SOLVENCY AND LIQUIDITY OF FINANCIAL INSTITUTIONS AND MINSKY'S THEORY OF FINANCIAL INSTABILITY

H. Visser

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"Men of business have keen sensations but short memories"

1. Introduction

In macroeconomic theory not much attention is paid to financial markets, though modern market economies cannot function without a complicated financial structure, as has been documented by Goldsmith (1969). It is usually assumed that the information on financial conditions contained in money demand and supply functions, summarized in the LM-relationship in IS/LM-models, is all we need in this respect. It is admitted, of course, that there is a credit market, for otherwise there could be no price of credit, i.e. no interest rate. However, by virtue of Walras's Law any one equation from a general equilibrium system in which economic actors are subject to the budget restriction can be left out when solving the system and usually it is the credit market that gets out of sight. Such a procedure obscures one's view of the adjustment mechanism and implies that the credit market does not generate shocks.

It is true that there are models which explicitly provide for a market for credit. These models meet the first objection formulated above, but not the second one. First of all, Patinkin's meticulously expounded general equilibrium model with its Walrasian markets for both money and credit (bonds) comes to mind (Patinkin 1965, Part I, especially Ch. XII).
This model is used to describe the characteristics of the system in comparative static analysis and to derive the equilibrating mechanism, with the bond market exerting its influence on interest rates and consumer spending via portfolio composition and wealth effects. Patinkin is not interested in situations where the credit system collapses. Apart from changes brought about by monetary policy, the demand and supply functions for bonds are given and constant (see for an analysis in a similar vein for open economies Visser 1982). The only negative influence of credit market conditions on employment results from the minimum interest rate (Patinkin 1965 pp. 349 - '50). K. Brunner and A.H. Meltzer also explicitly consider credit markets (cf K. Brunner 1971; K. Brunner and A.H. Meltzer 1976), but their interest is in tracing the transmission process of monetary and fiscal impulses. The volume of credit plays no independent role. Recently, B.J. Friedman advocated paying more attention to the volume of credit as an alternative to the volume of money as a determinant of income (B.J. Friedman 1983). Unfortunately, this is a case of measurement without theory.

Insofar as credit markets are taken account of at all, they are supposed to function smoothly (cf. B. Hansen 1970 Ch. 7 for a general discussion of general equilibrium models with credit markets). The literature on developing countries takes a different view from the macroeconomic theory books. Especially since the studies by R.I. McKinnon (1973) and E.S. Shaw (1973), much has been made of badly functioning credit markets as an impediment to economic development. In developed market economies credit markets do function smoothly most of the time, but that does not warrant theoretical neglect. Occasionally a crisis occurs, in which confidence in certain groups of financial institutions suddenly falls to a very low level and creditors try to withdraw the funds they lent or deposited. Or if such crises do not occur, there is at least the danger that they may occur. Such crises are generally considered to be isolated occurrences, not endogenous to the system. Even if that were true,
they can be bad enough. A good case can be made for the proposition that the Great Depression of 1929-1933 was so serious because of the breakdown of the credit system, both in the United States and in Central Europe. The discussion on the causes and propagating forces of the Great Depression has mainly remained within the bounds of the Monetarist-Keynesian controversy, with the Monetarists seeing inept monetary policy as the culprit and more Keynesian-oriented economists stressing real disturbances. M. Friedman and A.J. Schwartz for instance point to the rapid decline in the stock of money as the main cause of the severity and the duration of the Great Depression (M. Friedman and A.J. Schwartz 1963 Ch. 7, especially p. 301).

On the Keynesian side, Temin stresses the fall in consumption, while acknowledging a minor role for financial variables, such as attempts to reduce indebtedness (P. Temin 1976, especially p. 171 - '2). Galbraith too focuses on real variables: insufficient investment, trouble transmitted from agriculture, a bad income distribution that made consumption highly sensitive to wealth reductions (a fall in stock market prices), a bad corporate structure and a bad banking structure that made bankruptcies cause domino effects, a dubious state of foreign balance and a poor state of economic intelligence (J.K. Galbraith 1961 pp. 193 ff.). With Keynes himself the cause of the cyclical downturn lay in a fall in the marginal efficiency of capital, followed by an increase in liquidity preference. Both factors make investment decline. At the same time, the propensity to consume falls, because of an inequal income distribution, which makes consumption sensitive to a fall in the value of securities (Keynes 1936 Ch. 22).

Keynesians, as we see, allow a role for financial variables, but it is not a centre-stage role. In contrast, in Irving Fisher's debt-deflation theory, a rapid shrinking of the volume of credit is what characterizes great depressions (I. Fisher 1933). Moreover, such a shrinkage need not be exogenous. Scant attention has been paid to this theory. That is the more remarkable as Fisher is the patron
saint of the monetarists, who, mistakenly, only refer to his formul-
lation of the quantity theory of money and his interest theory. It
must be admitted that a shrinking of the volume of credit entails a
shrinking of the volume of money, as the greater part of the money
supply is created by the banks granting credit. They are not synony-
mous, however, as not only commercial banks grant credit.

During the past couple of decades Fisher's debt-deflation theory has
been revived and elaborated by Hyman Minsky. The only other economist
who, to the best of my knowledge, has taken Fisher's debt-deflation
theory seriously recently is James Tobin. He does not analyse
credit markets explicitly, but traces the shifts of the IS- and
LM-curves that result from debt deflation (Tobin 1980 Ch. 1).
Our attention will be reserved for Hyman Minsky's approach, which
concentrates on the credit market. With tenacious single-mindedness
Minsky defends his proposition that capitalism has an innate tendency
to develop financial crises periodically, which in principle could
lead to debt deflation and depression. Minsky has been left crying
in the wilderness. The economics profession seems to have little
time for his ideas (see the comments by J.S. Flemming, R.W.
Goldsmith and J. Melitz in C.P. Kindleberger and J.P. Laffargue
(eds) 1982 on Minsky 1982b). On the other hand, C.P. Kindleberger,
as great an expert on financial crises as anybody, has some kind
I will first give a recapitulation of Fisher's theory, after that
expound Minsky's theory and then see if these are of any use in
understanding the present financial system and its problems.
2. Irving Fisher's Debt-Deflation Theory

In Fisher's view, there are two dominant factors in great booms and depressions, sc. over-indebtedness and after that deflation. Even if there is no clearcut criterion of over-indebtedness (Fisher 1933 p. 345), at some point of time it emerges in the sense that debtors or creditors or both become alarmed at the volume of debt and the burden of interest and repayment liabilities. This leads to the following chain of events (Fisher 1933 p. 342). Debt is liquidated. To that end distress selling occurs: inventories and other assets are sold at whatever prices can be fetched. Bank loans are paid off, which reduces the money supply. At the same time, the velocity of circulation of money is reduced. All this leads to a fall in the price level. The net worth of business firms falls, which leads to bankruptcies. Profits disappear, which causes a reduction in production and employment. Confidence is lost and spending is further reduced, as is the velocity of circulation. The nominal rate of interest falls, but the real rate rises.

It is the combination of over-indebtedness and deflation (in the sense of a fall in the price level) that is at the heart of the problem. With either over-indebtedness without deflation or deflation without over-indebtedness things would be much less serious. Over-indebtedness and deflation reinforce each other. Over-indebtedness leads to deflation. Deflation leads to an increase in the real value of debts. The efforts to liquidate debts are increased, leading to further deflation and so on. In great depressions, as in 1929 through 1933, the liquidation defeats itself, the very effort of people to lessen their burden of debt increases it.

In this view of Fisher's the money supply is important. Like Friedman and Schwartz more than thirty years later, he argued that there might have been a stock market crash, but not a deep depression if the Federal Reserve System had taken action to counteract the decline in the money supply and the fall in prices - as it might have done...
but for Governor Benjamin Strong's - of the Federal Reserve Bank of New York - untimely death in 1928 (L. Fisher 1933 p. 347, M. Friedman and A.J. Schwartz 1963 pp. 44 ff.). The policy advice may be the same, the analysis is not. In Fisher's view it is not only the diminution in the quantity of money that plays havoc with the system, but also the reduction in the velocity of circulation of money. This reduction cannot, as in standard monetarist analyses, be attributed to a fall in the rate of interest and in inflation expectations, in accordance with a stable money demand function, but results from a loss of confidence and from bankruptcies, i.e. from a loss of wealth and the fear of such losses, whilst the increase in the real value of debt during a deflation also exerts a negative influence on the velocity of circulation. This follows from asymmetries in the reactions of debtors and creditors to changes in the real value of debt. Debtors will reduce their spending when real debt increases, but creditors will hardly increase their spending, firstly because they do not feel sure that the higher real claims can be realized and secondly because they have a lower propensity to spend than debtors, which is why they have lent the money to them in the first place. Moreover, Fisher stresses the endogeneity of the money supply more than Friedman and Schwartz do, though it is true that with Friedman and Schwartz the money supply, given the volume of base money, also has endogenous elements. In their view the money multiplier got smaller because of an increase in the banks' liquidity ratio, for fear of being turned down at the Fed's discount window, and a rise in the public's currency/bank money ratio, as its confidence in the banks waned (M. Friedman and A.J. Schwartz 1963 pp. 332-350). For Friedman and Schwartz, the collapse of the credit system was not an important factor in itself: "If they (the bank failures) had occurred to precisely the same extent without producing a drastic decline in the stock of money, they would have been notable but not crucial. If they had not occurred, but a correspondingly sharp decline had been produced in the stock of money by some other means, the contraction would have been at least equally severe and probably even more so." (M. Friedman and A.J. Schwartz 1963 p. 352).
Up till now only Fisher's view on the depression has been given. However, before the depression there must be a boom, from which the over-indebtedness stems. The main cause, in Fisher's view, is that there appear to be highly profitable investment opportunities (Fisher 1933 p. 348).

So Fisher avoids the one-sidedness of both extreme Keynesians and extreme monetarists: autonomous expenditure plays a role (investment), credit is important and the money supply is for a great part endogenous; on the other hand, the money supply has a decisive influence on prices and a monetary policy aimed at preventing a fall in the price level would do much to reduce the seriousness of a depression. From Fisher's analysis it also follows that it may be important to prevent over-indebtedness in the first place.

3. Minsky's theory of financial instability

In an uninterrupted stream of publications, H.P. Minsky has propounded his theory that capitalism has an innate tendency to develop financial instability, defined as a process in which rapid and accelerating changes in the prices of assets (both financial and capital) take place relative to the prices of current output (H.P. Minsky 1982b p. 13; see for Minsky's theory also H.P. Minsky 1964; H.P. Minsky 1976 and the collection of articles, written over a quarter of a century, in H.P. Minsky 1982a).

Minsky's argument runs as follows. During economically good times, households, business firms and financial institutions show a tendency to become more lax as to their financial structure. As memories of the preceding bad times fade, economic units feel less inhibited to increase the ratios of debts to income and of debts to liquid assets. This makes the financial system more susceptible to disturbances.
Minsky distinguishes three kinds of economic units: hedge-finance units, speculative finance units and Ponzi-finance units, depending on the time structure of expected gross profits minus payment commitments. We denote anticipated gross profits or quasi-rents, that is after tax-revenues from sales or income from assets less running expenses, by $AQ_i$, with subscripts denoting periods. Expected payment commitments from the existing and expected future liability structure are denoted by $PC_i$. Hedge-finance units are characterized by the fact that expected gross profits exceed expected payment commitments due to debts in every relevant period, or

$$AQ_i > PC_i \text{ for all } i.$$  

The net worth of the economic unit is the present value of anticipated gross profits minus payment commitments. Combining the formulas given in Minsky 1972 (repr. in Minsky 1982a, p. 137) and Minsky 1982b (p. 21), net worth (NW) is

$$NW = \sum_{i=1}^{n} k_i \frac{AQ_i - PC_i}{(1 + r_i)^i}$$

$r_i$ is the risk-free market rate of interest for the relevant time-to-maturity class of assets and liabilities; $k$ is a correction factor reflecting uncertainty.

For hedge-finance units, all periods contribute positively to net worth. This implies that a change in interest rates cannot make net worth negative.

For a speculative-finance unit, $AQ_i < PC_i$ at first, and only for later periods $AQ_i > PC_i$. The deficit of expected gross profits over payment commitments is a result of a portion of the principal on debt falling due in the near term. The income portion of gross profits at all times exceeds the income or interest portion of payment commitments. In other words, debt-repayment exceeds the debt-repayment
funds that are generated by a unit's assets. The net worth of speculative-finance units is sensitive to interest rate movements.

A rise in interest rates will reduce the positive contribution to net worth of far-away periods more than it reduces the negative contribution of the near term. A rise in interest rates therefore reduces the net worth of speculative-finance units. Solvency, i.e. the degree to which debts can be paid off in case of liquidation of the firm, becomes endangered.

Another characteristic is that, whereas hedge-finance units are not heavily dependent on financial markets for their normal functioning, speculative-finance units frequently have to contract new debts and thus are to a high degree dependent on smoothly-functioning financial markets. Speculative-finance units include banks and other financial institutions, treasuries with floating debts, and ordinary business firms that roll over bank debt and commercial paper.

Finally, there is a special kind of speculative-finance unit, the Ponzi-finance unit. For Ponzi-finance units the income portion of payment commitments exceeds the income portion of cash receipts during a long period. As time goes by, Ponzi-finance units have to contract ever more debt, until in the end a concentrated large income stream comes in, which should permit the unit to pay off all debts.

Ponzi-finance is called after Mr. Charles Ponzi, a dubious Boston financier who attracted deposits by offering depositors a high rate of interest and had to attract ever more deposits in order to fulfil his interest obligations (H.P. Minsky 1977, reprinted in H.P. Minsky 1982a, p. 70). But not all Ponzi financing is necessarily of a dubious nature. Ponzi finance characterizes any scheme where interest is paid before revenues are generated and therefore is a normal feature of a large part of investment in process.
Ponzi-finance units are even more sensitive to interest-rate changes than normal speculative-finance units. A rise in the rate of interest makes the outstanding debt of the unit grow faster (unless it carries a fixed rate of interest) and so does not much to reduce the present value of future debt commitments, whilst the present value of the expected receipts in the far future, for instance from the sale of real estate, sharply falls, the more so as those receipts themselves may be inversely related to the rate of interest. All this makes the functioning of Ponzi-finance units even more dependent upon uninterrupted access to financial markets than normal speculative-finance units.

Let us now start from a situation where hedge-finance units dominate in the economy. According to Minsky, it appears profitable in such a situation to contract short-term debt, because such debt is relatively cheap. The lower cost of borrowed funds leads to an increase in the demand for capital assets. The price of capital assets rises and investment demand increases. Increased investment leads to increased profits (see below for Minsky's theory of investment; his profit theory is based upon very simple Kaleckian identities and will be neglected here). Higher profits give a further boost to speculative finance. In the process, the ratios of debts to income and debts to liquid assets rise. Consequently, more economic units become more dependent upon recurrent recourse to financial markets in order to finance their assets. The financial structure becomes fragile instead of robust. A financial system is called fragile when "modest changes in cash flows, capitalization rates, and payment commitments adversely affect the ability of private units to meet their financial commitments" (H.P. Minsky 1982b p. 24). A financial system is robust when this is not so.

With increased debt-income and debt-liquid assets ratios, a given percentage decline in income will make it more difficult for the unit to meet its payment commitments from its normal sources or its cash balance. Hedge-finance units turn into speculative units and specula-
rative units find it more difficult to refinance their positions. Besides, as the demand for credit increases and lending becomes more risky, the rate of interest rises. Higher interest rates increase the cost of production of investment goods with long gestation periods. At the same time, they lower their demand price. How this may lead to a Fisherine debt deflation is explained in the next section.

4. Investment in Minsky's approach

Minsky has clarified his ideas on the relationship between investment and financial conditions with the help of a diagram (H.P. Minsky 1976 p. 108).

The diagram depicts the relevant information for the investment decision of a representative firm. \( Q_1 \) is gross profits after taxes and after required payments on debts and dividends expected for the next period; it is the internal finance expected to be available. \( P_I \) is the supply price of the capital asset demanded by the firm, given money wages, prices of purchased inputs and the capital costs of investment goods as they are produced. The internal financing
constraint depicted as a function of the supply price of the capital asset is a rectangular hyperbola.

If the firm had to rely entirely on internal funds, it would buy $01$ investment goods. Barring the possibility of drawing down available cash or selling assets, more investment goods can only be bought if debts are contracted. For investment to take place, the price of investment goods, that is the supply price of capital assets, must be lower than the capitalized value of expected future earnings. This capitalized value is the demand price of the capital asset, that is the highest price it pays the investor to pay without expecting to incur losses. The demand price $P_d$ is found by discounting $AQ$'s or anticipated quasi-rents for future periods.

Given the mate of interest on loans of the relevant risk and term-to-maturity class, the discount rate depends upon the market valuation of owning rights to an uncertain, fluctuating stream of yields $Q$ against owning rights to a stream of fixed interest payments.

Let us assume, as in the diagram, that the supply price of capital $P_I$ is lower than the demand price for capital $P_d$. In the situation depicted in the diagram, $01$ will be invested during the next period out of internal funds. In a world where the firm is a price taker both in the product and factor markets and in the credit market and where problems of risk and uncertainty don't count, there would be no limit to the firm's demand for capital assets. However, in the real world markets are not perfect and firms are not price takers.

Minsky distinguishes between borrower's risk and lender's risk, focusing attention on the financial markets and leaving the implications of imperfect competition on product markets out of consideration. Borrower's risk increases the discount factor applied to expected future earnings in calculating constant value or demand price.
Borrower's risk has two aspects. First, increased investment in one line of production means less diversification and therefore a higher risk relative to the wealth of the firm or asset owner. Second, with more debt-financed investment and therefore a decrease in the capital-asset ratio, less risks can be taken in order not to endanger the firm's solvency and expected future net yields are discounted at a higher rate.

As a result of borrower's risk the demand price for capital falls at some volume of investment (note that if the firm is a price maker, this fall would be steeper, as investment leads to increased production, which could only be sold at lower prices). Lender's risk follows from the increased uncertainty and riskiness of claims to the firm as debt-financed investment increases. This leads to lenders asking higher interest rates, shorter terms to maturity, etcetera.

Expected payment commitments (PC) increase. So the cost of a new capital asset to the investing firm is its supply price plus the capitalized value of whatever the firm has to pay lenders over and above a risk-free interest rate in order to induce them to part with their money. With a lag, all debt will, upon refinancing, have to conform to the marginal contract. Higher cost of a marginal new capital asset will in due time lead to higher costs of the intra-marginal assets, too. In the diagram, an increase in the cost of the capital goods, represented by the lender's risk curve, increases marginal cost even more and the relevant curve for the investment decision is the marginal lender's risk curve. In passing, it may be noted that the firm will apply a lower discount rate to PC's than to AQ's, as payment commitments are certain, while expected earnings are not (in other words, $0 < k_1 < 1$ in the net worth formula in the preceding section).

We now trace what happens over the business cycle. Let us assume that investment and income in the economy turn out to be higher than expected, for instance as a result of finance being more easily
available. The firm has more internal funds available for its investments. Debt charges are lower than expected and profits per equity share correspondingly higher. The demand price for capital, \( P_K \), increases. Both borrowers and lenders are willing to increase the volume of debt. The marginal lender's risk curve and the borrower's risk curve move to the right and flatten out.

As the boom proceeds more and more short-term debt at ever more onerous conditions is contracted. Interest rates rise. As a result, costs of production increase and profits fall - the more so as wages will also show a tendency to increase. Cash flows may fall short of the short-term need for cash due to debts.

Hedge-finance units become speculative-finance units. Borrowers become cagey. They do not want to contract new debt or if they would, do not succeed. They try to retire debt or build up a fund of liquid assets. The point of intersection of the borrower's risk curve and the marginal lender's risk curve moves to the left, as both curves now run more steeply. Moreover, both curves will bodily shift to the left because aggregate investment falls and profits consequently decline. The supply price of capital assets rises (\( P_T \) moves upward). The demand price falls (\( P_K \) moves downward), because of lower demand (summed over all firms) and more onerous conditions for borrowing money. The prices of capital assets may fall even more if economic units are forced to sell assets, such as when conglomerates sell subsidiaries. If the authorities do not intervene, the economy may slide off into a debt deflation.

It will be clear that Minsky's theory of investment is quite similar to Tobin's (cf Tobin 1971, especially p. 330). In Tobin's view investment depends upon the relationship between the value of capital and its replacement cost, i.e. the relationship between the market price of existing capital goods and the price of currently produced capital goods. Tobin studied the general equilibrium properties of the system, given the marginal physical product of capital assets, and
not the implications of fluctuating financial conditions. Nevertheless, the mechanism linking financial conditions to investment spending is not much different. Tobin traces the influence of monetary policy on investment.

An expansionary monetary policy leads to inflation and drives up the real rate of return on capital goods relative to the real rate of return on money holdings, which acts as a spur to investment. Minsky also uses a portfolio composition argument to link the money supply to the volume of investment. Starting from the notorious chapter on "The essential properties of capital and money" from Keynes's *General Theory* (J.M. Keynes 1936 Ch. 17), he argues that an increase in the money supply lowers the marginal liquidity premium on money holdings (until some floor is reached), which increases the relative attractiveness of holding capital goods (H.P. Minsky 1976 p. 90). Portfolio shifts from money into capital goods due to inflation play no explicit role in Minsky's analysis.

Tobin's q-ratio approach has been put to an empirical test by Von Furstenberg. q, defined as the ratio of the market value of the liabilities of non-financial corporations to the replacement cost of their assets, did indeed explain a large part of the variance in the annualized orders and investment rates in the United States over the period 1952:I - 1976:IV (G.M. von Furstenberg 1977 p. 359). But capacity utilization explains investment at least as well (G.M. von Furstenberg 1977 p. 374).

Anyhow, the investment equation is notoriously difficult to specify (cf L.R. Klein 1974) and if one factor such as q is found to have a significant impact on investment, that is as much as can reasonably be asked. Moreover, it seems that of the factors that influence q, those related to current and prospective earnings - to the marginal efficiency of capital - do affect investment, whereas the cost of capital does not (cf Tobin's comment in G.M. von Furstenberg 1977, p. 402). This accords with Minsky's view that, at least during a boom, investors are not easily deterred by mere higher interest rates.
5. A Note on the Interest Elasticity of Net Worth

Minsky makes much of the threat that interest rate increases pose for speculative finance units, such as financial institutions. The burgeoning literature on the concept of duration helps to give more precision to the idea of the sensitivity of a firm's net worth to interest rate changes. The duration of a security or a portfolio is a weighted average of the periods to the moments that interest and principal payments are to be received or when they are to be paid, in the case of liabilities. The present value of a security the principal of which is to be received (or paid) after n periods, is

\[ P = \sum_{i=1}^{n} \frac{C}{(1 + r)^i} + \frac{A}{(1 + r)^n} \]

\( P = \text{present value}, \ C = \text{interest payments}, \ A = \text{principal}. \)

C and A are weighed so as to reflect risk and uncertainty, r is the going risk-free market rate of interest. For the sake of simplicity we assume a flat term structure of interest rates.

Duration is defined as

\[ D = \frac{\sum_{i=1}^{n} \frac{C}{(1 + r)^i} + \frac{A}{(1 + r)^n}}{P} \]

The point is that the maturity of a security does not give enough information as to its interest rate sensitivity. Coupon payments must be taken account of too.

The interest elasticity of P follows from

\[ \frac{dP}{dr} = - \sum_{i=1}^{n} iC (1 + r)^{-i-1} - An (1 + r)^{-n-1} \]
and multiplication by $r/P$:

$$\frac{dP}{dr} \cdot \frac{r}{P} = \left[ \sum_{i=1}^{n} \frac{C_i (1 + r)^{-i}}{P} + \frac{nA (1 + r)^{-n}}{P} \right] \frac{r}{1 + r}$$

It follows that the interest elasticity of the present value of an asset or liability, or a portfolio of assets or liabilities, is equal to duration times minus $r/(1 + r)$.

It is sometimes argued that a firm can make its net worth insensitive to interest rate changes if it makes sure that the duration of its assets equals the duration of its liabilities. This is only correct when the net worth of the firm is included in the liabilities (cf De Man a.o. 1982 p. 161; Bierwag, Kaufman and Toevs 1983 p. 30). Equal duration means equal interest elasticity. If the duration of the assets is equal to the duration of the liabilities exclusive of (positive) net worth, a rise in the rate of interest will decrease the present value of the assets more than the present value of the liabilities and net worth falls. In order to immunize the impact of interest rate changes on net worth, the duration of the liabilities must exceed the duration of the assets. In other words, the weighted average length of time for which payments are deferred from the present must exceed the weighted average length of time for which receipts are deferred from the present (Santoni 1984 p. 11).

It would seem that Minsky errs on the safe side in proposing hedge-finance units as the paragon of financial stability. The net worth of such units will not become negative as a result of interest rate changes, but it may fall. Net worth need not fall if the duration of the liabilities exceeds the duration of the assets to some extent. It is not necessary that the net expected cash flow is positive for all future periods, as is the case with hedge-finance units.
The trouble with net present value and duration approaches is that they are not easy to apply in empirical research. This is because formal time-to-maturity may differ from effective time-to-maturity for a number of assets and liabilities and, moreover, detailed data on formal time-to-maturity are not easily available. Also a number of assets and liabilities carry variable interest rates. That presents no special difficulties: in case of interest rate increases firms with a predominance of variable rate assets and fixed rate liabilities are in a favourable position; if it's the other way round they are in an unfavourable position.

If simulations of the impact of interest rate changes on net worth are not feasible, one can try to regress the market valuation of the equity shares of a firm or group of firms on interest rate changes. Such calculations have been made by Flannery (1981) and Santoni (1984). Flannery studied the published data on 15 large American commercial banks to compute the sensitivity of total operating expenses, gross operating income, and the difference between the two, net current operating earnings, net of taxes, with respect to interest rate changes (12-month Treasury bill yields) over the period 1959-1978. He found an average estimated speed of adjustment of asset yields to current market rates of 0.442, compared with a speed of adjustment of 0.356 for liabilities. This corresponds to an average asset maturity of 1.26 years and an average liability maturity of 1.81 years. A rise in the rate of interest will increase net current operating earnings in the short run. After some time the rates on both assets and liabilities adjust to current market rates. Flannery found that for 13 of the sample's 15 banks market rates have no statistically significant long-term impact on net current operating earnings.

A few notes are in order. Operating costs include non-interest costs, especially labour. These costs will show an upward trend and probably do not explain variability in costs. Still, Flannery's results are not purely attributable to interest rate changes.
Secondly, in the long run net current operating earnings remain approximately constant as a percentage of total assets after a change in the market rate of interest. If the capital-assets ratio remains constant, this means a constant return on equity. If the rate of interest, and therefore the discount rate applied to future net earnings, rises, the market value of the firm's shares falls. This seems to make Flannery's results compatible with Santoni's. Santoni regressed quarterly data on the percentage change in indexes of share prices on the percentage change in the Corporate Aaa bond rate over the period 1961 - 1983. The indexes were Standard and Poor's indexes of share prices of 400 industrial firms, banks outside of New York City, New York City banks, and savings and loan holdings companies.

Apart from the rate of interest, the real GNP growth rate was included as an explanatory variable. For all groups of firms, the estimated interest elasticity of the capital values was negative: -0.4 for industrial firms, around -0.9 for both groups of commercial banks and -2.4 for savings and loans. Santoni argues that the numerically low elasticities for the financial institutions are to explained by their portfolios consisting of relatively long-term assets and short-term liabilities. This does not square with Flannery's findings. For savings and loans, with a very high proportion of mortgage loans, Santoni's explanation may be right, but for commercial banks Flannery offers the more likely explanation.

6. **Monetary policy and fiscal policy**

In Minsky's view, it is difficult for the monetary authorities to restrain a euphoric boom (H.P. Minsky 1972, repr. in Minsky 1982a pp. 138-142). Investors have rosy expectations and are not to be deterred by a rise in the rate of interest. Restrictive monetary policy measures lack bite because of financial innovations, which compensate for any restriction in the growth of the money supply by an increase in the velocity of circulation and enable investors to borrow funds and drive up asset prices.
A restrictive monetary policy may work in a non-euphoric situation, where the expectations of economic units are not wildly optimistic and they are not willing to lower their capital-asset and liquidity ratio's too much. If a euphoric boom is under way, monetary restriction only works if it forces economic units to sell assets or fund positions and in that way cause assets prices to fall. This fall will be the more steep as asset prices reflect inflationary and real growth expectations (as is often the case with shares and real estate) and restrictive monetary policy brings such expectations to an end. The danger is that a debt deflation may result. Indeed, it is Minsky's conviction that since the 1960's, successful monetary constraint has always pushed the economy to the brink of a debt deflation, in the U.S. at least (H.P. Minsky 1980, repr. in Minsky 1982a, p. 77).

When a financial crisis develops, the central bank can help to prevent a debt deflation, and after 1933 such deflations have not occurred. The central bank has to act as a lender of last resort to speculative-finance units that see the flow of funds they need dry up. In that way it prevents a sharp fall in asset prices, thus reducing the number of business failures and the severity of the fall in investment. But the greatest check to a downward spiralling of national income is big government, which acts as a stabilizer of national income and profits by running deficits when national income falls. The failure of a couple of Ponzi-finance units then will not set off a disastrous chain of events.

The price of the help which the central bank and the government offer is, according to Minsky, inflation. As the interventions by the authorities reduce the fear of a fall in profits, economic units become increasingly willing to debt-finance their assets (H.P. Minsky 1980b, repr. in Minsky 1982a, p. 43). In this way, even poorly chosen investment projects are validated, which leads to stagnating labour productivity and inflation (ibidem, pp. 56-'7). Moreover, in a full-employment economy, wages will rise more than is warranted by productivity growth and quasi-rents will fall (H.P. Minsky 1976 p. 140).
7. Concluding remarks

Recent history does not corroborate the view that higher and higher inflation combined with stagnation is inevitable. Big government does not in itself validate poor investment decisions. Even when budget deficits run high, there may be a recession of sorts where inefficient producers are pruned out.

It appears that the innate financial instability of capitalist economies must not be taken as something inevitable, but as a tendency that may develop. Something can be done against it.

The monetary authorities can supervise the financial institutions and see to it that capital-assets ratios do not deteriorate during good times. This may help the market to maintain confidence in the financial institutions when negative shocks occur. The monetary authorities can of course do nothing to promote financial orthodoxy in non-financial firms. There may be a case for variable demands by the authorities as to liquidity and capital-asset ratio's over the business cycle, with prescribed minimum ratio's going up during good times and going down after a fall in asset prices. This would enable the financial institutions to write off bad debts, stimulate recovery from a cyclical trough and help prevent overheating of the economy. The difficulty of course is that such demands must not only be made on commercial banks, but on all financial institutions. Otherwise commercial banks would be placed in a disadvantageous position vis-à-vis other financial institutions. This would divert business to financial institutions on which the monetary authorities have less, or no, grip and might weaken the stability of the financial system, the more so as less reputable characters may be attracted to the credit industry in that case.
It seems better to step on the brake by sharpening balance sheet requirements in an early stage rather than rely only on monetary restriction in a late phase of the cyclical upswing. Nevertheless, the central bank must stand ready to act as a lender of last resort. It may be impossible to exclude financial crises altogether. It may even be undesirable to do so, as a mildly serious shock every now and then may be wholesome and prevent business firms and financial institutions becoming too complacent. When such a shock occurs, some financial institutions may find it temporarily impossible to attract funds, which of course has repercussions for business firms in need of external funds too. As Walter Bagehot remarked: "After a great calamity, everybody is suspicious of everybody; as soon as that calamity is forgotten, everybody again confides in everybody" (W. Bagehot 1920 p. 125). What may be true for great calamities, may also be true for small calamities.

It may be true that the certainty of a lender of last resort being at hand may lead to laxer financial mores. Therefore, small crises that lead to the failure of one or a very few banks, preferably to a take-over with only some loss for the shareholders, may fulfil a useful role. But history suggests that financial crises where no lender-of-last-resort facilities were offered have been followed by much larger and deeper depressions than financial crises where such facilities have been offered (vide C.P. Kindleberger 1978, especially Ch. 11). A lender of last resort, or at least an organizer of safety nets, is what is needed to prevent Fisher-Minsky debt deflations.
Bibliography


