funds sectors, the consumer sector has consistently been most important as a holder of money. The fraction of total money held by this sector rose slightly during 1939-45 and sharply during the next two years. Since then it has varied within the narrow range of 37-41 per cent (Table A-6). The corporate and non-corporate sectors have been next in importance. Except for the federal sector, whose share rose and fell dramatically during 1942-47, no other sector has accounted for more than 9 per cent of total money since 1946. The postwar increase in the corporate share has been offset by a nearly corresponding decrease in the non-corporate share. Since corporate is substantially higher than non-corporate velocity, this change has tended to increase aggregate velocity. The increased share of the other investors and state and local sectors has had the opposite effect.

In total, these postwar shifts in weights had virtually no effect. Application of 1946 weights to the 1956 sector velocities yields an aggregate velocity figure nine-tenths of 1 per cent above that actually recorded in 1956.¹⁷ This result reinforces a conclusion of the preceding subsection: shifts in sector weights have reduced, rather than increased, velocity since 1946.

CORPORATE VELOCITIES FROM *Statistics of Income*

Although the seven-sector breakdown of the flow-of-funds accounts adds significantly to our understanding of aggregate velocity, more detailed information would be desirable. It would be interesting, for

17. If 1947 or 1948 weights are used in this comparison, computed aggregate velocity in 1956 is 1.7 per cent below the recorded figure.

example, to obtain velocities for consumers by income, occupation, age, and other classes. While the required data are totally lacking for consumers, there is much additional information which yields useful approximations to velocity ratios for corporate subsectors. In general, all that is needed for such "velocity" computations are balance sheets and income statements for groups of firms. These are available from several sources.¹⁸ Only the annual *Statistics of Income* is used here.

The velocities from *Statistics of Income* are ratios of total outlays, including tax and dividend payments but excluding capital expenditures, debt retirement, and securities purchases, to year-end cash holdings. The omission of capital expenditures is the only important conceptual difference between these estimates and those already discussed. Since the corporate velocity estimates from *Statistics of Income* conform closely to those from flow-of-funds accounts throughout 1939-56, it appears that conceptual differences are relatively unimportant.

Statistics of Income contains the ingredients for the construction of several hundred sector velocities.¹⁹ For recent years these sectors consist of seven broad industry divisions (agriculture, forestry, and fishery; mining and quarrying; construction; manufacturing; public utility; trade; and service); fifty-four major industry groups; and ten asset-size classes for each of the foregoing. We shall examine velocity only for the seven industry divisions, selected major industry groups, and size classes for all corporations (except finance) and four major industry groups.

1. *Major industry divisions.*—Velocities for selected major industry divisions and for all non-financial corporations, 1931-57, are shown in Chart 4.²⁰ After establishing troughs in 1932 or 1933, in each division (other than the service division), velocity rose to 1937, fell from 1937 to 1940, rose in 1941, and fell from 1941 to 1943. During the postwar period Chart 4 resembles Charts 2 and 3: each

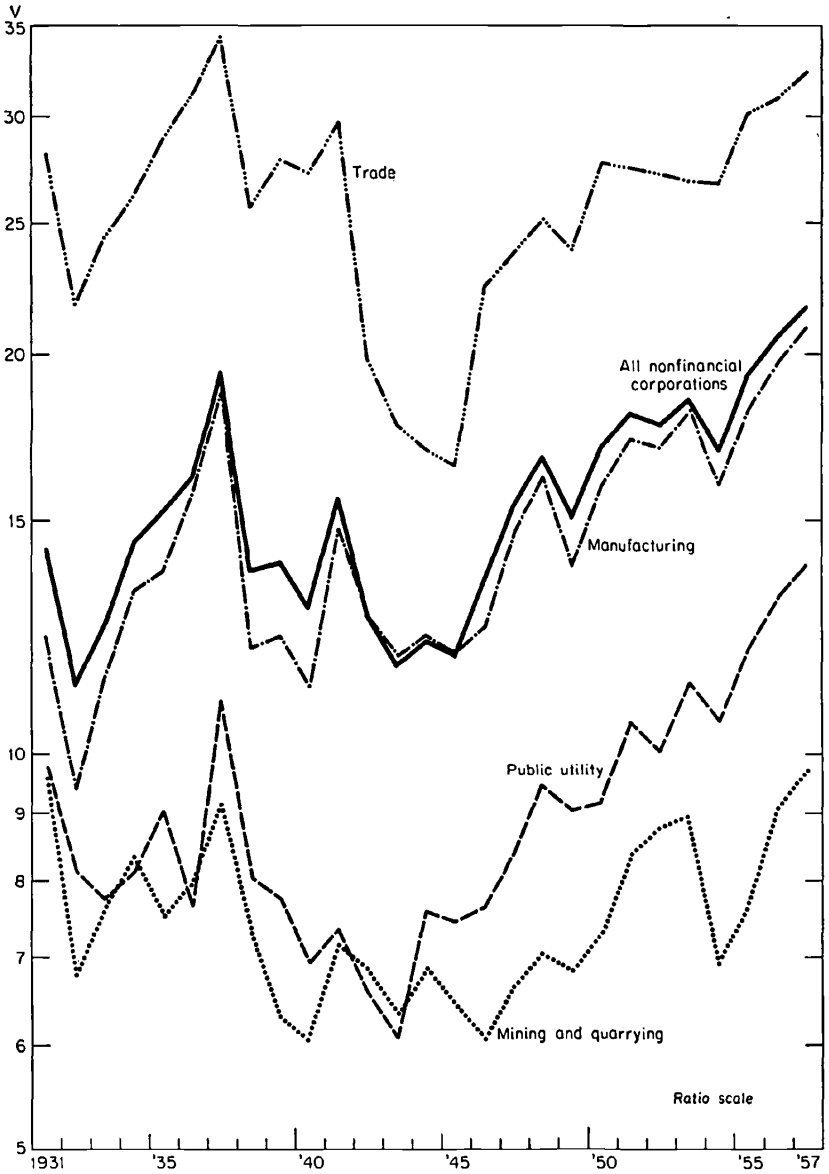
18. U.S. Treasury Department, *Statistics of Income* (Washington, annually); U.S. Federal Trade Commission—Securities and Exchange Commission, *Quarterly Financial Report for Manufacturing Corporations* (Washington, quarterly); Robert Morris Associates, *Statement Studies* (Philadelphia, annually); and reports of individual firms.

19. There are numerous problems in the use of these tabulations for velocity estimates. For instance, they refer to fiscal years of reporting firms rather than to calendar years; time deposits and perhaps even marketable securities in some cases are included in "cash"; classification of diversified firms in a single industry class is highly artificial; and, as noted in the text, capital expenditures are entirely ignored. In addition, because the universe of reporting firms with balance sheets is not identical in every year, we have relied solely on year-end cash figures rather than averages of beginning- and end-of-year cash.

20. Table A-7 contains velocities for industry divisions not shown in Chart 4.

CHART 4

SECTOR VELOCITIES BY SELECTED MAJOR INDUSTRY DIVISIONS, 1931-57*



* Source: Table A-7.

sector velocity experienced a net rise; the rates of rise, for the most part, are similar (average growth rates are presented in Table A-1); and, as was true throughout the prewar period, there are great absolute velocity differences. Manufacturing velocity is very close to that of all non-financial corporations in level, trend, and year-to-year movements. Trade velocity, though much higher, and mining velocity, though the lowest, move in similar fashion. In the other four industry divisions, velocity behaves with less regularity: service, agriculture, and construction velocities lagged behind the all-corporation trend, while public utility velocity rose much more rapidly. Once again we find that higher velocity has been a very general postwar phenomenon.

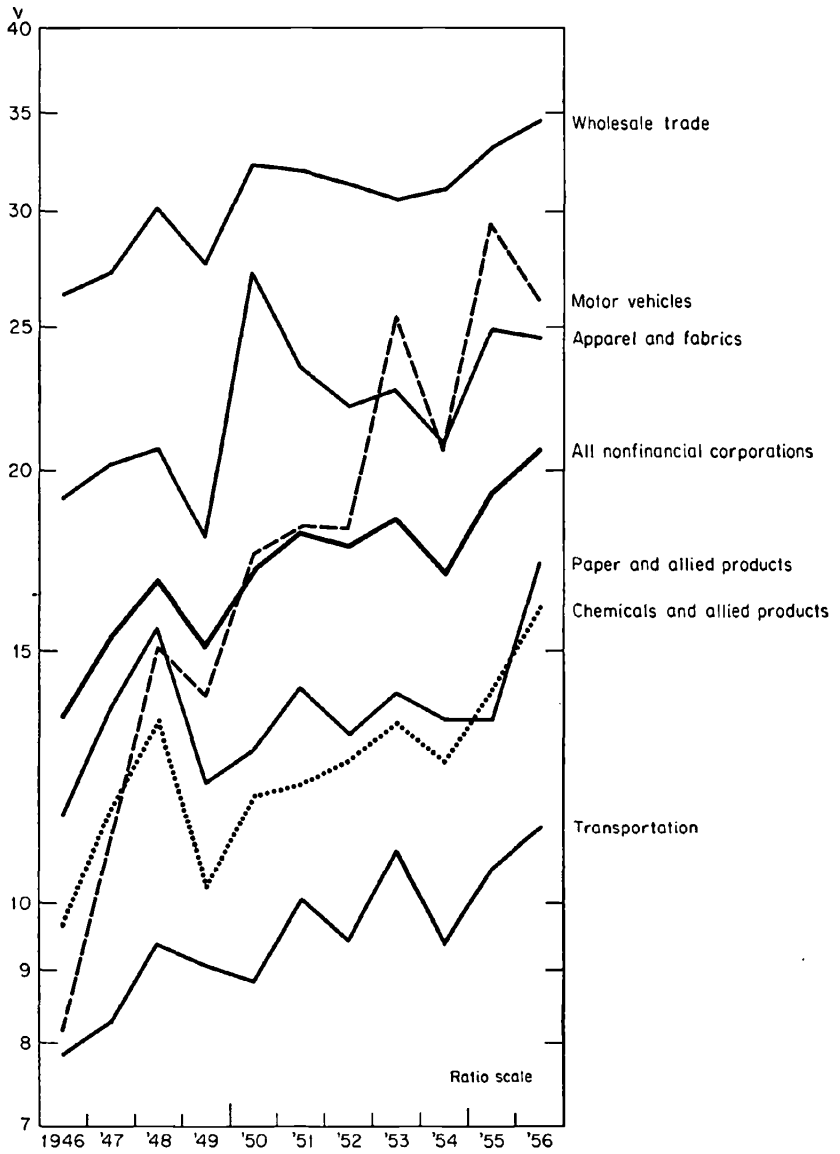
Weight shifts have been negligible among major industry divisions since 1946 (Table A-8). Manufacturing has consistently accounted for slightly over half of all cash held by non-financial corporations, and trade for 22-23 per cent. The shares of the service and construction industries have grown, while the share of the public utility industry has declined. However, the weighted average of 1956 sector velocities is the same, whether 1946 or 1956 weights are used. It is clear, therefore, that the postwar rise in corporate velocity is wholly the result of velocity rises within corporate industry divisions.

2. *Major industry groups.*—Charts 5A and 5B show velocities over the period 1946-56 for ten of the fifty-four major industry groups included in *Statistics of Income*, as well as for two broader categories—retail and wholesale trade. I have also computed velocities for thirty-two other major industry groups over this period. All forty-four series are presented in Table A-9; annual growth rates may be found in Table A-1.

These series provide additional evidence of the generality of the postwar velocity rise; only automotive repair services failed to increase over the period as a whole. However, the annual growth rates differ widely, varying from less than zero for one trade group and three services groups²¹ to 13.1 per cent for automotive dealers and filling stations and 11.4 per cent for motor vehicles. Since 1951 the velocity trends of beverages, personal services, and food and kindred products have been downward. Retail-trade velocity, on the other hand, has risen almost without interruption throughout the postwar period.

21. Retail food trade, business services, personal services, and automobile repair services. Except for the last group, 1956 velocities exceeded 1946 values despite the negative growth rate.

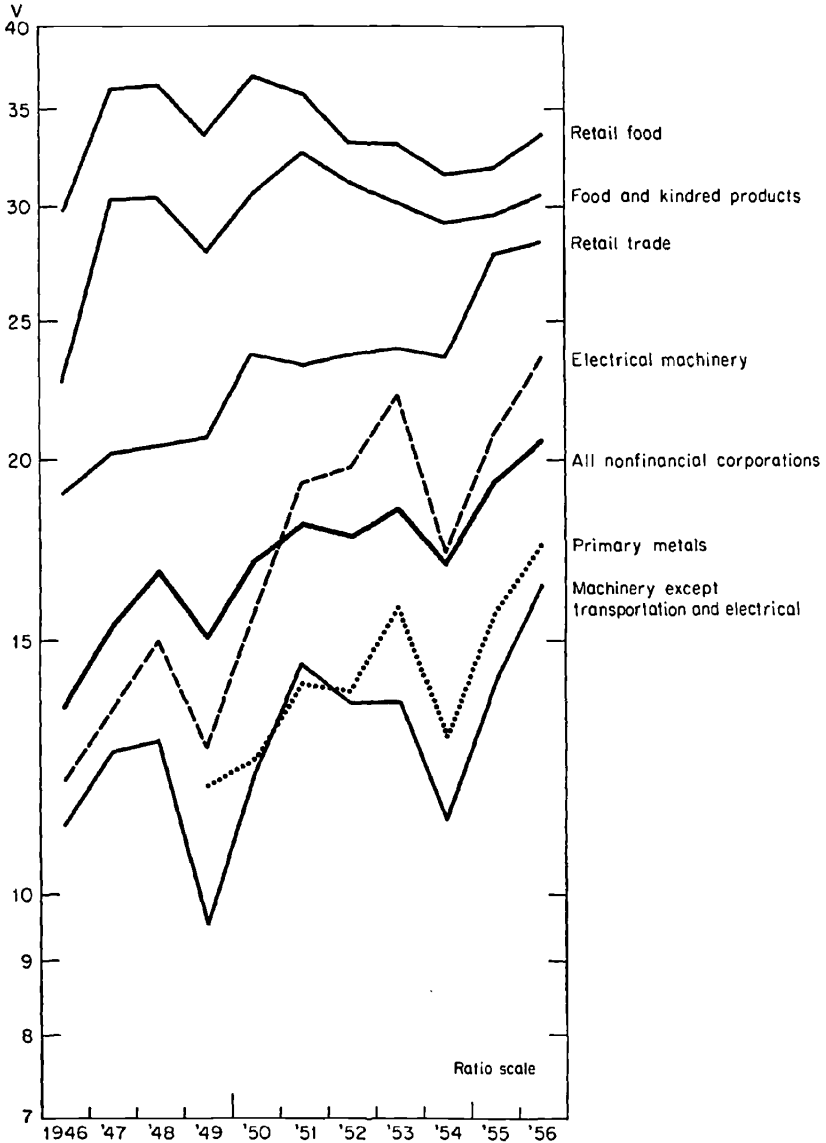
CHART 5A
 CORPORATE VELOCITIES, SELECTED MAJOR INDUSTRY GROUPS, 1946-56*



* Source: Tables A-7 and A-9.

CHART 5B

CORPORATE VELOCITIES, SELECTED MAJOR INDUSTRY GROUPS, 1946-56*



* Source: Tables A-7 and A-9.

Two other points are worth noting. Analysis of Charts 5A and 5B and thirty-two uncharted series reinforces the impression derived from Chart 4 that cyclical rises and falls in velocity are common to nearly all segments of business. Also, the differences in velocity levels by industry groups correspond broadly to the differences by industry divisions shown in Chart 4.

3. *Size classes.*—As I have already indicated, corporate data from *Statistics of Income* are classified by size of total assets as well as by industry. We know from Lutz's study of the interwar period that velocity is probably an inverse function of firm size.²² Conceivably, changes in average firm size could explain the rising trend of corporate velocity; in any event, differences in the behavior of velocity among the various size classes may provide clues to the nature of the postwar velocity rise.

Chart 6 shows size-class velocities for all non-financial corporations for 1939, 1941, 1943, and 1946–57.²³ Once again it is clear that the postwar velocity rise has been broadly based, rising during 1946–57 in all ten size classes. There are some noteworthy differences among these classes in pattern of change and in velocity levels, particularly when the prewar and wartime data are taken into account. Firms in the largest size class (\$100,000,000 and over) experienced a substantially greater velocity increase during 1946–57 (5.9 per cent per year) than did firms in any other category; in fact, this was the only size class whose velocity rose more rapidly than aggregate corporate velocity. Moreover, in the two largest size classes, velocity *rose* from 1939 to 1943, as well as from 1943 to 1946; in all other classes it fell in the earlier period, and the rate of decline was inversely related to asset size. As a result of both the wartime and the postwar convergence of size-class velocities, velocity in the largest class was 88.8 per cent of that in the smallest class in 1957, compared with only 27.5 per cent in 1939. It should also be noted that velocity has not risen significantly since 1950 for firms in the three smallest size classes.

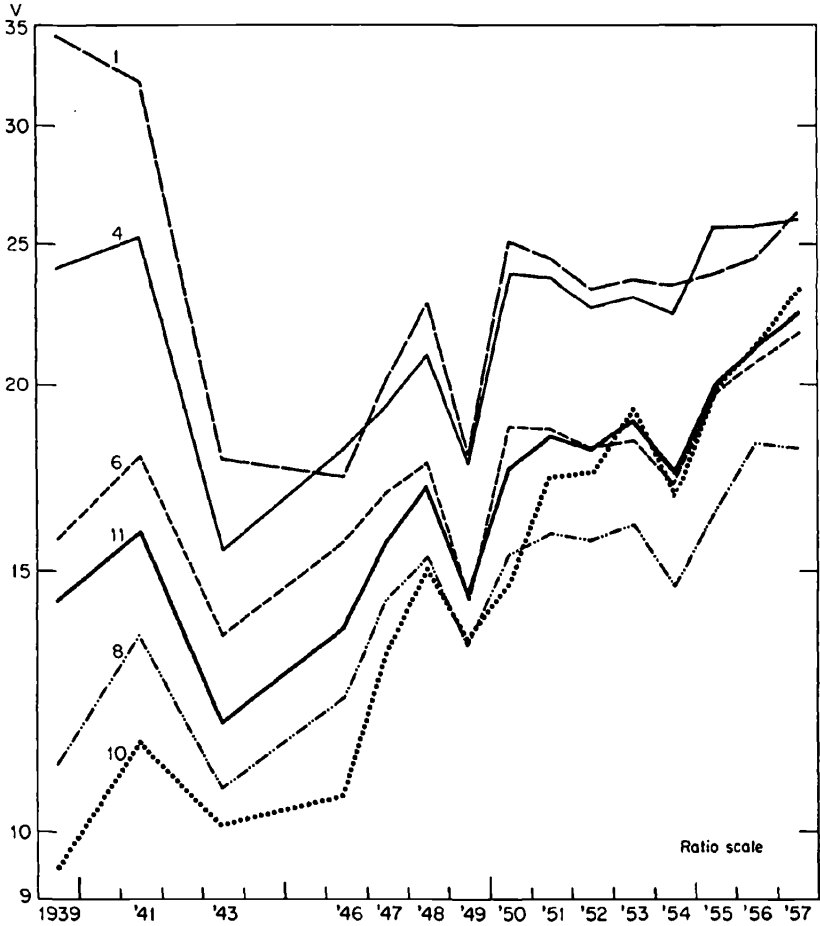
In general, smaller firms tend to have higher velocity than larger firms, although this is not evident among the smallest classes (less than \$1,000,000 total assets) in recent years. The differences exhibited in Chart 6 are not so great as those among industries (Chart 4), a fact which suggests that size may be less important than in-

22. *Op. cit.*, chap. 4. Lutz's Chart 11 shows ratios of average cash balances to estimated annual cash payments for two samples of corporations: 46 large manufacturing firms, 1915–43, and 103 medium-sized and small manufacturing firms, 1916–42. Throughout 1916–42 the smaller firms had higher velocity.

23. Table A-10 contains velocities for size classes not shown in Chart 6.

CHART 6

SELECTED SIZE-CLASS VELOCITIES, NON-FINANCIAL CORPORATIONS, 1946-57*



* Source: Table A-10. The following code is used in this study for designation of asset-size class:

Curve Number	Asset-Size Class
1	Under \$50,000
2	\$50,000-\$100,000
3	\$100,000-\$250,000
4	\$250,000-\$500,000
5	\$500,000-\$1,000,000
6	\$1,000,000-\$5,000,000
7	\$5,000,000-\$10,000,000
8	\$10,000,000-\$50,000,000
9	\$50,000,000-\$100,000,000
10	\$100,000,000 and over
11	Total

dustry as a determinant of business velocity. However, these differences among size classes exist even within particular industries, as Table A-12 indicates.²⁴ Within each of four industries, smaller firms have tended to maintain higher velocities than larger firms. This finding strongly supports the view that the velocity differences shown in Chart 6 for all non-financial corporations are genuinely the result of firm size and not merely a reflection of varying industrial composition among size classes. In chemicals and motor vehicles (Table A-12) velocity behaved much the same as for all non-financial corporations; in particular, it rose more in the largest size class than in any other, and most markedly since 1950. Transportation and retail food trade, however, provide contrasts to the general pattern. In the former the sharpest velocity rises occurred in the intermediate classes; only moderate rises in the largest classes, and little change since 1948 in the smallest classes. Retail food trade velocity declined in all size classes during 1950-55—somewhat more for large, than for small, firms.

At the end of 1957, firms in the largest size class held about one-third of all non-financial corporate cash (Table A-11). This proportion has grown slowly since 1946, exerting moderate downward pressure on aggregate corporate velocity. However, there were declines in the shares of the \$5,000,000-\$10,000,000 and \$10,000,000-\$50,000,000 groups. As a result, the net impact of weight shifts on the trend of corporate velocity has been very minor: the aggregate figure is virtually the same whether 1946 or 1957 weights are applied to the 1957 size-class velocities.

IV. WHY VELOCITIES DIFFER AT ANY POINT IN TIME

In Section III we noted persistent differences in velocity from sector to sector, those among corporate size classes being particularly striking. There appear to be several reasons for these differences.

DIFFERENCES AMONG CORPORATE SIZE CLASSES

1. *Inadequate velocity measures.*—Our measures of corporate velocity include neither capital expenditures nor financial payments. Both give rise to a demand for money, and their omission results in an understatement of corporate velocity. Insofar as large firms en-

24. The industries included in these tables are chemicals, motor vehicles, transportation, and retail food trade. They were selected for their quantitative importance, adequacy of representation in all size classes, and absence of major reclassifications during 1946-57.