PORTENTS OF DISCONTINUANCE

Credit analysis theory is based on the assumption that since the success of a business enterprise is measured in pecuniary terms it is possible to distinguish between the sound and the unsound, the successful and the unsuccessful, by examining certain "credit" ratios. 1/ That is to say, the theory assumes that if a designated credit ratio falls below or rises above some empirically determined level – depending on the relationship measured by the ratio – that deviation signals financial difficulty and even, if it persists, portends discontinuance of business operations. The data available for use in this study permit an experimental testing of this primary assumption, particularly the assumption that persistent deviation from an empirical norm foretells disappearance of an enterprise from the business scene. Such a testing is subject to limitations, but it can ascertain whether in this particular group of corporations a systematic ratio pattern was exhibited by the discontinuing companies.

For a test of the type to which this chapter is devoted our data should pertain only to the experience of companies that are known to have suffered severe financial difficulties resulting in reorganization or failure. The sample with which we have to work is not, however, of this character. Strictly speaking, all we know is that these companies ceased filing federal corporate income tax returns. Some may have changed to a non-corporate form of organization, and others may have discontinued business voluntarily. But we have reason to believe that the majority were what may be termed involuntary discontinuances.

The data on which this chapter is based were developed as follows. The primary samples for our study consisted of a drawing of about 200 eligible companies in each of the five industries from the 1926 federal income tax returns, and of another, smaller drawing from the 1930 returns. These companies were then traced through

the files for the succeeding ten and six years, respectively. The corporations studied in the foregoing chapters are those from the 1926 drawing that continued to file income tax returns through 1936. The remainder ceased filing returns some time before that year, as did nearly half of the companies in the 1930 drawing. Since companies involved in mergers and consolidations had been eliminated from the samples, and since federal law requires the filing of an income tax return by every active corporation, these companies that ceased filing returns may be assumed to have gone out of business as corporate entities. Presumably they were failures, although, as mentioned above, a few may have left business voluntarily or changed to a non-corporate form of ownership. 2/

The present analysis is based, therefore, on the returns of companies that discontinued after remaining in the sample six years or more. Thus it includes, from the 1926 drawing, the companies that discontinued some time during the years 1932-36, and, from the 1930 drawing, the companies that disappeared in 1936. These discontinuances number 200 in all, distributed among the five industries as follows: baking 47; men's clothing 41; furniture 38; stone-clay 43; machine tool 31. They are referred to as the identical sample of discontinuing companies. While the sample is small, it is, to our knowledge, the only one available for testing, in regard to small manufacturing concerns, the basic assumptions of credit analysis theory.

In studying the financial statements of enterprises that ultimately disappear from the business scene one of the most serious problems is the difficulty of reducing the tabulations to a basis adapted to temporal analysis. If all the disappearances occurred in a single year the problem would not arise, but in the present instance we are dealing with corporations that disappeared severally over a period of five years. A tabulation of their financial statements for a series of calendar years before discontinuance would not permit careful analysis, because the number of companies would change from year to year and in each year some would be nearer discontinuance than others. Therefore we have taken the year of disappearance as the point of reference, regardless of the particular calendar year it happens to be, and have tabulated the financial statements according to the number of years be-

fore discontinuance. 3/ Thus the statements of the 200
companies were grouped into six divisions, according to
whether they covered the first, second, third, fourth,
fifth or sixth calendar year 4/ before the company in
question left the business scene. The statements in each
of these divisions were then aggregated to yield a compos-
ite balance sheet and income account for each of the six
year-before-discontinuance periods. The tabulations could
not be carried beyond the sixth year before disappearance,
for some of the corporations were in the sample only six
years. 5/

FINANCIAL RATIOS AS INDICATORS

In the financial structure of our sample corpora-
tions there were many elements that gave advance evidence
of ultimate discontinuance, but three ratios proved to be
particularly sensitive indicators in this respect: cur-
rent assets to current liabilities, net worth to total
debt, 6/ and net working capital 7/ to total assets. These
three were selected by the trial and error method, a
large number of possible ratios being tested.

The first and third of these ratios reflect the
"freezing" of working capital, the first by comparing the
two determinants of working capital with each other, and
the third by comparing the difference between these two
components with the total assets of the company. The sec-
ond ratio - net worth to total debt - reflects the rela-
tive positions of the owners and creditors in the enter-
prise. When the capital of an enterprise becomes less and
less liquid, and the creditors' claims persist in increas-
ing, in relation to the owners' equity, we have what are
here called portents of discontinuance. It is significant
that the profit ratio was a less sensitive and reliable
indicator than any of the three ratios listed above. In
the present chapter these three "indicator" ratios, com-
puted for each year before discontinuance, are compared
with the corresponding ratios for the continuing compa-
nies. 8/

In this comparison certain obvious difficulties have
had to be surmounted. In the first place, the ratios for
the surviving companies pertain to given calendar years,
while those for the discontinuing companies cover given

years before discontinuance, each of which represents a
different assortment of calendar years. And in the second
place, a change in a ratio between, say, the fifth and
the third year before discontinuance cannot be wholly at-
tributed to the fact that the time of disappearance was
drawing nearer: some of the change may have been due to
the dominance of generally prosperous years in the fifth,
and of generally unprosperous years in the third, year
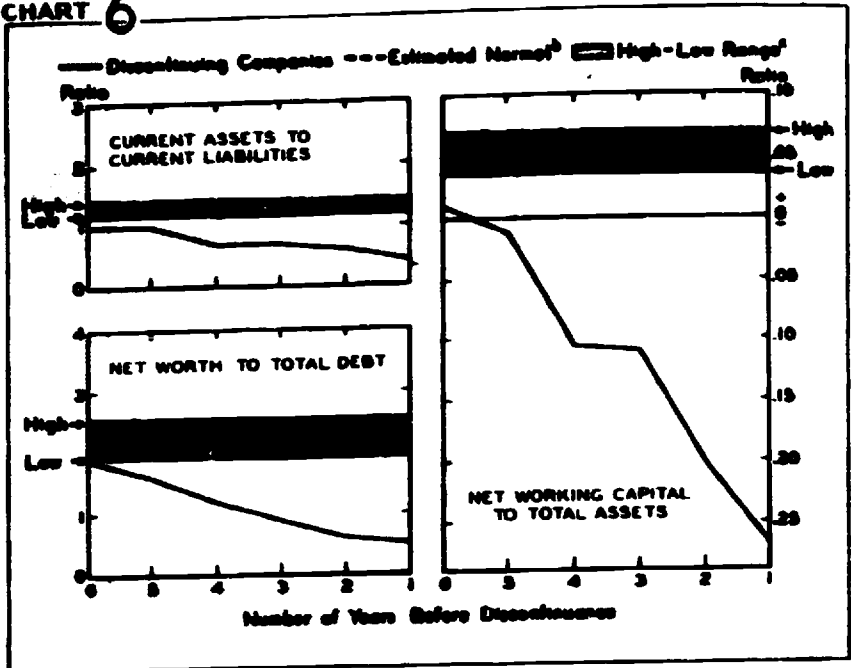before discontinuance.

A rather crude means of solving these problems is
to determine, for the surviving companies, the high-low
range of each ratio's variation during all the years
1926-35. When this method is followed any given ratio
for the discontinuing companies is not regarded as out of
line until it has passed outside that ratio's high-low
range as established by the surviving companies. For some
purposes of comparison, however, this method of correc-
tion is too conservative, because in relatively prosper-
ous or relatively depressed years a ratio for the dis-
continuing companies may be dangerously high or low and
still fall within the high-low range for the continuing
corporations.   Therefore a standardizing technique has
been applied to the three selected ratios in order to de-
rive, for each of them, the "estimated normal," that is,
a ratio for the surviving companies which pertains to the
same combination of calendar years that is contained in
each year before discontinuance. 9/

Although both of these bases of comparison give con-
sideration to the cyclical factor they serve different
purposes. The high-low range indicates the maximum cycli-
cal variation and hence is particularly useful in deter-
mining when the level of the disappearing companies' ra-
tio is out of line. The estimated normal allows roughly
for the cyclical influences operative in each given year
before discontinuance, and thus can be used to test the
direction of movement as well as the level of the disap-
pearing companies' ratio.

In Charts 6 to 10 the three ratios mentioned above -
current assets to current liabilities, net worth to total
debt, and net working capital to total assets - are pre-
sented for the discontinuing companies in each industry,
and for each year before discontinuance, and are compared
with the estimated normal and with the high-low range es-

**47 DISCONTINUING AND 81 CONTINUING BAK-
ING CORPORATIONS: Three Selected Ra-
tios,   by Number of Years Before Dis-
continuance [a]**

CHART 6

Chart content labels: Discontinuing Companies, Estimated Normal[b], High-Low Range[c]. Current assets to current liabilities, Net worth to total debt, Net working capital to total assets. Number of Years Before Discontinuance.
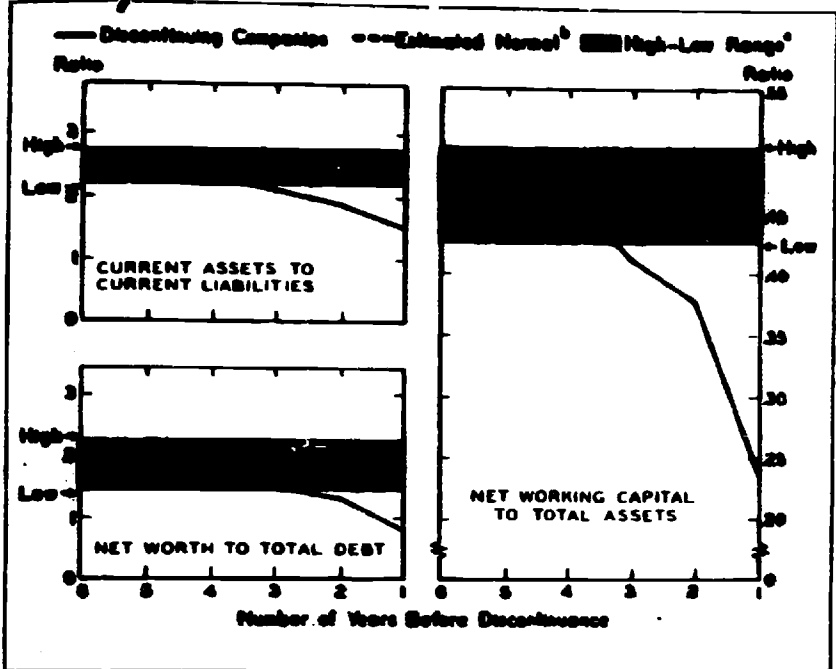
[a] Based on Table D–2 in Appendix D and
Table B–22 in Data Book (see footnote
16 of Chapter 1).

[b] Weighted average of the continuing
companies' ratios for the various cal-
endar years contained in each year be-
fore discontinuance; for method of es-
timate see Appendix D.

[c] Range of 1926–35 annual ratios for
sample of continuing companies.

41 DISCONTINUING AND 46 CONTINUING MEN'S CLOTHING CORPORATIONS: Three Selected Ratios, by Number of Years Before Discontinuance [a]
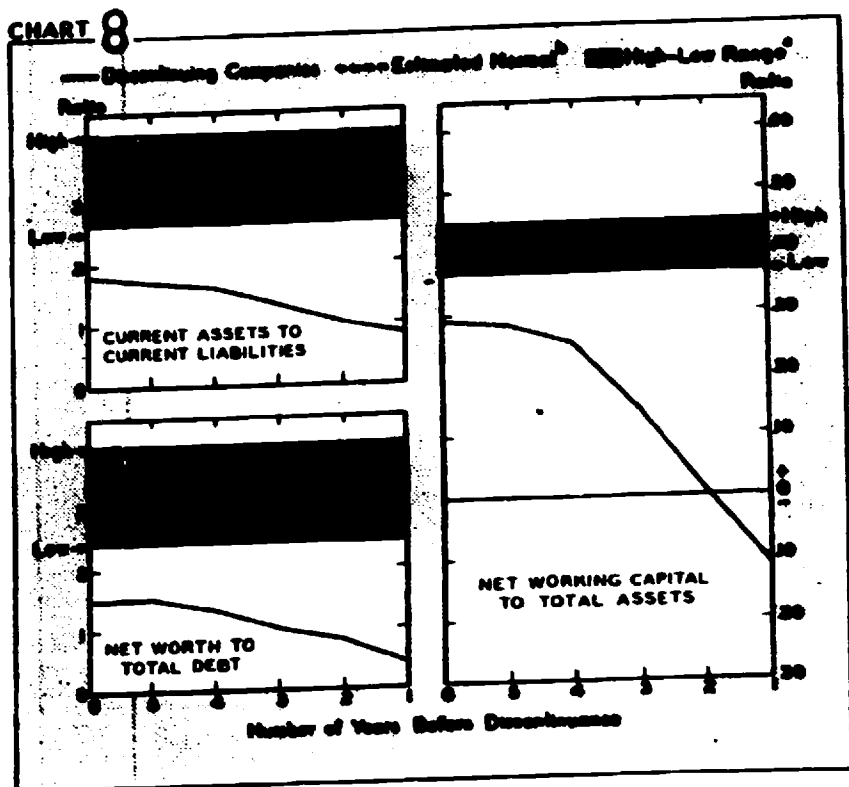
CHART 7

**38 DISCONTINUING AND 66 CONTINUING FUR-
NITURE CORPORATIONS: Three Selected Ra-
tios, by Number of Years Before Dis-
continuance** [a]

CHART 8

CURRENT ASSETS TO
CURRENT LIABILITIES

NET WORKING CAPITAL
TO TOTAL ASSETS

NET WORTH TO
TOTAL DEBT

[a] Based on Table D-2 in Appendix D and
Table 8-24 in Data Book (see footnote
16 of Chapter 1).

[b] Weighted average of the continuing
companies' ratios for the various cal-
endar years contained in each year be-
fore discontinuance; for method of es-
timate see Appendix D.

[c] Range of 1926-35 annual ratios for
sample of continuing companies.

38 DISCONTINUING AND 66 CONTINUING FUR-
NITURE CORPORATIONS: Three Selected Ra-
tios, by Number of Years Before Dis-
continuance [a]

CHART 8

CURRENT ASSETS TO
CURRENT LIABILITIES

NET WORTH TO
TOTAL DEBT

NET WORKING CAPITAL
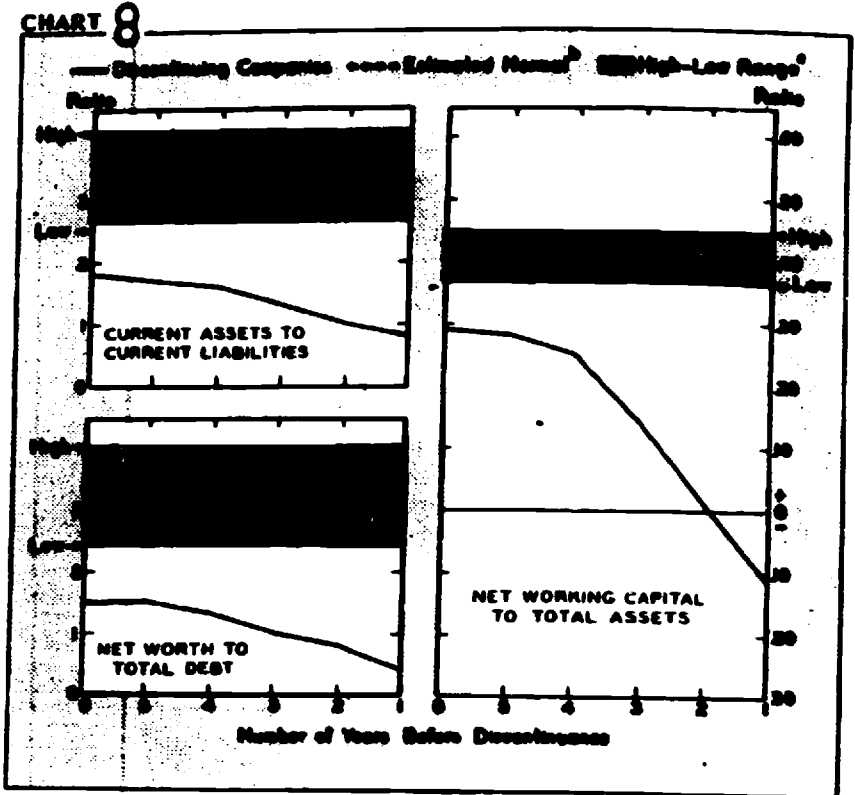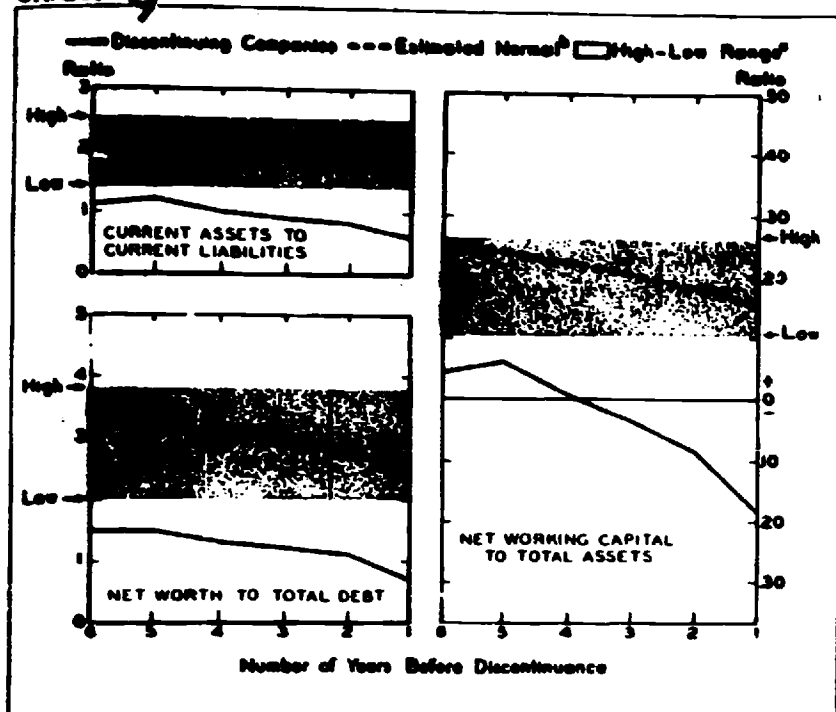TO TOTAL ASSETS

Number of Years Before Discontinuance

[a] Based on Table D-2 in Appendix D and
Table B-24 in Data Book (see footnote
16 of Chapter I).

[b] Weighted average of the continuing
companies' ratios for the various cal-
endar years contained in each year be-
fore discontinuance; for method of es-
timate see Appendix D.

[c] Range of 1926-35 annual ratios for
sample of continuing companies.

CHART 9

43 DISCONTINUING AND 70 CONTINUING
STONE AND CLAY CORPORATIONS: Three
Selected Ratios, by Number of Years
Before Discontinuance [a]

Number of Years Before Discontinuance

[a] Based on Table D-2 in Append·x D
and Table B-25 in Data Book (see foot-
note 16 of Chapter 11).

[b] Weighted average of the continuing
companies' ratios for the various cal-
endar years contained in each year be-
fore discontinuance; for method of
estimate see Appendix D.

[c] Range of 1926-35 annual ratios for
sample of continuing companies.

31 DISCONTINUING AND 118 CONTINUING
MACHINE TOOL CORPORATIONS: Three
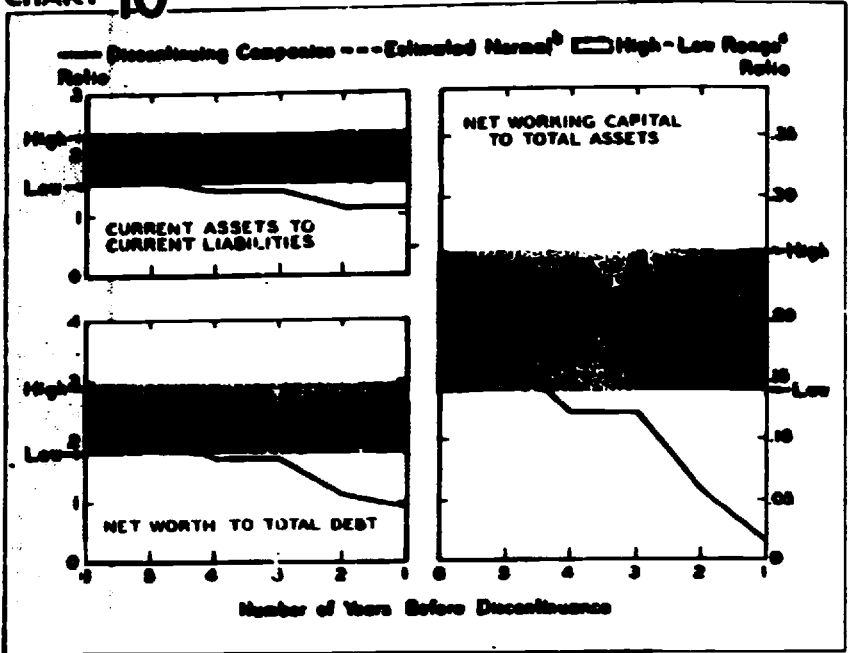Selected Ratios, by Number of Years
Before Discontinuance [a]

CHART 10

[a] Based on Table D-2 in Appendix D
and Table B-26 in Data Book (see
note 16 of Chapter II).

[b] Weighted average of the continu-
ing companies' ratios for the vari-
ous calendar years contained in each
year before discontinuance;   for
method of estimate see Appendix D.

[c] Range of 1926-35 annual ratios
for sample of continuing companies.

tablished by the surviving companies over the period 1926-
35. 10/ From these charts it can be observed that except
in men's clothing all three ratios were below the esti-
mated normal as early as the sixth year before discontin-
uance. And in three of the industries they were out of
line that early even if we adopt the very conservative
standard of the high-low range for the continuing compa-
nies; here machine tool and again men's clothing are the
exceptions.

Equally significant is the movement of the discon-
tinuing companies' ratios as the year of discontinuance
draws near. In all five industries they declined per-
sistently, in most instances sharply, from the sixth to
the first year before discontinuance, thereby increasing
their divergence from the estimated normal. For the five
industries combined this increasing divergence is found
to be statistically significant: in each of the three
ratios the probability that chance alone would account
for this persistent divergence is less than one out of a
hundred. 11/

Of the three ratios shown in Charts 6 to 10, that of
net working capital to total assets provides the most def-
inite indications of ultimate discontinuance.12/ In each
industry its downward movement was sharp - more so than
that of either of the other ratios - and virtually unin-
terrupted. It was the only one of the three to fall de-
cisively below the high-low range in the men's clothing
sample. In the stone-clay and machine tool groups its
downward movement was accompanied by a decline in the es-
timated normal, but its decline was greater than that of
the estimated normal and its level was decidedly lower.

The ratios plotted in Charts 6 to 10 are ratios of
aggregates, against which it may be argued that the in-
fluence of the larger companies in the sample has more
weight than that of the smaller, and that the relative
influence of an individual company may vary significant-
ly during the period. While these ratios of aggregates
are, in essence, the properly weighted averages of the
ratios for the individual companies, the relative weights
may vary somewhat through the period. Ratios of aggre-
gates were employed here because the open-end classes in
the available frequency distributions precluded the cal-
culation of the correct mean ratio. Medians were similar-

ly indeterminate because of the necessity of interpolat-
ing within frequency distribution classes.

There are several reasons for believing, however,
that the movements shown by the ratios plotted in these
charts are representative not only of the sample compa-
nies in the aggregate, but also of the particular enter-
prises. In the first place, the companies in the samples
are all relatively small; most had total assets between
$50,000 and $150,000, with only a few over the $200,000
level. Therefore there was not the opportunity - found
in some simple aggregations of financial statements -
for the influence of one or a few companies to outweigh
that of a great many other concerns in the group. It is
this factor, incidentally, which provides the basis for
the representativeness of much of the analysis in the
preceding chapters of this study.

Secondly, a special tally of the ratios of the par-
ticular companies in the samples of discontinuances re-
vealed that the great majority in each group evidenced a
downward movement similar to that shown in the charts. A
count was made of the number of companies in each sample
for which the given ratio fell with no more than two in-
terruptions from the sixth to the first year before dis-
continuance; for some of the companies there was no in-
terruption, and the majority had only one. The results,
expressed as a percentage of the number of companies in
each sample, are presented herewith. It can be seen that
the proportion of companies recording what may be called
a persistent decline ranged from 51 percent (net worth
to total debt in the men's clothing group) to 76 percent
(net working capital to total assets in furniture). In
most of the samples from three-fifths to three-fourths
of the companies experienced the indicated decline. The
comparatively small proportions for the men's clothing
sample accord with our earlier observation, based on the

	Current Assets to Current Liabilities	Net Worth to Total Debt	Net Working Capital to Total Assets
Baking (47 cos.)	62%	68%	68%
Men's clothing (41 cos.)	54	51	68
Furniture (38 cos.)	66	71	76
Stone-clay (43 cos.)	70	53	72
Machine trol (31 cos.)	61	65	61

charts, that the portents for this group were less well
marked than those for the other samples.

For the companies that showed more than two inter-
ruptions the given ratio sometimes declined markedly,
sometimes remained fairly stable and occasionally rose
in the fifth and fourth years before discontinuance and
then plunged downward. In each sample a handful of com-
panies experienced a persistent rise in the ratio, indi-
cating that these discontinuances were the voluntary liq-
uidations mentioned earlier. There appear to have been
four or five of these companies in each sample. If it
could be established that they, and they alone, were vol-
untary liquidations, their elimination from these samples
would further sharpen the contrasts pictured in Charts
6 to 10.

A final reason for trusting the movements shown by
the ratios in these charts is provided by the fact that
crudely calculated mean ratios give a similar picture.
These mean ratios are characterized as "crudely calcu-
lated" because the assumed midpoint of the open-end class
was held constant. Thus calculated, the mean ratios de-
cline slightly less than the ratios of aggregates shown
in the charts. But if the midpoints of the open-end and
next lower classes had been moderately adjusted downward
as the last year before discontinuance approached, the
mean ratios would have fallen equally as sharply as the
ratios of aggregates; and there is every reason to be-
lieve that the central tendencies of these upper classes
in the frequency distributions actually underwent such a
decline.

The fact that the mean ratios declined commensurate-
ly with the ratios of aggregates shown in the charts in-
dicates merely that the downward movement was not brought
about solely by the large companies. It would still be
theoretically possible for the mean ratios to decline and
the particular company ratios to fluctuate erratically
over the distribution. That this did not occur is indi-
cated by the foregoing tabulation, showing that the ra-
tios for the majority of companies declined persistently.

Thus far we have seen that for the discontinuing com-
panies as a group the three ratios were lower, at least
from the fifth year and usually from the sixth year be-

fore discontinuance, than the estimated normals for the
surviving companies as a group. But these comparisons can
tell nothing about the range of variation in the ratios
of the companies within each group. Such information is
presented in Chart 11, which shows, for each ratio and
each industry, how the discontinuing companies were dis-
tributed in the last year before discontinuance according
to various ratio levels, and also the percentage distri-
bution of the continuing companies according to the cor-
responding estimated normals. It is evident, as would be
expected, that a greater proportion of discontinuing than
of continuing companies had the more adverse ratios -
those in the lowest two levels distinguished here.

But it should not be overlooked that there is a con-
siderable area of overlap between the two groups of com-
panies. In men's clothing, for example, about 40 percent
of the discontinuing companies had a ratio of current
assets to current liabilities ranging between 1 and 4,
while only slightly more than 50 percent of the continu-
ing companies had estimated normal ratios falling within
this range; and two-fifths of these discontinuing compa-
nies had a ratio as high as 0.4 or more for net working
capital to total assets, while as high a proportion of
continuing as of discontinuing men's clothing companies
had positive net working capital below the 0.4 level. In
other words, there is no clearly marked dividing line be-
tween the ratios for the continuing and the discontinuing
companies. Some companies in the samples survived through
1936 with relatively poor ratios, while others with rela-
tively good ratios went out of existence before that year.

An obvious inference that might be drawn from the
foregoing analysis is that these three ratios may provide
an acceptable criterion for a credit analyst in evaluat-

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FOOTNOTES FOR CHART 11

a/ Based on unpublished tables prepared by the Income Tax Study, a WPA
project sponsored by the Treasury Department. The estimated normal ratio,
which forms the basis for each distribution of continuing companies, is the
weighted average of these companies' ratics for the various calendar years
contained in the first year before discontinuance; for method of estimate
see Appendix D.

b/ The stone-clay and machine tool distributions of discontinuing compa-
nies are exclusive of a few corporations that reported neither current as-
sets nor current liabilities.

CHART 11
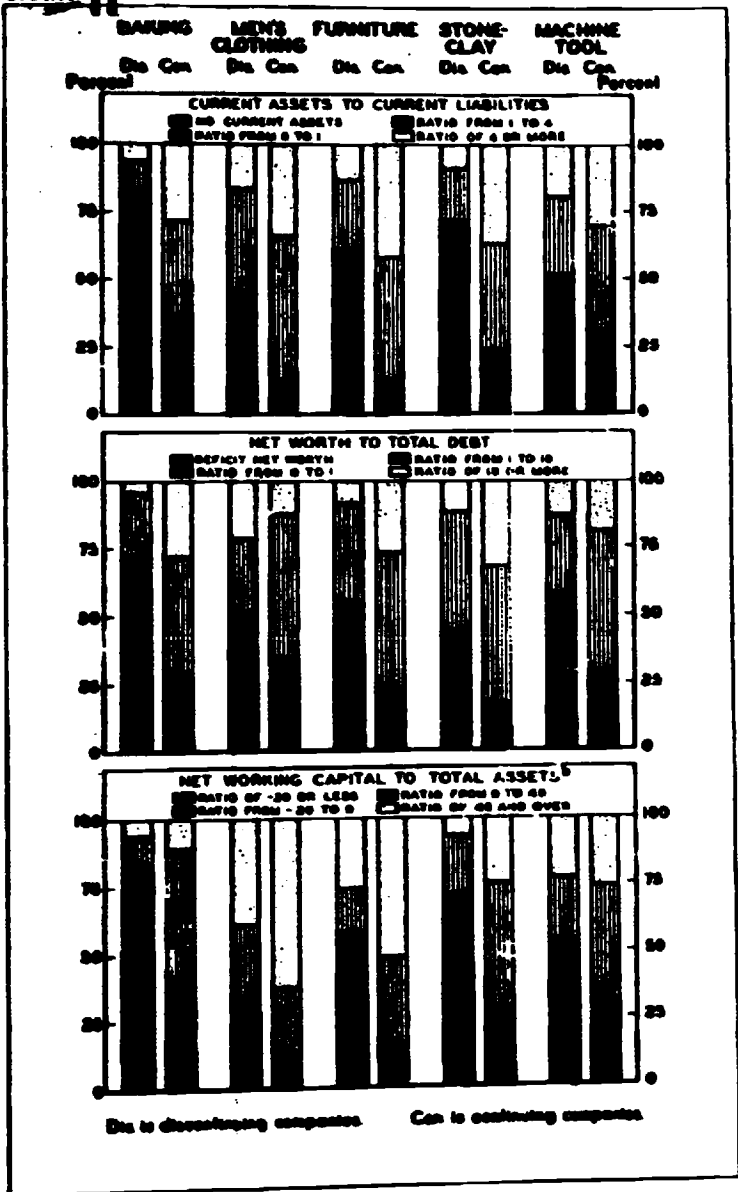
ing the tendencies exhibited by an individual enterprise.
Such an inference, however, cannot be fully substantiated
from the data in their available form. To justify such a
conclusion the material presented here should be supple-
mented by a more detailed study based on individual com-
pany ratios rather than on aggregates. It seems probable
that values of the ratios lower than the estimated nor-
mal may be accepted as portents of discontinuance. But it
has not been possible to determine whether the proportion
of companies exhibiting a persistent decline differs sig-
nificantly between the continuing and the discontinuing
groups.

Chart 11 brings out still another point that should
be stressed at this juncture to avoid misinterpretation
of our analysis.   It will be seen that in each industry
there was some small proportion of discontinuing compa-
nies with credit ratios that are high under customary
standards of credit appraisal. The companies with these
high ratios may have been the ones that discontinued op-
erations voluntarily. We stressed at the outset that for
the present samples there was no means of distinguishing
the voluntary from the involuntary discontinuances. Be-
cause of this absence of information on the reason for
discontinuance, it seemed unduly arbitrary to eliminate
these companies from the sample. While their presence in
the sample calls for caution in interpreting the findings,
it strengthens the contention that the adverse movements
of the three "sensitive" credit ratios are significant
portents of discontinuance. Chart 11 also indicates that
some of the continuing companies had amazingly poor cred-
it ratios. Whether such conditions persisted is not known,
but they may well have done so in some instances. In oth-
er words, a poor credit ratio is no more a sufficient
than it is a necessary condition of discontinuance.

In spite of all the necessary qualifications there
are important implications in the foregoing analysis.
The present samples give clear evidence that in general
the financial structure of the discontinuing companies
as a group began to deviate from that of the surviving
companies as early as six years before actual disappear-
ance. Moreover, most of these deviations between the two
groups of companies became increasingly marked as the
time of disappearance approached. The indications of dis-
appearance were relatively definite in four of the indus-

tries, but not so marked in the remaining industry, men's
clothing. This exception is probably due to the fact that
the existence of small-scale men's clothing companies is
generally precarious. The demand for their products is
whimsical if not capricious, and style and fabric changes
are introduced too suddenly for the comfort of the en-
trepreneur. And after one or two unsuccessful seasons a
clothing company is near exhaustion, for resistance to
forces of economic contraction or deflation is not so sus-
tained as in, say, the baking industry, where the owners'
equity and the investment in fixed property are compara-
tively large.

So far as credit analysis theory is concerned – the
primary assumptions of which it has been the purpose of
this chapter to test – our analysis has led to the con-
clusion that deviation of certain credit ratios from an
empirically-determined level has definite diagnostic val-
ue. In other words, if the ratio persists in moving in an
adverse direction, that movement is portentous of busi-
ness discontinuance. This does not mean that a company
having this financial experience will inevitably and nec-
essarily discontinue operations. It does signify, how-
ever, that an unhealthy condition is developing which,
unless corrected, will result in business discontinuance.*

The length of the period during which the financial
structure of these companies gave indications of approach-
ing discontinuance is a factor of particular importance
for business cycle analysis because it reflects the ex-

Note by Oswald W. Knauth, Director – The sample contains companies that
discontinued voluntarily as well as companies that discontinued involun-
tarily. Even if the voluntarily-discontinuing companies were eliminated,
this analysis does not establish that any company experiencing an unfavor-
able movement of any or all of these three "sensitive" credit indicators
is necessarily destined to discontinue operations. The author does not
stress sufficiently that when unfavorable developments occur many things
can happen in a company to reestablish a normally-functioning enterprise.
Per contra, it happens at times that a company changes from solvency to
insolvency with startling rapidity. Unrecognized weaknesses uncover each
other and spiral with increasing speed.

All that can properly be deduced from the data presented is that cred-
it ratios are an important element in forecasting the continuance or dis-
continuance of individual enterprises; and that weak companies frequently
show signs of distress several years in advance of their formal discontin-
uance. These facts are already generally recognized, and the further par-
tial corroboration offered in this chapter does not materially add to our
knowledge of the subject.