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MINSKY'S LAW OR THE THEOREM OF SYSTEMIC FINANCIAL FRAGILITY *

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For the past twenty years, Hyman P. Minsky has developed a critical view of the functioning of capitalist economies (1). His main point is that such economies, if they are left on their own, generate crises for financial reasons. Minsky argues that:

> "[No] theory of the behavior of a capitalist economy has merit unless it shows how the *normal functioning* of a capitalist economy leads to conditions conducive to a financial crisis" [1979a, p. 9].

Whereas in the neo-classical scheme crises can arise only as the result of exogenous shocks or government intervention, Minsky believes that there are market processes that inevitably push the economy towards relations that are conducive to financial crises and deep recessions. This cumulative endogenous process is set in a monetary capitalist economy, in which investment and balance-sheet decisions are always made under conditions of uncertainty and where firms get part of their funds through issuing liabilities that households hold in the asset forms of shares, bonds, or bank accounts.

A financial crisis will sometimes lead to a deep depression and a debt deflation. When government or central bank intervention is successful in avoiding a deep depression, on the other hand, inflation or stagflation is likely to arise [Minsky 1980, p. 519]. There are

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therefore two possible exits to the cumulative market forces that lead to the build-up of incoherent financial structures. More recently, Minsky has mainly emphasized this second exit.

> "The 'financial instability hypothesis' holds that the functioning of a modern capitalist economy... leads to business cycles and that, from time to time, these cycles include threats of incoherence in the form of a runaway inflation or a debt deflation process that leads to a deep depression...
>
> The result of the process need not be a great depression. Policy interventions, of a lender of last resort nature, along with the impact of big government and the deficits it generates when income falls, have succeeded in containing the thrust towards deep depressions ... The 'inflation', 'stagflation' and 'turbulence' since 1966 are prices paid in our times, for not having deep depressions" [Minsky 1982, pp. 2-3].

Little attention is given to this new thesis in what follows. I shall attempt to model in a simple manner the institutional framework described by Minsky, and to see whether or not financial crises must 'naturally' happen. Because Minsky himself has presented several versions of his hypothesis, but without being really explicit in any of them, it is impossible to assert in a clear-cut manner the validity of his views. Thus, the reader is warned that he must not expect a definite answer.

The conditions required by Minsky's law

Minsky has extensively dealt with the consequences of debt issuance in a world of uncertainty. The extent to which firms, banks and households are willing to issue and accept debt depends mainly on two elements:

the capital income which is expected in the future and which allows borrowers to finance interest costs and pay back the principal, and the rate of capitalization of expected income. In the case of firms, whereas aggregate profits are mainly a direct function of the rate of growth of the economy, expected profits are the result of each entrepreneur's view concerning the difference between revenues and costs, while the rate of capitalization depends on the confidence with which those anticipations are formulated and on the interest rate which arises from the money market.

Given the structure of contracts inherited from the past, firms are faced with financial deadlines. These payments cannot always be matched by an equivalent cash-flow on the revenue side. Minsky distinguishes three types of cash-flow relation for financing investment: (a) hedge finance, where for each future period required financial payments are less than expected profits; (b) speculative finance, in which for the close periods the sum of interest costs and principal repayment is above expected profits, so that the firm is required to roll-over debt while the capitalized value of expected profits minus payments is non-positive for some levels of discount rates; and (c) "Ponzi" finance, in which expected profits for some periods do not even cover interest costs, and in which additional financing is required to meet debt commitments.

According to Minsky, only hedge financing is compatible with a stable capitalist system (2). As Minsky indicates:

> "For things to go wrong with a hedge financing unit something first has to go wrong someplace else in the economy - unless the hedge characteristics of the initial financing were based upon unrealistic euphoric expectations with respect to markets and their growth" [1977a, p. 144].

When there is speculative or Ponzi finance, on the other hand, any rise in interest rates has a negative effect on investment projects. First, part of the loan

has to be rolled-over on costlier terms. Secondly, the rise in money interest rates means that the market discount rate used to value the expected profits increases; this can result in the cancellation of stand-by orders, or the withdrawal of the bank's financial support. When roll-overs are either not available or too expensive, economic agents are forced to sell their most liquid financial assets. But these assets are liquid only as long as a minimal share of them has to be sold at any point of time. Too rapid a liquidation of assets may lead to a collapse of asset values, successive bankruptcies, the abandonment of projects and eventually a deep depression [Minsky 1964, 1979]. This will cause a drop in realized profits, and thereby create more cash-flow problems for the firms overall. If the financial structure is as fragile as it was in 1929, this may bring another Great Depression, unless the central bank intervenes (3).

If one assumes that the initial real world cause of a deep depression is the financial system, as in Minsky's instability hypothesis then (i) one must demonstrate that the economy 'naturally' moves towards either a speculative or a Ponzi financial structure; and (ii) one must show that interest rates must eventually rise during this process. Whereas Minsky brings forward some justification for (i), he does not provide any proof of point (ii) (4).

The paradox of tranquillity

As early as 1964, Minsky had clearly established the main points of his thesis:

> "The broadest hypothesis is that the behavior of an economic system with respect to the real variables is not independent of the financial structure of the economy... [The second hypothesis] is that the likelihood of a financial crisis occuring is not independent of the financial structure of the economy and the financial structure reflects the "past" of the economy. The third hypothesis...is that the financial changes that take place during a sustained boom...are such that the domain within which the financial structure is stable is decreased as the boom progresses, so that the likehood that a disturbance of the financial system will lead to a financial crisis is increased as the boom lengthens... If in addition it is assumed that a sustained boom will not be broken by any... deficiency in demand, then it follows [the fourth hypothesis] that if a sustained boom is to be broken it must be broken by a financial crisis" [1964, p. 175].

The first two hypotheses mentionned in the above quote set the analysis in a monetized production economy *à la* Keynes. Hypotheses three and four constitute Minsky's law. Why is an economic boom conducive to a fragile financial structure? The answer must be found in Keynes' view of capitalism which relies on expectations, entrepreneurs' animal spirits and the distinction between uncertainty and risk (5). In a world of uncertainty, continuously successful enterprises breed more new endeavours because a string of successful attempts diminishes perceived uncertainty [Minsky 1982a, p. 121]. As a result, tranquil growth is inconsistent with constant expectations of continued growth. I call this the *paradox of tranquillity*. The longer an economy is in a tranquil state of growth, the less likely it is to remain in such a state, i.e., "each state nurtures forces that lead to its own destruction" [Minsky 1976, p. 128] or "stability, or tranquility, in a world with a cyclical past and capitalist financial institutions is destabilizing" [Minsky 1979, p. 19]. Minsky presents the paradox of tranquillity as follows:

> "Stable growth is inconsistent with the manner in which investment is determined in an economy in which debt-financed ownership exists and in which the extent to which such debt-financing can be carried is determined by the market...

> The tendency to transform doing well into a speculative investment boom is the basic instability in a capitalist economy" [1977, p. 24].

Within the context of Minsky's law, if the forecasts of the entrepreneurs (and the bankers') are being realized, then the rate of discount used to judge the validity of investment projects should be moving downwards, and the rate of capitalization upwards. With given expectations about the future flow of profits, banks should stand ready to offer more loans. Hence more investment projects can be implemented without the banks reacting negatively to higher leverage ratios (debt to own funds) on the part of their clients and on their own part. Those are the economics of *euphoria* [Minsky 1982a, p.120]. In Adrian Wood's post-Keynesian theory of the firm [1975, ch. 2], managers of firms set their own limits to what they consider as acceptable for financial risks, in particular the highest acceptable leverage ratio. These limits are generally within the constraints set by those who provide the finance (the banks), because enterprise managers wish to keep their relative autonomy and do not want their corporation to be at the mercy of other (bank) managers (6). Nevertheless, the standards set by the firms are not independent of the standards set by the bankers, and so in a period of continuous boom, the *acceptable* leverage level may rise.

> "...Over a period in which the economy does well, views about acceptable debt structure change. In the deal-making that goes on between banks, investment bankers, and businessmen, the acceptable amount of debt to use in financing various types of activity and positions increases" [Minsky 1977, p. 24].

It is assumed here that as the boom lenghtens, in Minsky's analysis, firms are ready to use more leverage and to take more risks. Richard Kahn, in his abstract of Joan Robinson's complex *Accumulation of Capital* [1956], identifies this supplementary restriction on the

domain of validity of tranquillity or steady-state analysis:

> "[Animal spirits] promote an optimist view of the future. In this aspect high animal spirits are incompatible with the conditions of a Golden Age, in which the prospect of the future is strictly determined by knowledge of the present and the past" [Kahn 1972, p. 206].

One must, however, distinguish the intentions of the entrepreneurs from their realization. Each entrepreneur can *decide* to increase its level of investments and its leverage ratio, but if all entrepreneurs act alike, the increase in the leverage ratio requires supplementary decisions. This can be demonstrated by using Wood's simplified representation of the financial constraints of the firms [1975, p. 18] (7):

$$r^*P^* + x^*I = I \qquad (1)$$

where I is the level of investment of the period; r^* is the desired retention ratio of the firm on profits, the latter including compulsory interest and quasi-compulsory dividend payments; P^* are the profits that are *expected* to be realised at the end of the period; x^* is the marginal *desired* leverage ratio, i.e., the share of investment which is *eventually* financed through external sources. From the previous definition of 'profits', it should be obvious that external sources of funds, as they are here defined, include both the issue of net new debt and the issue of new equity (8).

At the macroeconomic level, abstracting from government and the foreign sector, the national identities yield:

$$P + W = C + I \qquad (2)$$

The formula established by Michal Kalecki [1937a] reduces equation (2) to equation (3):

$$P = I + C_p - S_w \qquad (3)$$

where P and I are *actual* profits and investment; C_p is consumption out of profits and S_w savings out of wages.

If one wishes to introduce a government sector, equation (3) become equation (4) (9):

$$P = I + C_p - S_w + D_f \qquad (4)$$

where D_f is the deficit of the government sector. Equation (3) (or (4)) are balance-sheet identities and are valid whether expectations are realized or not. This is not the case, however, of equation (1). If we want to pursue our analysis in *historical* time, we must be concerned with realized variables. Let us denote by F the *actual* interest and dividend payments made to households (the *financial* costs to the firms). Then equation (1) can be rewritten in macroeconomic *realized* terms as:

$$xI + (P-F) = I \qquad (5)$$

The reader can imagine that firms distribute to households, at the beginning of a period, contractual wages and interests plus quasi-contractual dividends, the latter being decided on the basis of expected profits and of the desired retention ratio. Realized retentions are then equal to the difference between realized profits P and distributed property income F. The realized (marginal) leverage ratio x results from the relationship between investment expenditures and realized retentions. Let us now assume, for simplicity, that there are no savings out of wages ($S_w = o$). Overall savings are then the sum of retentions by the firms and savings on dividends and interests by households.

Calling s_h the propensity to save on households property income, we get a modified equation (4) (10):

$$P = (1-s_h)\,F + I + D_f \qquad (6)$$

We then have a system of two equations ((5) and (6)). I, F and s_h are assumed to be known (given r* and P*). P and x are the two unknowns. Solving for x, we get the *realized* marginal leverage ratio:

$$x = s_h F/I - D_f/I \qquad (7)$$

We can note that, in general, an increase in the government deficit diminishes the realized marginal leverage ratio of the business sector. Thus, as has been pointed out recently by Minsky [1980, p. 518], increases in government deficits sustain business profits, and may lower the businesses' leverage ratio. Why this should necessarily induce chronic and accelerating inflation, however, only Minsky knows (11).

Leaving aside the role played by big government, let us see what happens to the realized leverage ratio during a boom period. Differentiating the logarithm of equation (7) with respect to time, and using conventional notations, one gets:

$$\dot{x}/x = \dot{F}/F + \dot{s}_h/s_h - \dot{I}/I \qquad (8)$$

One can forget about $\dot{s}_h$ by assuming it to be zero. $\dot{F}$ has two components: the rise in interest payments and the rise in dividends. Unless one *already assumes* that interest rates rise in a boom, there is no reason to suspect that interest costs should rise any faster than investment costs. Furthermore, it has been shown that in the short-run, firms are slow to adapt dividends to realized profits [Brittain 1966, ch. 3]. This is the well-know ratchet effect. In the upswing dividends grow at a slower rate than profits, and in a downswing dividends are not cut as badly as profits. This implies that in an economic boom (induced by the favorable animal spirits of the entrepreneurs), dividends would grow more slowly than investment expenditures and hence, according to equation (8), an economic boom induces a *fall* in the leverage ratio x.

Minsky is quite aware of the difference between the intentions of entrepreneurs and the realization of their

expectations, i.e., of the problems involved in jumping from the representative firm to the macroeconomic setting (12). In his book, *John Maynard Keynes* [1976], Minsky attempts to prove graphically that the successful running of the economy must lead to an increase in the leverage ratio. In one figure, he incorporates the fact that if all firms increase their demand for investment, aggregate demand will be larger and therefore profits will increase with the added outside borrowing requirements. As Minsky himself pinpoints:

> "In the case illustrated the improvement of realized profits partially frustrates the planned debt-financing of investments of firms and simultaneously reinforces the willingness of firms and bankers to debt-finance further increases in investment" [1976, p. 114].

Minsky, however, does not make further use of this insight, i.e., the fact that in a period of continuous or accelerating expansion, the willingness of managers to increase leverage may not be sufficient to transform the debt-structure into a fragile one. On the other hand, when a slowdown occurs for some exogenous reasons, there should be cumulative financial disorders. As Joseph Steindl [1976, ch. 9] long ago has emphasized, because of the ratchet effect, a decrease in investment is usually followed by a less than proportional decrease in dividends. If simultaneously the expectation of a recession induces households to increase their propensity to save, equation (8) indicates that the leverage ratio should surge upwards. In such difficult times, firms may *decide* to reduce their leverage ratio, but unless they take drastic measures with respect to dividends, they cannot be successful in their attempts. Most firms think that the best way to reduce their debt is to cut in investment expenditures, whereas the overall result of such decisions is a further rise in the leverage ratio, i.e., enforced indebteness [Steindl 1982, p. 79].

Some arguments in favour of a natural evolution towards financial fragility

In the previous section it was shown that the functioning of a monetized production economy led to the paradox of tranquillity. It was also demonstrated that although bankers and entrepreneurs may desire to increase external financing, macroeconomic relations may not permit this expansion. In this section, some arguments supporting Minsky's hypothesis are presented.

In the previous section only *net* debts and *net* savings were considered. It should be clear, however, that the 'robustness' and the 'resilience' of a financial system are not independent of the *gross* liabilities or savings of each agent or each sector of the economy. For instance, it is quite possible for the net flow of new consumer credit to double or triple, although net households savings and national income stay constant (13). Similarly, existing corporate shares can be purchased either by genuine savings or by credit-acquired funds, the counterpart of which is the newly acquired deposits of the seller (14). In those two examples, the fragility of the financial system in the two contrasting situations is not identical. Although net savings and national income are constant, gross savings are not and neither is the size of the balance-sheet of financial institutions.

In a period of 'tranquillity' followed by 'economic euphoria', it is quite possible for gross liabilities and gross savings to outrun the growth of income or of profits, thus leading to a multi-level financial structure, the *financial bubble*. Such a bubble becomes likely to extend since the profits of banks are equal to the margin between the average gain and the average cost on their assets and liabilities respectively: the larger the bubble, the larger the profits (15). Minsky has identified the fragile consequences of such layering, in particular the 'domino' effect it may lead to:

> "Liabilities (debts) are issued to finance - or pay for - positions in owned assets... In a layered financial structure, the unit acquiring

> a liability may have liabilities of its own, and its ability to fulfill its obligations depends upon the cash flow it receives from its assets, i.e., other units' liabilities" [1976, p. 87].

A further distinction can be made. In the previous section, the internal *flow* of finance (retained earnings) and the external *flow* of finance (issues of shares and debt) were distinguished. Several financial analysts, however, prefer to or also consider the overall balance-sheet, separating stockholders' equity from debts proper. When taking into account these *stock* relations, it become clear that "takeovers, mergers and conglomerate expansion that characterize a boom" [Minsky 1976, p. 89] may lead to a more fragile financial structure. Indeed, despite no increase in net investment nor in the flow of funds obtained from households, absorbing firms increase the overall debt/equity ratio, if the takeover is entirely financed by debts (16). The latter is likely when firms dispose of excess credit lines, as it should be the case in a boom situation. The cause of this increase in the debt/equity ratio is a transformation of the shareholders' equity of the absorbed company into a long-term (or sometimes short-term debt of the absorbing corporation. The increase in the debt/equity ratio may eventually scare the banks' financial analysts (17).

It is also possible to extend the model set out in the previous section to support Minsky's hypothesis. Ironically, this extension supposes that all external funds take the form of new share issues. Therefore, there is no debt as such, only a partial reliance on outside funds to finance investment. This extended model is Nicholas Kaldor's neo-Pasinetti theorem [1966, appendix]. By introducing an endogenously determined aggregate valuation ratio, Kaldor is able to show that the production and the financial policies set out by the firms *are realized*, independently of the savings decision of the households, provided these same firms choose the proper margin of profit and provided the banking system accepts to accomodate [Davidson 1978,

pp. 324-6] (18). Going back to our equation (1) which indicated the intentions of entrepreneurs, Kaldor shows that the desired values are realized values, if entrepreneurs are themselves aware of equation (1) (19). Dividing through by the stock of capital, one gets Kaldor's main equation:

$$\pi = (1-x)gv/r \qquad (9)$$

π is the share of profits in national income: g is the rate of growth of investment; v is the capital/output ratio; as previously, r is the retention ratio and x the leverage ratio. Under the condition of equation (9) and with accomodating monetary conditions fulfilled, any coherent set of π, x, g, v, and r can be fixed by the firms: it will be realized (20). Therefore, with Kaldor's valuation ratio mechanism almost any marginal leverage ratio can be desired and attained. Differentiating the logarithm of (9) with respect to time, assuming changes in growth rates are possible from the supply side, and with (1-x) = z, one gets:

$$\dot{g}/g + \dot{v}/v = \dot{\pi}/\pi + \dot{r}/r - \dot{z}/z \qquad (10)$$

Equation (10) is a somewhat more general version of equation (8). This can be seen by setting a constant rate of growth ($\dot{g} = 0$) and introducing a ratchet effect ($\dot{r} > 0$). *Ceteris paribus*, the leverage ratio must fall ($\dot{z} > 0$, or $\dot{x} < 0$). Equation (10) may be said to support Minsky's hypothesis when considering an increase in the *growth* rate of investment ($\dot{g} > 0$). If all other parameters are kept constant, such an increase in the growth rate of investment implies an increase in the marginal leverage ratio, i.e., a rise in the proportion of outside funds that finances new investment. The situation where $\dot{g}$ is positive precisely corresponds to a boom economy where, as described by Minsky, growth is accelerating. Of course, entrepreneurs could adapt other parameters, such as the profit margin, to the new growth rates. However, as projected targets are continually realized, banks relax leverage standards,

and the production sector may decide to adopt the new financial norms. Leverage ratios then become larger.

Is the financial system inherently unstable?

For discussion purposes, let us now assume that, as a result of an economic boom, the debt structure has become of the speculative or the Ponzi type. This simply means, according to Minsky's definitions, that for some high values of interest and discount rates, the net present value of the financial flows of firms become negative. When a private project is started, however, net present values are always positive. Hence present values may become negative as a result of unexpectedly rising interest rates. When this happens, firms may try to stop the implementation of their projects and/or banks may become reluctant to refinance them. For Minsky, this is the beginning of the end for the economic boom, as financial institutions realize that the ruling standards are not conservative enough nor sufficiently safe. When firms attempt to reduce their investment commitments and/or their leverage ratio, the cumulative effects suggested by equation (9), amplified by a multi-level financial structure, come to the fore (21).

> "The upper turning point is a completely endogenous affair if investment goods financing conforms to our model of Ponzi finance, if an investment boom leads to an increase in both short and long term interest rates, and if such an investment boom takes place in a financial structure that is heavily weighted by speculative finance...
> The upper turning point is completely endogenous once it is accepted that interest rates rise in an investment boom and that the successful functioning of the economy induces profit seeking bankers and their customers to experiment with speculative financial arrangements..." [1979a, p. 44-5].

However, for the crisis to arise as a result of endogenous forces, one must still be able to explain why an economic boom should endogenously lead to rising interest rates (22). Why does Minsky assume such an endogenous rise? (23). The answer may be found in earlier Minsky writings [1964, pp. 206-11]. In a growing economy, as distinct from a static economy, firms are always in need of credit to start off new investments. Hence, *in some sense*, there always is some excess demand for loans. Banks are continuously required to search for reserves or for ways to reduce their needs in required reserves. If new reserves are not supplied, or if new ways are not found, commercial banks may be forced to raise interest rates [Cramp 1971, pp. 66-7]. In this sense there are continuous rising pressures on interest rates (24).

Minsky himself, however, has indicated under which circumstances there need not be an endogenous rise in interest rates in a buyant economy, for:

> "The only way interest rates cannot rise during an investment boom is for the supply of finance to be infinitely elastic - which either implies that a flood of financial innovations are taking place or if the central bank (or rather the central banks of the world) supply reserve deposits to banks in unlimited amount" [1979, p. 45].

Thus, if the banking system provides sufficient finance (the real bills doctrine), interest rates need not rise even as investment is increasing. The word *finance* here does not mean savings but rather the loans which, at the macroeconomic scale, firms require to increase production. Finance is a recurring theme in post-Keynesian literature. In her *Generalisation of the General Theory*, Robinson [1979, p. 20] argues, on the basis of Kalecki's works [1937], that as long as the leverage ratio of a firm stays constant, it can obtain all the required loans at a constant interest rate, provided that future profit expectations are kept high. In fact, one can even go further and assert that during a boom,

even with rising debt ratios, firm should be able to get as much credit as they wish at a constant interest rate, because of endogenously falling leverage ratios. Hence, if debt ratios rise during a boom, it can only be as a result of strategic planning by the firms. In the long-run entrepreneurs are more cautious than lenders. Hence in periods where credit is easily available , entrepreneurs fix their desired debt ratios below the standards set by the financial community. If there is a rise in gearing ratios during a boom, then it is because banks do not perceive these higher ratios to be riskier, which implies that interest rates should not be any higher.

Post-Keynesian economists emphasize the endogenous nature of money (25). Provided that firms are respectful of the standards set by the banks, there is no reason, *a priori*, for increasing economic activity to generate higher interest rates. There is no vertically given money-supply curve. The supply of money is determined by the demand for credits of the firms, bank deposits being the residue of credits that have not yet been paid back. Central banks only have an indirect control upon the money stock. Given the interest rate, central banks must supply all the money which is demanded at that cost (26). The rate of interest is not the result of a conventional supply/demand mechanism. It is fixed by the monetary authorities, in accordance with the expectations of the actors on the financial markets. At that fixed rate, all the liquidity required by the economic agents is forthcoming, either through financial innovation or through new reserves from the central bank.

To sum up, the endogenous theory of money says causality runs from planned expenditures by the firms to money and not the other way around. Unless some factors external to finance are at work (such as higher liquidity-preference, rising prices, bottlenecks of labour or of real resources, balance of payments deficits), nothing should stop the central bank from supplying reserves in unlimited amounts to commercial banks, the latter in turn supplying the required lines of credit. In fact, as long as the central bank functions as the

lender of last resort, not to supply the required reserves at the given interest rate implies a deliberate policy of weakening the financial institutions during a boom. Thus it is a specific policy decision and not an inherent characteristic of a capitalist system which can create financial fragility conditions.

Conclusion

One cannot consider the functioning of a monetized capitalist economy as 'naturally' leading to a fragile financial system. There is no need to assume that there are intrinsic financial forces leading to periodic financial crises or near-collapses. One must look for other causes, as Minsky himself has occasionally done, such as the pursuit of speculative rather than productive goals, or rising rates of profits leading to rising rates of interest, or rising prices leading to the restrictive intervention of the central bank (as it happens now), or a natural ceiling to the rate of growth (supply constraints) which induces a collapse in the animal spirits of the entrepreneurs.

All of these factors have a more or less severe impact on the economy, depending on the fragility of the existing financial structure, as shown by Minsky. Neoclassical monetary theory cannot assess those relations since it ignores the credit/liability side of economic activity.

Notes

1. See Minsky [1964, 1976, 1977, 1977a, 1979, 1979a, 1980, 1980a, 1981, 1982]. A book of essays [1982a], most of which are not cited above, has also been published.

2. Paul Davidson [1978, pp. 410-21] has argued that 'prudent finance' as described by Minsky is more unstable than 'speculative finance' because *if firms stop investing*, the former situation implies a deficit in the cash-flow of the firms which should generate some compensating demand (as with a government deficit). This is true, but then instability is mainly due to some deficiency of demand in the previous period rather than to some structural disorders on the financial side.

3. Minsky, of course, recognizes that financial crises can be the result of something other than the combination of speculative finance and rising interest rates. But he regards such crises as being of an exogenous nature, and for this reason, although he sometimes analyzes them [1964, ch. 3], they are only a supplementary feature to his main thesis: "...In the simplest case where aggregate gross profits (aggregate Q) equals aggregate investment, the shortfall of Q below anticipated Q as an aggregate phenomenon depends upon a prior shortfall of investment. That leaves the generation of financial crisis and a deep depression essentially unexplained, for the decline of investment and aggregate income is what has to be explained" [1979a, p. 20].

4. With regards to the first point, Allen Sinai adopts a harsher viewpoint than ours: "The major shortcoming of the analysis is the failure to elucidate the continuous process of which financial positions evolve into a 'fragile financial structure'... Neither do we learn how speculative or Ponzi financing units evolve from a robust position, only that Ponzi finance exists and is quite sensitive to outside disruptions" [1977, p. 189]. Minsky sometimes refers to history to justify his law (i.e. an endogenous thrust towards financial fragility and debt deflation), calling it an empirical generalization [Minsky 1975; 1980, p. 518]. Not all financial analysts agree, however, on such an interpretation of historical facts. For instance, John Lintner attributes the gradual increases in debt ratios of the last thirty years to the large deficits of the government during the Second World War. [1977, pp. 204-5]. These deficits were the cause of abnormally low debt ratios in the fifties, while the following increasing ratios were a consequence of a normalization. In the same book of essays about financial crises. Sametz has written: "Thus while all agree that crises originate in unsustainable developments in the sequence of financing... not only do [all authors but Minsky] challenge the inevitability of the sequence from financial fragility to financial crisis, ... they also consider the onset of fragility itself to be as likely 'contrived' (i.e. due to bad policy) as natural or irresistible" [1977, p. 134].

5. See Keynes [1936, p. 148 n. 1, p. 161] and Minsky [1976, pp. 64-71].

6. The fact that some large corporations recently had difficulties in borrowing funds does not rebuke this Post Keynesian view of the firm. Their abnormally high debt ratios are the result of both marketing mismanagement and the prolonged stagnation. As a matter of fact, some studies show that when deferred income taxes (which for most megacorps will never be paid back) is not included in debts, there is hardly any increase in the leverage ratio of non-financial Canadian firms from 1963 to 1977 [Government of Canada 1980, p. 30].

7. Equation (1) assumes that firms do not detain money, and that they do not hold claims on other firms. This is a simplification from Wood's model. In an overdraft economy, however, businesses may not be required to hold any liquid assets since they can always rely upon the provision by banks of legally binding lines of credit [Wojnilower 1980, p. 288].

8. Private balance-sheet accounts usually mix retained earnings with issued shares to form the stockholders' equity. As a result, financial analysts compute leverage figures as being the ratio of total liabilities (equity plus debt as such) to stockholders' equity. Presently, new issues of shares are a minor source of finance, at least with regards to large firms [Wood 1975, p. 53]. Furthermore, contractual requirements on dividends have become almost as strict as they are on interest payments [Robinson 1956, pp. 247-8]. For these reasons, some financial analysts prefer to look at financial flows, and to distinguish internal funds (retentions) from external funds (issues of shares and bonds), as we do here [Guillou 1981]. Minsky himself sometimes makes this distinction: "Typically additional capital assets are acquired partially by own funds and partially by borrowed or outside funds, new-share capital being one class of outside funds" [1976, p. 107].

9. This is precisely the equation used by Minsky [1980, p. 516; 1982a, pp. 14-58] to explain the modern absence of deep depressions and the presence of inflation. Government deficits, which arise as a consequence of a fall in private investment, sustain the level of profits and validate the debts of the business sector, thus putting a halt to any downward spiral [Steindl 1982]. This, with central bank accomodation, would result in bursts of inflation [Minsky 1982, pp. 3-4]. Are we back to monetarism?

10. Capital gains and consumption out of capital gains have been omitted.

11. As discussed in note 9 above, some Monetarist construction must back up Minsky's statements.

12. The jump from microeconomics to macroeconomics implied by Minsky's model is Davidson's main critique of it [1978, pp. 416-8]. Sheila Dow and Peter Earl [1982, ch. 12] also face Minsky's problem when they set out to demonstrate, through case studies, the validity of Minsky's *systemic* theory. It turns out that most if not all of the financial crises they analyse have arisen as a consequence of mismanagement or fraudulent behaviour!

13. This can be seen by looking at the following two identities:

    1) consumption + gross savings = household income + net change in consumers' debt;

    2) gross savings = net savings + net change in consumers' debt.

14. In this latter case, there hase been an increase in the money supply,

15. Furthermore, the extension of credit to speculators in periods of euphoria leads to self-fulfilling expectations since the purchasing-power acquired by these speculators will allow them to raise prices on the stock market. See Minsky [1976, pp. 117-21].

16. I am endowed to Professor Minsky for this particular point.

17. When dividend payments are discretionary, it can be said that takeovers generate some financial instability, as payment commitments of firms become less flexible. However, as long as there is no roll-over problem, the substitution of interest payments for quasi-compulsory dividend payments, is not of much consequence. As a matter of fact, interest payments may be less than dividend payments depending on the price-dividends ratio, the rate of growth of earnings and the future interest rates. It follows that while we can be sure that efforts to take advantage of 'underlevered' positions (by takeovers for instance) lead to debts proper growing "at a faster rate than both the capital stock and profits", we have no knowledge ("if interest rates on financial contracts do not increase") about the direction taken by "the ratio of payment commitments to profit". The latter assertion is contrary to Minsky's opinion [1980, p. 517]. As he points out however, the efforts by firms to increase their *average* leverage ratio to the new acceptable ratio may induce them to aim to unreasonable *marginal* leverage ratios, thus creating a fragile financial structure in the short-run.

18. Part of the securities issued by the firms cannot be bought by households because they usually keep part of their savings in the shape of bank deposits. To accomodate, the banking system must be ready to buy the leftover titles to wealth without acting in any speculative fashion. This is Davidson's well-known critique [1978, ch. 12 and 13] of Kaldor's implicit rate of interest mechanism. For Kaldor, however, this implicit rate of return has nothing to do with the determination of the money rate of interest.

19. S.J. Moss [1978, pp. 316-9] has shown under which conditions the proof is valid, in particular, what values the propensity to save of households cannot take. Kaldor's 1966 model is the ultimate version of the revolutionary Keynesian causality (running from investment to savings), as effective demand is entirely determined by the self-imposed constraints of entrepreneurs [Shapiro 1977].

20. At least from the demand side, if supply can be forthcoming.

21. When there are rising interest rates, it is even more likely that $\dot{x} \geq 0$, since F includes dividends and interest payments, with the latter increasing despite falling investment expenditures.

22. A recent article [Weise and Kraft, 1981] is quite revealing in this regard. The authors try to give an interpretation, from a game theoretic approach, of Minsky's financial instability hypothesis. To do so, they *postulate* that, during the boom, investment is mainly financed through borrowing. This situation, they say, cannot last forever, *for the rise in interest rates* (and in wages) eventually reduces expected profits, which induces entrepreneurs and bankers to reduce their investments and their loans respectively. This model of Minsky's hypothesis is quite instructive, for it uncovers the *deux ex machina* of endemic instability. In Weise and Kraft's article, the rise in interest rates is caused by the economic boom, as if it were the result of some natural law.
    The study of economy history may reveal that several upper turning points are *accompanied* by high interest rates, but it does not mean that these are natural or inescapable. Keynes himself mentions that interest rates rise towards the end of a boom. For him, however, this is a consequence and not a cause of the crisis: "[I]suggest that a more typical, and often the predominant, explanation of the crisis is, not primarly a rise in the rate of interest, but a sudden collapse in the marginal efficiency of capital... [The] dismay and uncertainty as to the future which accompanies [such] a collapse... precipitates a sharp increase in liquidity-preference - and hence a rise in the rate of interest" [1936, pp. 315-6].

23. Dow and Earl implicitly ask the same question in their review of Minsky's graphic model [1982, pp. 140-1].

24. A further explanation, relying on portfolio theory, is also offered by Minsky [1982a, p. 123].

25. See Kaldor [1970, 1982], Kaldor and Trevithick [1981], Davidson [1978, pp. 226-7], Parguez [1975], Lavoie [1982, 1984]. One must distinguish the exogenous/endogenous theories of the supply of money from the inside/outside money debate concerning real balances effects. The post-Keynesian theory of endogenous money must also be carefully differentiated from the so-called endogenous monetarist view of money, where the creation of money results endogenously from government deficits and balance of payment surpluses.

26. Keynes himself, in the *General Theory*, does give the impression that he is dealing with a vertical money-supply curve [Kaldor 1982, p. 73]. It is, however, possible to find quotes where, on this question, he sounds very much like a post-Keynesian: "[The] new money is not 'forced' on anyone; - it is created in order to satisfy the increased liquidity - preference which corresponds to the lower rate of interest or the increased volume of transations..." [1936, pp. 328-9]. Also see Moore [1984].

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Summary

The author shows that H.P. Minsky's financial fragility hypothesis relies on two crucial conditions: during a boom there is a tendency towards a more levered financial structure while interest rates are increasing. It is shown that although there is some substance to the first condition it does not necessarily arise, whereas a theory of endogenous money precludes the second unless some non financial phenomena are taken into consideration.