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**The Financially Fragile Firm:
Is There a Case for It in the 1920s?**

by

D. L. Isenberg*

Working Paper No. 15

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The firm in Hyman Minsky's financial fragility hypothesis is faced with competitive pressures and a market economy which is characterized by business cycles [Minsky 1975, Ch4-6; 1982b]. His firm is profit and growth oriented, so that in the expansionary phase of the business cycle the firm invests expecting to reap the reward of increased profits as well as a larger share of the market. It is the sources of these funds that finance investment projects that is the focus of Minsky's hypothesis. In this hypothesis it is assumed that internal sources of funds will dry up before investment projects do, so the firm seeks external funds. Given the increased importance of debt and declining use of equity finance since the 1960s, it is the use of debt finance that concerns Minsky. In his hypothesis the firm contracts for debt, investment continues and the balance sheet of the firm reflects the build up in debt which is the hallmark of financial fragility.

The financial fragility hypothesis draws no distinction among firms with respect to size, degree of competition in the market/industry, sector or product line. The analysis applies to developed market systems in general. It is the aim of this paper to analyze the generality of the nature of Minsky's firm and the behavior that in the aggregate leads the economy into a position of financial fragility.

This paper is an empirical investigation of Minsky's hypothesis in the U.S. consumer durables sector during the 1920s. The first section of the paper briefly describes Minsky's financial fragility hypothesis, while the second sketches a brief economic historical background of the 1920s in the U.S.. The third section introduces the methodology utilized and the fourth presents the results of the analysis. In the conclusion the findings and their implications are summarized.

Minsky's System

The following summary of Minsky's financial fragility hypothesis is derived from his article in Kindleberger and Laffargue [1982b]. In his hypothesis firms are categorized by their debt and income relationship. The taxonomy includes three types of firms. These categories are strictly definitional; it is only in the business cycle framework that the behavioral characteristics of the firms become apparent.

The hedge-financed firm has assets and liabilities with terms to maturities that are matched, and it has expected income flows that exceed its debt payments. Using Minsky's notation the hedge firm is characterized as

$$(1) \quad AQ_i > PC_i \quad (i = 1, \dots, n)$$

where AQ_i is the anticipated income, net income, for each period and PC_i is the contracted debt service payment in each period. Hence, this firm is described as conservatively financed. It is the only firm in the Minsky taxonomy in which total anticipated income exceeds total debt payments in each period, and in which the expected income is greater than the debt service payment.

The second firm is the speculative-financed firm. It is also characterized by a total expected income stream that exceeds its total debt payments. However, it differs from the previous firm in that in the initial m periods of the life of the investment project the income in each period will be less than the contracted debt service payment in that period. During these m periods which Minsky considers to be over a small time period, the interest portion of the debt payment will be smaller than the expected income in each period, so the firm by at least remaining current on its interest payments will not go into arrears. In an attempt to maintain a good credit rating, the speculative firm will usually restructure its debt during these initial m periods. It will either renegotiate

its existing debt or contract for new borrowings. After these first m periods have passed, the expected income in each period exceeds the debt payments, so the firm is again on a stable financial footing.

Using our previous notation to describe the speculative firm, it is characterized as

$$(2) \quad AQ_i < PC_i \quad (i = 1, \dots, m. \text{ } m \text{ is small})$$

$$(3) \quad AQ_i > PC_i(y) \quad (i = 1, \dots, m)$$

$$(4) \quad AQ_i > PC_i \quad (i = m+1, \dots, n)$$

$$(5) \quad \Sigma AQ_i > \Sigma PC_i \quad (i = 1, \dots, n)$$

where $PC_i(y)$ is the interest portion of the debt payment.

The financial structure of the speculative firm has greater debt exposure than the hedge firm and therefore carries with it greater risk. In addition, unlike the hedge firm, the speculative firm must return to the credit market during its first m time periods which indicates that it faces increased uncertainty and therefore a greater vulnerability. The credit market conditions will have changed since the firm's initial foray into the market. These changes may be for the best or the worst; the crucial point is that the future is unknown and unknowable. This latter point is the one that Minsky emphasizes; it also is another reason for a higher risk level adhering to such a firm.

The final firm is the Ponzi firm. Structurally, it is an exaggerated speculative firm. Like the other two firms, it, too, has a total expected income summed over all periods that exceeds its total debt commitment. Its difference arises from the extended number of periods during which the firm has expected income that is less than the contracted debt payments; instead of m , it has $n-1$ periods. Also during these deficit periods the interest portion of the debt exceeds the expected income. So, like the speculative firm, the Ponzi firm must

again go to the credit market to obtain a financial solution. Instead of merely being able to renegotiate existent debt, the Ponzi firm must incur additional debt if it is to meet its interest payments or its debt payments during the first $n-1$ periods. It is only in the final period, n , that the Ponzi firm makes a windfall gain so that it can validate its total debt commitment. An example of such a firm would be in the residential construction industry. The construction firm begins a new investment program which is building houses. It borrows the entire sum for this project. The income from the investment project arrives only in the final period, n , when a consumer takes a mortgage out on the house. The construction debt is only then extinguished, validated, assuming that the house sold at a price that at least equalled its total cost. Using our previous notation the Ponzi firm is characterized as

$$(6) \quad AQ_i < PC_i \quad (i = 1, \dots, n-1)$$

$$(7) \quad AQ_i < PC_i(y) \quad (i = 1, \dots, n-1)$$

$$(8) \quad AQ_i \gg PC_i \quad (i = n)$$

$$(9) \quad \sum AQ_i > \sum PC_i \quad (i = 1, \dots, n)$$

where \gg indicates the windfall gain of the final period.

The increased uncertainty faced by the speculative firm is compounded by the financial position taken by the Ponzi firm. Any deterioration in the credit market, rising interest rates, credit rationing or declining debt instrument prices, will have a deleterious effect on the Ponzi firm. Since it has placed itself in such an initially precarious position, any further deterioration in its financial position may mean bankruptcy.

Minsky produces a macroeconomic effect from this microfoundation by placing his firms in a business cycle economy. It is in this business cycle framework that the dynamic of the financial fragility hypothesis becomes apparent.

Beginning in the early expansion phase of a business cycle the majority of firms should be hedge firms. Since this phase is renowned as the most profitable phase of the cycle, the primary source of investment finance will be internal. However, as the expansion extends, internal funds dwindle, competition intensifies for market share, expectations as to the continuation of the expansion rise as does debt usage. The continuing expansion is fueled by the debt-financed investment expenditures, while at the level of the firm, these debt obligations build up on the balance sheet causing a change in the firm's financial position. The expectations of the continuation of the expansion are the foundation for the continued investment expenditures along with the assumption that debt used to finance such expenditures will be validated. The result of this rose-colored psychology is the movement from hedge to speculative and in some cases Ponzi positions of finance.

This increased use of debt produces more than just a quantitative change; there is also a qualitative decline. Given a positively sloped yield curve which is typical in a business expansion, short term interest rates are lower than long term rates. In the interest of cost minimization some firms will use short term liabilities as a temporary finance for their long term assets. While reducing cost in the short run, this behavior raises balance sheet risk even when it is undertaken as purely stop-gap finance. Such mismatching of the terms to maturity increases borrower's risk and is integral in the move towards financial fragility.

The combination of this qualitative balance sheet deterioration with the quantitative deterioration induced by the increase in debt usage, indicates the manner in which a more financially fragile position is taken by the firm. Given the macroeconomic pressures of the business cycle expansion and the microeconomic

motivations of the firms, this competitive investment behavior leads not just firms, but sectors and possibly the whole economy, towards a financially fragile position. This fragility is seen as firms' debt structures move from hedge to speculative, from speculative to Ponzi, or from Ponzi to bankruptcy in some cases. Bankruptcy or Ponzi finance is not the necessary end of a financially fragile firm. All that the hypothesis requires is an increasingly heavy debt load compared to income or assets. This behavior replicated throughout the economy puts it into a more precarious financial position. Such a position might induce a liquidity crisis or a Great Depression. The determinants of the macroeconomic outcome are the extent of speculative and Ponzi financing positions throughout the economy along with the policy responses of the monetary and fiscal authorities.

Minsky's financial fragility hypothesis builds on a microeconomic foundation to produce macroeconomic effects. While most of the empirical evidence on this hypothesis draws on the U.S. post-World War II macroeconomy, some sectoral analyses have also been undertaken.¹ Investigating the financial behavior of a sector rather than the macroeconomy allows for a more detailed view of the micro units. As long as the microcosm, the sector, exhibits the required expansionary behavior, then the framework necessary to the financial fragility hypothesis is in place.

The U.S. in the 1920s

The popular view of the 1920s in the U.S. as a roaring and prosperous period is not without merit. The technological inventions and innovations introduced in this period led to increases in productivity as well as new or improved consumer goods.² As charted by the National Bureau for Economic Research (NBER), the aggregate level economic activity between 1922 and 1929

experienced only two minor downturns, 1924 and 1927.³ The average annual growth rate for the decade was 4%. Given the severity of the 1920-21 recession, economic growth in the remainder of the decade had to be strong for a 4% growth rate to be attained. As John Kenneth Galbraith [1962:8] has put it,

...The twenties in America were a very good time. Production and employment were high and rising. Wages were not going up much, but prices were stable. Although many people were still very poor, more people were comfortably well-off, well-to-do, or rich than ever before. Finally, American capitalism was undoubtedly in a lively phase. Between 1925 and 1929, the number of manufacturing establishments increased from 183,900 to 206,700; the value of their output rose from \$60.8 billions to \$68.0 billions. The Federal Reserve index of industrial production which had averaged only 67 in 1921 (1923-25=100) had risen to 110 by July 1928, and it reached 126 in June 1929.

This flourishing economy provided the primary rationale for the stock market's boom. Other factors aiding in its rise included "...a maldistribution of income, high rates of profit, a plentiful supply of credit and, above all, investor confidence...." [Fearon, 1987:117] The tremendous growth in the overall economy coupled with these other factors produced an even more phenomenal growth in the stock market. The economy rose out of its 1920-21 recession to almost double its output value by 1929 whereas, the stock market almost quadrupled its value by 1929. Starting with an index value of 56 in 1921 (1935-9=100), the value of the market increased to 153 in 1928 and 201 in 1929 [Fearon, 1987:117]. This investor confidence abedded by the duration of the market's expansion and an abundant supply of credit altered the perception of stock market investment from that of a speculative act of gambling to that of a risk-free assured investment [Soule, 1947:293-296].

The creation of such a state of confidence is the element most critical to Minsky's hypothesis since it is responsible for promoting financial

fragility [Minsky 1982a]. This enhanced confidence affects the investment decision-making process. It reduces the perception of lender's and borrower's risk associated with debt finance so that both the lender and borrower are increasingly willing to undertake bold investment projects. These projects with their "unseen" risk have a greater chance of not generating the income than was expected leaving the firm in a financially vulnerable position.

Given the 1920s state of confidence the question becomes one of whether speculative and Ponzi financing were dominant in the 1920s.

Raymond Goldsmith [1956] in his exhaustive study on savings in America provides a useful overview of debt usage during the 1920s. Using historical cost data for asset valuation and book value for debt, the debt-to-asset ratios for the non-financial private sector were generated for his benchmark years. This ratio was 0.30 in 1922 and 0.31 in 1929. An alternative measure of Goldsmith's figures, assets at replacement cost and debt at market value, is presented in Taggart [1986:24]. He shows that in 1922 the debt-to-asset ratio was 0.28, and in 1929 it was 0.28. Irrespective of measure, the 1920s do not appear to have been financially fragile.

Given that both of these measures fail to pick up a major increase in the use of debt, it does not appear that there was a significant change in debt usage in the "roaring Twenties". However, these data only allow a spot check at the benchmark years and they only capture macroeconomic phenomena. A more detailed, continuous microeconomic examination may uncover another story.

Methodology

The consumer durables sector was chosen as the focus for this study for several reasons. First, the consumer durables sector was a growth sector during the 1920's. Many economic historians have gone so far as to call this

the period of the consumer durables "revolution".⁴ The electrification of the home was in full swing; the automobile market was reaching a point of saturation; and the development of credit institutions and instruments necessary to promote consumer durables purchases was under way [Fearon, 1987:Chaps 3 and 9, et passim.]. Not only did the sector have a strong growth pattern, there was also a variety of technologically innovative industries in it. While these major inventions were being disseminated as products and processes, the sector also encompassed industries such as furniture which were in a mature phase of growth. These qualities of growth, innovation and maturity made this sector a good choice for this study.

The methodological approach employed to investigate the Minskian hypothesis in the 1920s is a financial analysis utilizing the following tools: sources and uses of funds, financial ratio analysis and Moody's Manual of Industrials bond credit ratings.⁵ The analysis is organized by firm size so that the similarities and differences arising from size can be observed. The sources and uses analysis employed, while a variation on the traditional method, reveals the firm's expenditures on growth and production as well as its method of finance. The financial ratio analysis puts the growth and investment-financing decisions into a larger perspective with respect to the firm's income and equity position.⁶ Moody's credit ratings indicate the risk perceptions of a professional market watchdog. These act as a proxy for the market's view of risk with respect to the firm's debt exposure.

The data set consisting of firms' balance sheets was drawn from Moody's. The balance sheet variables used include plant and equipment expenditures, current assets, current liabilities, long term debt and earned surplus. The financial ratios utilized include total debt-to-net worth (TD/NW), long term

debt-to-net worth (LT/NW), short term debt-to-net worth (ST/NW), the current ratio (CURR), the quick ratio (QUICK), and short term-to-long term debt ratio (ST/LT).

Whereas, the primary evidence for financial fragility lies with the values of the balance sheet variables and the changes in the ratio values over time, an additional indicator of fragility is provided by the changes in the credit ratings given to the firms on their outstanding bonds by Moody's. A summary of the upgradings and downgradings on these bonds completes the financial analysis.

The balance sheet variables, financial ratios and the credit ratings changes are organized into financial analyses on average "firms". These "firms" represent the entire sector as well as being disaggregated into small, medium and large firms. This averaging process allows a behavior pattern typical of each size firm to emerge without a major loss of information. A more detailed description of the derivation of the variables, ratios and "firms" is provided in the Appendix.

Consumer Durables in the 1920s

Sectoral Behavior

The summary variables and ratios for the average sectoral "firm" are provided in Table 1. The trend of these numbers indicates a strong expansion throughout the sector that was primarily financed with internal funds. Plant and equipment increased by more than 100% from 1920 to 1929, while earned surplus grew by over 200%. Current assets and liabilities peaked in 1928. While current assets do not quite double, they do grow in response to the increased demand for variable capital due to the plant and equipment expansion. Current liabilities, since their nature is short term, would not

necessarily be expected to grow at the same rate as current assets or plant and equipment. Rather, their maturities could have been shortened or part of the variable capital could have been financed out of profits. However, its trend and cyclical behaviors match that of current assets rather closely. One of the most striking behaviors is that of long term debt which fell by 90% from 1920 to 1929.

The financial ratios offer another view of this "firm", but they provide essentially the same perspective of conservative financial behavior. All of the debt-to-net worth ratios declined between 1920 and 1929. Starting the decade at 0.47, the TD/NW declined to 0.20 by 1929.⁷ The liquidity measures, the current and quick ratios, also provided evidence for the sustained liquid position of the "firm". The only time the quick ratio indicated an illiquid position was in 1920 when the highly liquid assets were worth only 63% of its short term liabilities. Yet, the value of current ratio in 1920 signifies that the "firm" could have used its current assets to pay off its short term debt.

Finally, the short term-to-long term debt ratio upon initial viewing appears to indicate a major movement away from long term debt at the beginning of the decade into short term debt after 1925. Such a move would signal a move towards fragility if this debt were funding long term assets. A look at the balance sheet variables makes it obvious that it is not. Internal finance was being substituted for long term debt. All the indicators point to the fact that this "firm" was in a stronger financial position in 1929 than in 1920.

A cyclical analysis of this period produces a little different outcome. An NBER charting of the cycles in the 1920s produces 3 full trough-to-trough

cycles, 1919-1921, 1921-1924, 1924-1927, and the 1927-1929 expansion [Burns and Mitchell, 1946:105]. After the 1921 trough was reached the consumer durables's expansion was marred only slightly by the 1924 and 1927 downturns. Plant and equipment expenditures rate of expansion slowed in 1924 and 1925, rebounded in 1926 and then settled into a relatively constant rate of growth through 1929. The growth rate of earned surplus experienced greater swings in amplitude, but, again, it always remained positive. Its growth slowed in 1924, picked up in 1925 and thereafter on an annual basis continued this oscillatory behavior. However, even with these cycles the "firm" was able to internally finance its expansion. Current assets and liabilities were more sensitive to these cycles. Their values declined in 1924, rebounded in 1925, continued their growth through 1927 and peaked in 1928. The coincident cycles of these two variables evidence a matching of their terms to maturities.

The cyclical changes in the financial ratios' values fail to provide any additional information. Their cyclical activity was dominated by the secular behavior, so no new evidence of financial fragility was provided.

All of the evidence whether viewed from the cyclical or secular perspective indicates that the sectoral "firm" remained in a solid financial position throughout the decade and had by its end reached an even more resilient position. It appears that internal funds were the primary source of investment finance and that short term debt financed operating capital purchases, not plant and equipment.

Small, Medium and Large "Firms"

The disaggregation of the average consumer durables "firm" into its small, medium and large components reveals only minor differences from the sectoral "firm". Tables 2, 3 and 4 detail the financial behavior of these

TABLE 1
SECTORAL FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	80,373	165,594	56,565	10,976	89,095	0.47	0.41	0.05	1.03	50.56	3.51
1920	125,239	172,321	80,834	7,639	90,702	0.54	0.49	0.05	0.63	0.93	2.79
1921	123,836	110,137	59,489	8,466	72,534	0.46	0.40	0.06	1.21	0.40	3.82
1922	127,759	141,390	44,347	6,829	96,813	0.35	0.29	0.06	1.18	0.66	4.76
1923	145,096	197,613	57,047	6,542	153,213	0.26	0.21	0.05	0.95	0.62	4.59
1924	159,606	168,323	42,363	5,778	160,799	0.21	0.17	0.04	1.50	0.84	5.66
1925	166,065	254,898	66,952	3,467	193,095	0.24	0.21	0.03	1.47	2.25	5.13
1926	219,669	276,340	70,898	3,453	202,296	0.23	0.20	0.03	1.41	2.11	5.79
1927	239,344	290,139	75,739	2,781	227,592	0.22	0.19	0.03	1.61	3.15	5.59
1928	261,376	295,165	88,881	2,758	248,232	0.23	0.21	0.02	1.43	5.49	4.52
1929	281,101	278,237	71,261	673	305,370	0.20	0.18	0.02	1.01	6.15	4.78
1930	280,538	238,917	48,911	922	303,831	0.15	0.12	0.02	1.89	3.48	7.02

1. Components may not sum to total due to rounding errors.

TABLE 2
LARGE FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	61,936	146,676	54,049	10,396	73,735	0.45	0.36	0.08	0.79	310.01	2.92
1920	90,406	148,620	65,512	9,784	70,316	0.44	0.37	0.07	0.47	1.56	2.54
1921	89,655	130,277	48,458	13,052	59,674	0.38	0.28	0.10	1.02	0.51	3.97
1922	89,490	121,179	32,144	13,277	75,460	0.26	0.14	0.12	1.07	0.44	6.38
1923	100,507	165,183	40,806	12,069	119,083	0.26	0.15	0.11	1.20	0.52	6.94
1924	110,856	178,988	32,790	10,961	127,657	0.20	0.11	0.09	1.82	0.64	7.79
1925	116,876	209,287	46,587	8,015	152,042	0.21	0.15	0.06	1.73	3.06	6.02
1926	146,149	221,128	46,878	7,981	162,460	0.21	0.15	0.07	1.57	2.71	5.72
1927	157,869	220,722	48,864	6,528	175,067	0.19	0.14	0.05	1.83	3.81	5.61
1928	170,120	226,990	59,751	6,348	185,933	0.21	0.16	0.05	1.70	6.37	4.72
1929	179,200	217,557	50,213	2,418	225,081	0.18	0.12	0.06	1.38	6.34	6.31
1930	177,581	214,765	33,736	2,238	225,664	0.15	0.09	0.06	1.96	3.61	6.80

1. Components may not sum to total due to rounding errors.

firms. The most outstanding difference is seen in the divergence between the small "firm's" financial behavior and that of the large and medium "firms". While none of the "firms" in any size category moved into a financially fragile position, the small "firm" did leave the decade more highly leveraged than when it entered.

As seen in Table 2, the financial behavior of the large "firm" deviated little from the sectoral "firm". Since the large firms in the sector accounted for the major portion of sectoral activity, it was to be expected that these "firms'" behaviors would be coincident. The financial position of the large firm, like the sectoral, became more solid as the decade progressed.

Moody's credit ratings on these large firms' bonds also reflect this stability. Disaggregating the decade into two periods, 1922-1926 and 1927-1929, so that the expansions are highlighted, produces a temporal framework in which the credit ratings can be used to gauge fragility. During the decade the six large firms had eight outstanding bond issues, and they made one new issue. The outstanding issues maintained their initial ratings, and the new issue of 1929 was the only downgrading. While all of the outstanding bonds were at least investment grade, Baa, the majority were Aaa. The only bond rating below Baa was the new issue which had a Ba rating.

The medium "firm" stands in contrast to the large "firm": it entered the period in a highly leveraged position, its expansion program was inconsistent and it left the decade with relatively high debt ratios. Its pattern of debt decline, however, was consistent with that of the large firm. As seen in Table 3, the growth of this "firm" was not breath-taking; it was sporadic. In each expansion current assets were the first to grow, and then plant and equipment followed. Financing was carried out through a combination of earned

TABLE 3
MEDIUM FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	7,335	18,303	7,934	844	6,956	1.18	0.99	0.05	1.46	4.20	6.87
1920	9,075	18,069	11,396	1,476	5,394	1.17	1.11	0.06	0.69	2.47	5.07
1921	9,661	15,430	10,942	1,592	4,951	1.18	1.10	0.08	1.38	1.66	6.65
1922	9,480	14,487	10,776	1,499	3,474	1.05	0.98	0.07	0.82	2.48	5.53
1923	10,543	21,067	9,918	836	4,906	0.55	0.51	0.04	1.69	3.68	4.80
1924	10,004	21,010	9,270	651	4,256	0.48	0.45	0.03	1.01	3.79	4.46
1925	10,034	20,981	8,710	582	4,622	0.44	0.41	0.03	1.89	3.40	5.88
1926	10,277	21,223	8,314	829	4,601	0.49	0.37	0.12	2.11	4.34	8.89
1927	9,597	22,299	9,242	747	4,962	0.54	0.40	0.15	1.81	3.90	9.14
1928	9,585	25,569	9,851	289	7,479	0.40	0.36	0.03	1.52	2.28	5.49
1929	15,352	33,722	15,102	2,154	9,006	0.50	0.44	0.06	1.48	3.46	5.10
1930	19,418	25,799	10,530	4,666	7,716	0.41	0.26	0.15	1.70	5.10	8.29

1. Components may not sum to total due to rounding errors.

TABLE 4
SMALL FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	1,501	3,793	918	174	1,502	0.32	0.29	0.03	0.82	1.59	6.09
1920	1,939	4,459	1,258	418	1,689	0.41	0.34	0.07	0.78	1.09	5.04
1921	2,169	3,691	791	444	1,558	0.39	0.28	0.09	1.01	0.53	6.83
1922	2,159	4,044	843	340	1,797	0.34	0.21	0.11	1.38	1.86	6.85
1923	2,131	4,484	910	328	1,683	0.32	0.21	0.10	1.35	1.70	7.41
1924	2,321	4,507	766	332	1,824	0.26	0.16	0.09	2.19	1.17	10.30
1925	2,323	4,786	899	390	1,658	0.29	0.18	0.11	1.66	0.95	8.86
1926	2,314	5,060	845	387	1,896	0.30	0.19	0.12	1.23	0.64	7.58
1927	2,357	4,971	886	365	1,934	0.30	0.19	0.11	1.60	1.72	7.17
1928	2,353	5,331	992	343	1,956	0.31	0.20	0.10	1.76	3.26	6.93
1929	2,672	5,512	1,133	541	2,257	0.34	0.23	0.12	1.09	1.07	6.44
1930	2,615	4,723	813	452	1,570	0.31	0.20	0.11	2.52	1.40	11.54

1. Components may not sum to total due to rounding errors.

surplus, short and long term debt. The maturities of assets and liabilities were matched, so it was using a very conservative financing technique.

The medium "firm" appeared to be over-leveraged at the beginning of the decade, yet by its end it had attained a stable financial position. This movement towards a more resilient financial position is seen in the secular reduction of the debt ratios. The ST/NW ratio decreased which caused the TD/NW ratio to also decline. While the ST/NW fell by more than half by the end of the decade, its 1929 value, 0.50, was higher than the peak values attained by the other "firms". The liquidity ratios also followed this pattern. Their values may have been higher in the middle of the decade than at its end, but after 1922 their values indicated that the "firm" maintained a liquid position.

Just as the medium "firm's" debt reduction pattern mirrored the large "firm's", its bond credit ratings's also reflected the same pattern. There were three bond issues outstanding during the 1920s. Two had ratings that remained constant throughout the decade, and one issue had a rating reduction in the 1927-29 period. All of these bonds maintained ratings at investment grade, Baa, or above. The maintenance of the ratings was an indicator from the market that even with its higher debt ratios, the medium "firm" was not speculatively financed.

Finally, as seen in Table 4 the small "firm" experienced an even smaller and more cyclical growth pattern than the medium "firm's". Growth in plant and equipment was counter-cyclical. Since earned surplus was usually pro-cyclical, this forced the "firm" into a stronger debt dependency. The small "firm" used both short and long term finance to finance its growth, where long term debt included mortgages and bonds. Given that the small firm category

includes firms with assets up to \$5 million, it was not unusual for the larger small firms to have enough market recognition to float bonds. This reliance on debt shows itself in the secular and cyclical changes in the debt-to-net worth ratios in the decade.

The small "firm" came into the 1920s with a lower TD/NW ratio than the one it had when it left. The rise in TD/NW from a 0.32 in 1919 to 0.34 in 1929 is minimal, yet it stands in opposition to the behavior of the other "firms". Even waiting until 1922 to start the comparison produces a secular picture in which there is no change in the leverage ratio. Over the decade the ST/NW ratio experienced a secular decline, but it was overshadowed by the secular rise in the LT/NW ratio which was the cause of the TD/NW rise. The changes in the ST/LT ratio are evidence of the changing importance of these two debt maturities. Even though the small "firm" increased its debt burden over the decade, the use of long term debt as finance meant that maturities were matched so that additional risk to the "firm" was kept to a minimum. The cyclical analysis shows TD/NW increasing in expansions after 1921 which is a behavior that coincides with the financial fragility hypothesis.

The values of the liquidity ratios indicate that the small "firm" increased its state of liquidity as the decade progressed. These ratios experienced cyclical changes, but the values were always higher than they had been upon entering the decade. The profile of the small "firm" that emerges from this analysis of the financial ratios is that of a "firm" that must rely upon debt finance for its expansion, however, it uses very conservative financing techniques.

There were ten small firms out of the total of 45 that had outstanding bond issues. Altogether there were eleven outstanding issues, nine of which

had no change in their ratings. The two issues that had ratings changes experienced three downgrades in the 1922-1926 period and three in the 1927-29 period. Compared to the medium and large "firms" records, the small "firm" appeared to be a greater credit risk. A greater portion of the grades their bonds were given reflected speculative financing.⁸ Some of these issues initially had Aa ratings, but Baa was the most common initial grade. Both of these ratings are lower starting grades than the other "firms" had. In the downgrading process the other "firms" remained at or above investment grade, but the small firms had 5, almost one-half of their outstanding issues, rated as less than an investment grade bond by the end of the decade. No issue was rated less than a B, but today, a bond with this rating would be termed a "junk" bond.⁹

Conclusion

The financial behavior of the consumer durables sector at both levels of aggregation, sector and "firm", assumed a different profile than that hypothesized by Minsky. The sector appeared to have reduced its financial vulnerability as the twenties ensued, so that it entered the Great Depression in a stronger position than it entered the 1920s. While the large "firm" reflected the same behavior as the sector, the medium and small "firms" each deviated from that pattern in some manner. The medium "firm", like the sector, experienced an enhanced financial position by the end of the decade, but even then it had debt ratios that were higher than the peak values of the other "firms". The small "firm" experienced at best a secular constancy in its debt ratios over the decade. This behavior was due to the cyclical financial activity of the "firm". The small "firm" was the only one to exhibit financial behavior partially confirming the fragility hypothesis.¹⁰

The results of this investigation provide little support for Minsky's hypothesis. Firm size appears to be a major determinant of financial behavior. It is apparent that size and profitability, whether in a secular or cyclical framework, have a positive relationship, and that the large and medium "firms" were more able to rely upon internal finance for their expansions. In contrast to these "firms", the small "firm" relied more consistently on external debt funds. Given these results it would appear that the Minskian financial scenario is a specific case and that the more general case might be found in theories of the firm/investment that emphasize the generation of internal funds for finance.

Appendix

The study draws its financial information from Moody's Manual of Industrials for the years 1919 through 1930. Since balance sheet information was the most consistently reported of the financial statements, it forms the backbone of the analysis. Firms in the consumer durables sector that had 1) commenced operation by 1922, 2) remained in business for at least 5 years and 3) reported their positions in December on an annual basis were used in the study. Thus, 59 firms were included for analysis. These firms represent the automobile, household furnishings, household appliances and musical instruments industries. Their sizes range from \$0.5 million to \$920 million in assets. The small firm with up to \$20 million in assets is represented by 45 firms.¹¹ The medium firm with assets totaling over \$20 million and under \$40 million is represented by eight firms. The large firm of which there are six, has assets totaling over \$40 million. By the end of 1934, fourteen of these firms had declared bankruptcy. Of these, one was large, one was medium, and twelve were small.

To provide interfirm comparability a standardized balance sheet was compiled for each firm for each year of operation. While undertaking this transformation, it was discovered that several firms altered their fiscal year closing dates. In order to maintain comparability each balance sheet had to reflect the same incremental time period.

In these cases the actual balance sheet time periods were transformed into 12 month periods by a linear transformation. For instance, a firm that reported in December 1920 and then again in March 1921 would have to be transformed. This was implemented by taking the balance sheet changes between the two time periods and scaling them up by a factor of 4. This extrapolation was added on to the December 1920 balance sheet to produce a December 1921 report. The succeeding years, if the firm failed to return to a December end of the fiscal year, were treated similarly. This produced a uniform time period, but altered the actual values of balance sheet items. These extrapolated values retained the trend of the balance sheet items movements, so they continued to serve as an indicator of trend.

The sources of funds include 1) all the long term debt issued by the company, 2) short term debt which is composed of accounts payable, notes payable, federal tax reserve, accruals and other current liabilities and 3) earned surplus. Since Minsky's hypothesis focuses on debt finance, share issue was not recorded.

The uses of funds include investment expenditures on plant and equipment and on working capital. Working capital is the variable inputs used in production, current assets. They are defined as the balance sheet entries inventory, cash, accounts receivable, securities, insurance (since market value was not available, book value was used) and other current assets.

The financial ratio analysis was initiated at the level of the firm. These firm ratios were then transformed into the two levels of aggregation: sectoral and average sized "firm". In the construction of the financial profile for each sized firm, the annual value of each variable or ratio is a simple mean produced from the data on the firms in that size category. These annual averages were organized into the financial statement on each "firm". For the sectoral firm a weighted average by total assets was used. This weighting scheme produced a sectoral "firm" that reflected the relative impact of each firm in the sector.

ENDNOTES

1. In a study on the rise in farm debt service payments Paul Estenson [1986] finds support for the Minsky hypothesis. Martin Wolfson [1986] investigates this hypothesis in the financial sector. His findings indicate that in some cases there is a build up in debt that is associated with an expanding economy. However, Wolfson finds that it is the downturn in profits, not increases in interest rates that produce the strain and difficulty for the economy.

2. Schumpeter whose long waves depend upon technological innovations published a highly detailed account of the introduction and spread of these innovations in the 1920s in his two volume piece, Business Cycles. In his theory these industrial innovations are responsible for the rapid growth not only of the industry and sector, but of the macroeconomy as well.

3. The determination of the peaks and troughs of the cycles in the 1920s is not without controversy. In contrast to the NBER charting other researchers, such as L.P. Ayres and J.B. Hubbard, found the 1927 recession so weak as to be imperceptible, and so have charted an uninterrupted period of growth from 1924 to 1929 [Burns and Mitchell, 1946:197-111].

4. Olney [1985], Oshima [1961], and Juster and Lipsey [1967] argue that there was a revolution in consumer durables expenditures in the 1920's. Vatter and Thompson [1966] take the stand that there was only a revolution in expenditures on automobiles in the 1920's. The former argue that while not all of the industries in consumer durables experienced an expansion like that in autos, collectively they experienced an expansion in demand that was qualitatively different from their previous growth patterns.

5. The development of new techniques for testing financial distress in firms has progressed markedly since the 1960s. The initial works of Beaver [1966] and Altman [1968] have been extended to enable the forecasting of financial distress. However, these models still forecast best for bankruptcy, whereas Minsky's hypothesis does not require such a dire outcome. Merely a sustained rise in debt ratios or a sustained decline in the interest coverage ratio is sufficient to indicate financial fragility. Given the need for a technique sensitive to small changes, the outlined methodology was deemed the most appropriate.

6. The measure of value for the variables that form these ratios is historical cost for capital and book value for assets and debts. While the primary rationale for their use is data availability, they were also considered to provide a true reflection of the firm's value. The use of historical cost in inflationary periods is criticized for the distorted picture of expansion that it presents. The 1920s were not an inflationary period; they were a stable period. The wholesale price index [U.S. Dept. of Commerce, 1975:199] indicates that for all of the years in the decade the values fall between a high of 53.3 and a low of 49.1. 1920 is the exception with a value of 79.6.

The measure of debt and asset value used in this study, book value, is not subject to inflationary or speculative pressures. It is an historical cost

valuation of the firm determined when the share was issued. Changes in book value reflect increases or decreases in outstanding shares valued at par.

Another often used measure for assets and debt is their market value. In non-speculative periods, market value of shares and bonds is assumed to be a reflection of the firm's long term profitability. In speculative periods, market value exceeds actual value, producing an over-valued picture of the firm which tends to artificially depress leverage values. Given the stock market's frantic activity, especially in the late 1920s, such a measure would be inappropriate.

7. The sector's initial debt position is more precarious than the ratios portray, for the 1920-21 recession induced a price deflation that put these firms into an even worse position in real terms. Incorporating this initial price deflation with the price stability of the rest of the decade, underscores the stronger real financial position of the "firm" by 1929.

8. In the Moody's credit ratings a bond with a rating under Baa is considered to have speculative elements. The important characteristics of a bond to a potential investor would be assurity of coupon payments and in the longer run repayment of principal. Speculative elements would correspond to possible payment defaults in the case of future adverse periods.

9. Moody's [1987:vi] describes a B rating as "...generally lack[ing] characteristics of the desirable investment. Assurance of interest and principal payments or of maintenance of other terms of the contract over any long period of time may be small."

10. The different problems that small firms face in terms of financing their expansions are well documented (Jacoby and Saulnier, 1936; Merwin, 1939; Fazzari, Hubbard and Petersen, 1988). The continuation of the Reconstruction Finance Corporation as the Small Business Administration is a clear indication of this specific problem that small firms encounter.

11. These size categories are based on the categorization scheme used by Berle and Means [1932]. Since their categories were made with a 1929 base year and this study has a base year of 1919, a discount factor of 2.5 was employed. This figure was based on a very conservative compounded annual growth rate of 2%.

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TABLE 1
SECTORAL FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	80,373	165,594	56,565	10,976	89,095	0.47	0.41	0.05	1.03	50.56	3.51
1920	125,239	172,321	80,834	7,639	90,702	0.54	0.49	0.05	0.63	0.93	2.79
1921	123,836	110,137	59,489	8,466	72,534	0.46	0.40	0.06	1.21	0.40	3.82
1922	127,759	141,390	44,347	6,829	96,813	0.35	0.29	0.06	1.18	0.66	4.76
1923	145,096	197,613	57,047	6,542	153,213	0.26	0.21	0.05	0.95	0.62	4.59
1924	159,606	168,323	42,363	5,778	160,799	0.21	0.17	0.04	1.50	0.84	5.66
1925	166,065	254,898	66,952	3,467	193,095	0.24	0.21	0.03	1.47	2.25	5.13
1926	219,669	276,340	70,898	3,453	202,296	0.23	0.20	0.03	1.41	2.11	5.79
1927	239,344	290,139	75,739	2,781	227,592	0.22	0.19	0.03	1.61	3.15	5.59
1928	261,376	295,165	88,881	2,758	248,232	0.23	0.21	0.02	1.43	5.49	4.52
1929	281,101	278,237	71,261	673	305,370	0.20	0.18	0.02	1.01	6.15	4.78
1930	280,538	238,917	48,911	922	303,831	0.15	0.12	0.02	1.89	3.48	7.02

1. Components may not sum to total due to rounding errors.

TABLE 2
LARGE FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	61,936	146,676	54,049	10,396	73,735	0.45	0.36	0.08	0.79	310.01	2.92
1920	90,406	148,620	65,512	9,784	70,316	0.44	0.37	0.07	0.47	1.56	2.54
1921	89,655	130,277	48,458	13,052	59,674	0.38	0.28	0.10	1.02	0.51	3.97
1922	89,490	121,179	32,144	13,277	75,460	0.26	0.14	0.12	1.07	0.44	6.38
1923	100,507	165,183	40,806	12,069	119,083	0.26	0.15	0.11	1.20	0.52	6.94
1924	110,856	178,988	32,790	10,961	127,657	0.20	0.11	0.09	1.82	0.64	7.79
1925	116,876	209,287	46,587	8,015	152,042	0.21	0.15	0.06	1.73	3.06	6.02
1926	146,149	221,128	46,878	7,981	162,460	0.21	0.15	0.07	1.57	2.71	5.72
1927	157,869	220,722	48,864	6,528	175,067	0.19	0.14	0.05	1.83	3.81	5.61
1928	170,120	226,990	59,751	6,348	185,933	0.21	0.16	0.05	1.70	6.37	4.72
1929	179,200	217,557	50,213	2,418	225,081	0.18	0.12	0.06	1.38	6.34	6.31
1930	177,581	214,765	33,736	2,238	225,664	0.15	0.09	0.06	1.96	3.61	6.80

1. Components may not sum to total due to rounding errors.

TABLE 3
MEDIUM FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	7,335	18,303	7,934	844	6,956	1.18	0.99	0.05	1.46	4.20	6.87
1920	9,075	18,069	11,396	1,476	5,394	1.17	1.11	0.06	0.69	2.47	5.07
1921	9,661	15,430	10,942	1,592	4,951	1.18	1.10	0.08	1.38	1.66	6.65
1922	9,480	14,487	10,776	1,499	3,474	1.05	0.98	0.07	0.82	2.48	5.53
1923	10,543	21,067	9,918	836	4,906	0.55	0.51	0.04	1.69	3.68	4.80
1924	10,004	21,010	9,270	651	4,256	0.48	0.45	0.03	1.01	3.79	4.46
1925	10,034	20,981	8,710	582	4,622	0.44	0.41	0.03	1.89	3.40	5.88
1926	10,277	21,223	8,314	829	4,601	0.49	0.37	0.12	2.11	4.34	8.89
1927	9,597	22,299	9,242	747	4,962	0.54	0.40	0.15	1.81	3.90	9.14
1928	9,585	25,569	9,851	289	7,479	0.40	0.36	0.03	1.52	2.28	5.49
1929	15,352	33,722	15,102	2,154	9,006	0.50	0.44	0.06	1.48	3.46	5.10
1930	19,418	25,799	10,530	4,666	7,716	0.41	0.26	0.15	1.70	5.10	8.29

1. Components may not sum to total due to rounding errors.

TABLE 4
SMALL FIRM

YEAR	PLANT & EQUIPMENT (000)	CURRENT ASSETS (000)	CURRENT DEBT (000)	LONG-TERM DEBT (000)	EARNED SURPLUS (000)	TD/NW ¹	ST/NW	LT/NW	QUICK	ST/LT	CURRENT RATIO
1919	1,501	3,793	918	174	1,502	0.32	0.29	0.03	0.82	1.59	6.09
1920	1,939	4,459	1,258	418	1,689	0.41	0.34	0.07	0.78	1.09	5.04
1921	2,169	3,691	791	444	1,558	0.39	0.28	0.09	1.01	0.53	6.83
1922	2,159	4,044	843	340	1,797	0.34	0.21	0.11	1.38	1.86	6.85
1923	2,131	4,484	910	328	1,683	0.32	0.21	0.10	1.35	1.70	7.41
1924	2,321	4,507	766	332	1,824	0.26	0.16	0.09	2.19	1.17	10.30
1925	2,323	4,786	899	390	1,658	0.29	0.18	0.11	1.66	0.95	8.86
1926	2,314	5,060	845	387	1,896	0.30	0.19	0.12	1.23	0.64	7.58
1927	2,357	4,971	886	365	1,934	0.30	0.19	0.11	1.60	1.72	7.17
1928	2,353	5,331	992	343	1,956	0.31	0.20	0.10	1.76	3.26	6.93
1929	2,672	5,512	1,133	541	2,257	0.34	0.23	0.12	1.09	1.07	6.44
1930	2,615	4,723	813	452	1,570	0.31	0.20	0.11	2.52	1.40	11.54

1. Components may not sum to total due to rounding errors.