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Alessandro Vercelli

Financial fragility and cyclical fluctuations

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1. Introduction

As is well known, any flow of goods between two transactors is accompanied by an opposite flow of money. Mainstream economic theory focuses on the flow of goods, while the flow of money is considered as a veil or as the object of a second-stage analysis which may qualify the first-stage real analysis without substantially altering it. This is true in particular for the received theories of cyclical fluctuations which are essentially developed in real terms; money is seen as a passive variable or as a source of real disturbances but it does not affect in a crucial way the manner in which the economy works. This approach clouds the central role played by money and financial relations in determining the cyclical fluctuations of modern industrial economies which are characterized by increasingly sophisticated financial relationships. In order to try to understand what is lost in the received approaches to cyclical fluctuations, in this paper we intend to develop the germs of a different formal approach which focuses on the monetary flows and financial relationships between transactors. The elementary model suggested by this approach is not less unilateral than the usual ones, though in a complementary way; however we hope that it may contribute to a better understanding of the role of money and financial relations in the cyclical fluctuations of a sophisticated monetary economy.

The formal approach here outlined is grounded in a vision of the working of a sophisticated monetary economy which owes much to that put forward by Minsky (1975, 1982, 1986) and his main inspirers (in particular Keynes, 1936). However the formalization here suggested of this vision is quite different from that suggested by Minsky himself (1957, 1959 and the appendix of 1986) since the intrinsic financial instability of a sophisticated monetary economy is formalized in terms of *structural* instability rather than in terms of the usual assumption of *dynamic* instability.

The structure of the paper is the following. In the second section the difference between dynamic and structural instability is briefly recalled in order to clarify the concept of financial fragility. In the third section the concept of financial fragility is defined in reference to a representative financial unit, showing that the feedback between the current cash flows and financial fragility in principle determines cyclical fluctuations in its financial behavior. In the forth section it is shown how the interaction between the current and expected cash flows of financial units determines cyclical fluctuations in the financial aggregates of the entire economy which are likely to affect the timing of real cyclical fluctuations. In the fifth section a few implications of the suggested approach for economic analysis and policy are briefly discussed. In the concluding

section a preliminary assessment of the limits and promises of the approach here outlined is tentatively sketched.

2. Concepts of instability and financial fragility

Modern industrial economies are liable to recurrent financial crises. To wit, in the case of the USA the prodromes of a serious financial crisis manifested in 1966, 1970, 1974-75, 1979-80, 1982, 1984-85, etc. In these occasions the premonitory signs of a generalised financial crisis, though somehow controlled and aborted, have been effective enough to depress the real activity of the economy by reducing the liquidity and wealth of economic agents and by deteriorating their expectations. Therefore they often trigger a domestic slump which may produce sizeable international spillovers as in the case of the Mexican crises in 1982 and in 1995, and of the Far-East financial crisis in 1998. Also the booms are triggered and\or sustained by favourable financial conditions which often give birth to speculative bubbles in the financial markets. The financial conditions of economic units trigger downward and upward cumulative processes since they are strictly interdependent: the cash outflows of a unit are cash inflows of other units, and –ceteris paribus—the increases (decreases) of cash inflows of a unit produce an analogous increase (or decrease) in its cash outflows. These cumulative processes play an important role in explaining the observed auto-correlation between the deviations from the trend which defines in empirical terms the economic cycle. Moreover, the financial side of these cumulative processes helps explaining their observed asymmetry, i.e. the fact that the downward cumulative process which characterises the crisis is, generally speaking, sharper and shorter than the upward cumulative process which characterises the boom. The insolvency, and eventually bankruptcy, of the most financially fragile economic units triggers a downward chain reaction, often called 'debt-deflation process', which does not have a counterpart in the boom as the increase in the flow of new entrant firms induced by the boom is bound to have a slow and progressive effect.

The behaviour of financial units over the cycle crucially depends on their financial fragility (or instability) which determines the size and direction of their response to a changing environment and to unexpected shocks; the financial fragility of economic units depends in its turn on the evolution of the cycle which also depends on the average degree of financial fragility of the economy. Summing up, it is generally agreed that the economic cycles of modern industrial economies are crucially affected by the financial instability of their economic units. Despite a wide agreement on this statement, the concept of financial instability (or fragility) has been rarely

analysed in some depth and even more rarely formalised. In the absence of a deep clarification of its meaning financial instability (or fragility) has been generally interpreted and formalised in terms of the usual concept of economic instability. According to the received view an economic system is unstable whenever, in consequence of a shock that displaces it from its equilibrium position, it is led to diverge progressively from equilibrium. In this view the instability of a system depends exclusively on its dynamic behaviour in reference to a given equilibrium configuration while the functional and parametric structure of the model (i.e. its specification) remains unchanged. However the concept of financial instability, and even more clearly the synonym 'financial fragility', evokes the idea of a possible sizeable and abrupt change in the functional and parametric structure of the unit which forces it to change the qualitative characteristics of its dynamic behaviour. The more financially fragile is a certain economic unit the smaller is the shock which may induce insolvency and eventually bankruptcy, states which force it to change radically its financial behaviour. In order to model this idea we have to resort to a different concept of instability which we are going to define '*structural* instability' to distinguish it from the usual concept of '*dynamic* instability'. Let's define a system as structurally unstable whenever in consequence of a small shock ε, it undergoes a sizeable and abrupt change in its functional and parametric structure which alters the qualitative properties of its dynamic behaviour.[1] Financial instability is often called 'financial fragility' in order to stress the pathological implications of this property. The degree of financial instability (or fragility) may be measured by the minimum size of the shock ε which triggers a structural change with the characteristics defined above.

The pathology of financial instability is usually represented in terms of progressive divergence from an equilibrium having optimal, or at least desirable, properties. However this view does not seem able to capture the essential features of financial fragility and of its influence on the economy. We believe that we should not ignore the structural changes induced by financial fragility to the financial structure and behaviour of the economic units and of the economy as a whole. These structural changes seem to me the crux of the matter but remain out of focus if we adopt the usual approach based exclusively upon dynamic instability. Therefore we are going to suggest the basic outlines of a different approach based upon structural instability which posits structural changes at the centre of the analysis. This shift of perspective is bound to have deep implications for economic cycles analysis and policy which we intend to spell out in section 5.

[1] We have distinguished elsewhere (Vercelli, 1999 and 1991) between three different concepts of structural instability: structural instability in the strict sense as defined by mathematics where the shock ε is infinitesimal, ε-instability when the shock is small but finite, and parametric instability when the structural change in the parametric structure of the system does not involve a qualitative

3. The financial units

In the sophisticated monetary economy under consideration all the decision makers are seen as financial units. This is particularly suitable for banks and other financial institutions and fairly suitable for firms; the assumption is more difficult to swallow for the sector of households, though their financial behavior is becoming increasingly important in the most advanced economies such as the USA. In any case, as usual, the utility of this abstraction may be better assessed by evaluating the results which may be drawn from it. For the time being we stress that in the approach here suggested the traditional sovereignty of the consumer steps back from the front stage while the crucial role is played by financial indexes and constraints. The focus is on the interaction between the decisions of financial units and the financial constraints of their behavior without entering into the details of their decision process. If the general picture which is going to emerge makes sense, appropriate decision-theoretic foundations are to be worked out in the future.

Each financial unit i is characterized in each period t by a sum of cash outflows e_{it} which correspond to its purchases of goods and services, and cash inflows y_{it} which correspond to the sum of sales of goods and services which were in its possession at the beginning of the period. For our purposes a crucial role is played by the current financial ratio, i.e. the ratio between total outflows and total inflows realized by the financial unit in a certain period:

$$k_{it} = e_{it} \setminus y_{it} .$$

The ratio k_{it} may easily assume a value greater than *1* and sustain it for many periods provided that it is properly financed by the unit; of course this implies a corresponding reduction in the stock of cash balances or an increase in the stock of debt or a mix of the two, and this affects the financial constraints faced by the unit in the future. We stress at this point a severe limitation of the model which is going to consider explicitly only the cash flows realized in a certain period or expected in future periods, while the impact of these flows on the stocks owned by financial units is not going to be explicitly modeled. The crucial variable that defines the financial viability of an economic unit may therefore be expressed in a very simple way as the ratio between the sum of discounted expected outflows e^*_{it} and of the sum of discounted expected inflows y^*_{it}, both discounted in the

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change in its dynamic behaviour. The concept of structural instability here utilised is that of ε-instability.

usual way on the basis of the current rate of interest within a give time horizon *m*:

$$k^*_{it} = \sum e^*_{it+n} \backslash (1+r)^n \,/\, \sum y^*_{it+n} \backslash (1+r)^n, \qquad 0 \leq n \leq m.$$

We may define the following condition of financial sustainability:

(1) $\qquad k^*_{it} \leq 1.$

This condition may be violated in the short run by a certain economic unit only by reducing its cash and capital reserves so that the maximum horizon of sustainability is limited by the size of its reserves; however when the condition is violated the horizon of sustainability gets easily much shorter as the creditors of the unit typically react by withdrawing their support to the unit. Therefore, whenever the condition (1) happens to be violated by an economic unit, it promptly reacts by reducing k_{it} under *1* as much as possible in order to reduce the value of k^*_{it} and to avoid insolvency and bankruptcy. The relationship between k_{it} and k^*_{it} goes also in the other direction: whenever k^*_{it} has a value safely under the unity there is room for values of k_{it} greater than one in order to exploit the existing economic opportunities under the pressure of competition. The crucial feedback between the current and the intertemporal financial ratios is of course affected by the state of long-run expectations and by exogenous shocks which may affect the rate of interest and expectations themselves.

The financial fragility of a unit depends on its direct sensitivity to financial markets, namely to unexpected increases in the interest rate, and on its direct sensitivity to real markets, namely to unexpected falls in the rate of profit. In addition it depends on the expectations over future cash flows. As for the direct sensitivity to financial markets we follow Minsky in classifying the units into three categories characterized by a growing sensitivity to financial markets: hedge, speculative, and Ponzi financing units. Hedge units are immune to unexpected increases in the interest rate as these are unable by themselves to make k^*_{it} greater than *1*. Speculative units are vulnerable to unexpected developments in the financial markets since an unexpected increase of the interest rate may change the value of one or more terms of k^*_{it} itself. Ponzi units are even more vulnerable to financial markets since an increase of the rate of interest may prevent in some period, typically the early ones, the repayment not only of the principal but even of the interest. The direct financial dimension of financial fragility may be measured by the minimum size of the financial shock which makes k^*_{it} just greater than one. The 'real' dimension of financial fragility which measures the direct sensitivity to unexpected falls in the profit rate may be measured by the minimum size of the

shock which ceteris paribus just downgrades the unit from hedge to speculative, or from speculative to Ponzi, or from Ponzi to virtual insolvency; this affects indirectly also the sensitivity of the unit to direct financial shocks and its overall financial fragility. Therefore in order to assess the financial fragility of a unit we need a third measure: the minimum size of a, possibly combined, shock which would make k^*_{it} just greater than one.[2] This combined index of financial fragility within our conceptual framework is the most important index of financial fragility because even a hedge unit may be very fragile in this, more comprehensive, definition of financial fragility. Let's suppose that an hedge unit is characterized by terms which are all equal to one; it is evident in this case that, if changes in the rate of interest cannot jeopardize, by themselves alone, the solvency of the unit, an infinitesimal shock originating in the real market would be sufficient to provoke this result; on the contrary a speculative unit could be made insolvent only by a very large, and unlikely, increase in the rate of interest. As this example shows, the Minskyian classification gives useful information on the relative sensitivity of financial units to different kinds of shocks but it is misleading as an ordering meant to measure synthetically the financial fragility of units. Therefore in the sequel we are going to measure the financial fragility of a unit in terms of the combined index suggested before.

Each unit defines a threshold of financial fragility $1-\mu_i$ beyond which it does not want to go (see fig 1), taking into account the riskiness of its activities and its degree of risk aversion. Therefore, as soon as an unexpected shock pushes the unit beyond the threshold, it reacts by reducing k_{it} in order to increase its current liquidity or to reduce its extant debt in order to reduce k^*_{it}. On the other hand, whenever it is within the safe zone ($k^*_{it} < 1 - \mu_i$) generally speaking the pressure of competition pushes it to increase the size of investment which implies an increase in k_{it}. An increase in k_{it} in principle deteriorates k^*_{it} by increasing the debt or by decreasing its cash balances. The feed-back between k_{it} and k^*_{it} may be represented by the following elementary

model:

$$(2) \qquad Dk_{it} / k_{it} = \alpha(k^*_{it} - 1 + \mu_i) + \varepsilon, \quad \alpha < 1;$$

$$(3) \qquad Dk^*_{it} / k^*_{it} = \beta(k_{it} - 1) + \eta_i, \quad \beta > 1,$$

where $D = d/dt$ designates the time derivative, while ε and η designate exogenous shocks. A simple inspection of the dynamic properties of this model (of the well-known Lotka-Volterra type) immediately shows that, on the basis of the feedback described before and represented in the most

[2] The size of different shocks may be combined by measuring each of them in terms of its effects on $k^*_{it.}$

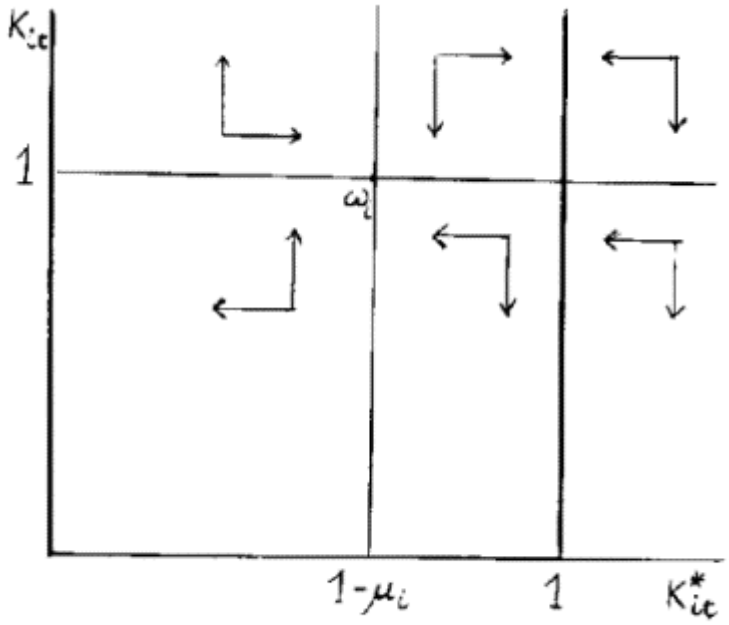

Fig.1

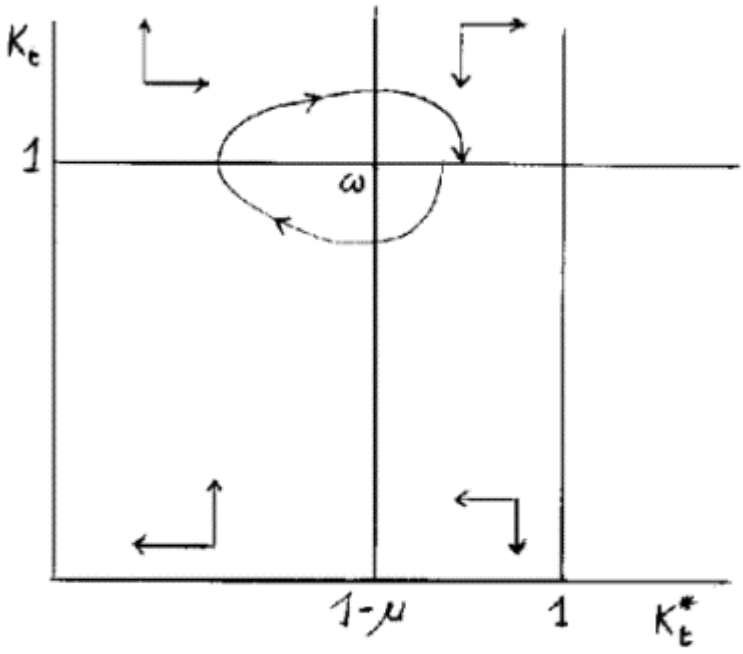

Fig.2

simple way by the model, a financial unit tends to fluctuate in a clockwise direction around ω according to a representative pattern as such depicted in fig. 1. These fluctuations are cyclical but not very regular since they are affected by the shocks ε and η and by control decision of the financial units and policy authorities that, for the sake of simplicity, have not been explicitly modeled here. These fluctuations are often, but not necessarily, correlated with the macroeconomic cycle as the boom produces unexpected increases in inflows and the crisis unexpected reduction in inflows and for the pro-cyclical behavior of expectations (see section 5). The less cautious (or less lucky) units are easily pushed by unexpected shocks which trespass the threshold μ_i into the zone characterized by financial unsustainability (i.e. where $k^*_{it} > 1$). If these units do not succeed to come back very quickly in the region of financial sustainability they are bound to become virtually insolvent. Unless they are somehow bailed out, their insolvency triggers a debt-deflation process which characterizes the most severe financial crisis: the insolvency of the first unit sharply reduces the expected inflows of other financial units so increasing their k_{it} and k^*_{it} and pushes them into the unsustainable zone, and so on. In each period it is physiological that a certain number of units (mainly industrial and commercial firms) become insolvent and go bankrupt, but the margins of safety of most units are sufficient to bear the shocks. In the case of financial crises the number of insolvent units and their size is such that the safety margins progressively breaks down unless the debt-deflation process is promptly aborted by energetic policy measures (see section 5).

4. Macroeconomic fluctuations

The fluctuations of financial units described in the preceding section may help to explain the cyclical fluctuations which characterize a sophisticated monetary economy. The fluctuations of single units are quite irregular in amplitude and period as they are affected by a host of specific factors which may change sharply from case to case. The interaction between the units and the process of aggregation of their behavior produces macroeconomic cycles having a more regular pattern. This depends on a certain degree of correlation over the cycle between the financial fluctuations of many units which depends on the network of financial links which connects them; the outflows of a unit are inflows of other units (from which it buys goods and services or it has to repay a debt), the outflows of which are inflows of other units, and so on. Since a fall (increase) in inflows of a certain unit ceteris paribus induces a fall (increase) in outflows in order to keep k_t and k^*_t close to their desired values a fall (increase) in inflows is tendentially transmitted to other units. Therefore by aggregating the inflows and outflows of the single units we obtain the following

model which depicts the aggregate fluctuations of the entire economy to the extent that they are determined by financial constraints:

(4) $Dk_t / k_t = \alpha(k^*_t - 1 + \mu) + \varepsilon, \quad \alpha < 1;$

(5) $Dk^*_t / k^*_t = \beta(k_t - 1) + \eta, \quad \beta > 1.$

This model produces cyclical fluctuations which are qualitatively altogether similar to the micro fluctuations described by the model characterized by the equations (1) and (2), apart from a greater regularity produced by averaging individual behaviors. In the absence of exogenous shocks the cyclical path would develop along a closed orbit dependent on the initial conditions; a shock shifts the representative point to a different orbit so that the orbit followed by the representative point along the cycle is not in general closed (see fig. 2). In addition we may assume that the representative point never enters in the unsustainable zone since this event would be prevented by any means, even by extreme policy measures such as the adoption of negative real interest rates or hyperinflation. However, under given circumstances the representative point may turn back very near the dividing line which implies that a sizable share of financial units would fall in the unsustainable zone so triggering a dangerous process of debt deflation. In the absence of vigorous policy measures meant to abort the process (see section 5) the economy may fall in a persistent state of acute depression as in the great depression of the 1930s.

We intend now to analyze the implications of this cyclical mechanism based on current and intertemporal cash-flow rates, for the overall financial aggregates of the economy. The aggregate outflows E_t translate into aggregate inflows Y_t^3 because the cash outflow of the buyer is identically equal to the cash inflow of the seller (whether the object of the transaction between them is a consumption good or an investment (real or financial) good. On the contrary the cash inflows of a unit do not need to feed outflows of an equal magnitude within the period. We may assume, for the sake of simplicity, that there is a lag of one period between realized inflows and the realized outflows which take account of them. Their ratio $k_t = E_t \setminus Y_{t-1}$ describes the marginal propensity to cash expenditure of the private units of a certain economy in the period $_t$. Moreover, in our model economy two public units have been introduced: the ‘Government’ and the ‘Central Bank’. The outflows of the Government are given by the purchases from the private units of good and services which characterize the public expenditure G_t, and by the purchase of bonds owned by private units

by the Central Bank *Bd*, while the inflows are given by taxes and fees payed by the private units to the Government as a counterpart of the public goods and services provided, and by public bonds sold by private units to the Central Bank Therefore the exogenous component of aggregate outflows is given by the deficit spending of the Government $D = G\text{-}T$ which is financed by issuing public bonds[4] and by the net effect of open market operations by the Central Bank ΔB. Under the present assumptions the sum of the cash value of deficit spending and of the net effect of open market operations measures the exogenous change in the stock of money circulating in the private sector of the economy ΔM:

$$\Delta M = D + \Delta B.$$

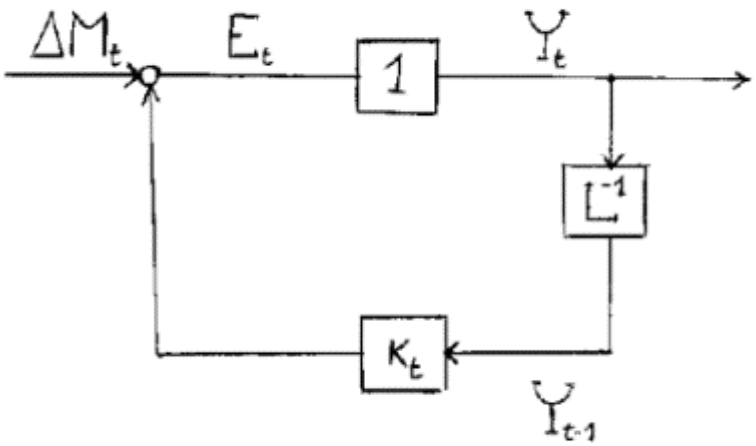

Fig.3

We may now represent the dynamic behavior of cash flow aggregates through the following elementary model (see fig. 3 for a representation in terms of block diagrams):

[3] We are not going to discuss in this paper the problems related to the procedure of aggregation leading from the outflows and inflows of individual units to the aggregate values of outflows and inflows.

[4] What is said in the text is literally true only if we assume that the public debt is integrally monetised, i.e. if the public debt issued by the Government to finance its deficit spending is 'bought' by the Central Bank. The current model does not have enough structure to allow a more

(6) $Y_t = E_t$

(7) $E_t = k_t Y_{t-1} + \Delta M.$

The dynamic behavior of this model depends on the cyclical fluctuations of k_t as described by the equations (3) and (4) and represented in fig.2, and by the sign of ΔM. We have to distinguish an inflationary regime when $\Delta M > 0$ (represented in fig.4) and a deflationary regime when $\Delta M < 0$ (represented in fig. 5). In both diagrams we have depicted likely paths (from the qualitative point of view) followed by this model economy. In both cases we have cyclical fluctuations which are characterized, generally speaking, by upward dynamic instability in the boom phase and downward dynamic stability in the depression phase. However, in the inflationary regime there may be an expansion characterized by upward dynamic stability which endogenously transforms itself in an expansion characterized by upward dynamic instability in consequence of the progressive increase in k_t triggered by the expansion itself on the basis of the mechanism described by equations (3) and (4). Moreover, and this is the most important difference, in the case of a deflationary regime the economic system may be trapped into a path of downward dynamic instability such that it would continue to deflate notwithstanding a value of k_t greater than one. A 'deflationary trap' of this kind may have characterized the Great Depression of the 1930s and perhaps some of the most severe subsequent financial crises (see section 5), however --also because of this experiences—modern industrial economies have managed to avoid to fall in a deflationary regime and therefore to be framed into a deflationary trap. Let's therefore concentrate the attention on the inflationary regime which may be considered as the usual or normal case starting the analysis of the typical cycle from the recovery characterized by downward stability which implies a further reduction of k^*_t, but a decelerating rate and a progressive increase of k_t which pushes up the equilibrium triggering the boom. The transition from the recovery phase to the boom is characterized by a radical structural change which modifies the dynamic characteristics of the system: the equilibrium suddenly shifts in the third quadrant becoming unfeasible and becomes at the same time dynamically unstable. In the boom both k_t and k^*_t increase until k^*_t enters into the dangerous zone. This triggers a financial crisis characterized by a sharp fall in k_t in order to reduce the financial fragility of the economy; while – notwithstanding the efforts of the individual units-- in this phase k^*_t still increases in consequence of the interaction between downsizing units and the influence of the debt-deflation mechanism triggered by the increase of insolvent units. As soon as k_t succeeds in becoming smaller than unity the recovery may begin. The transition from the crisis to the depression is again characterized by a

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detailed analysis of the effects on aggregate cash flows of different ways of financing the public debt. However in what follows what is important is only the sign of ΔM.

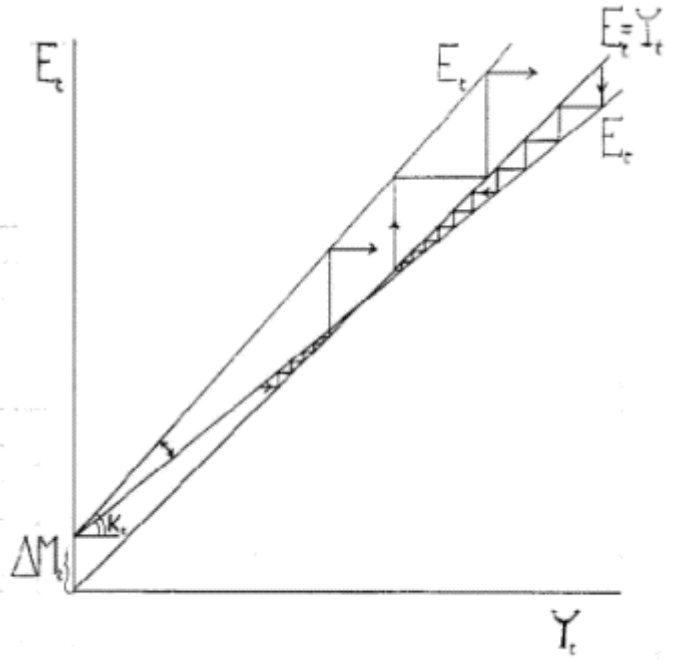

Fig.4

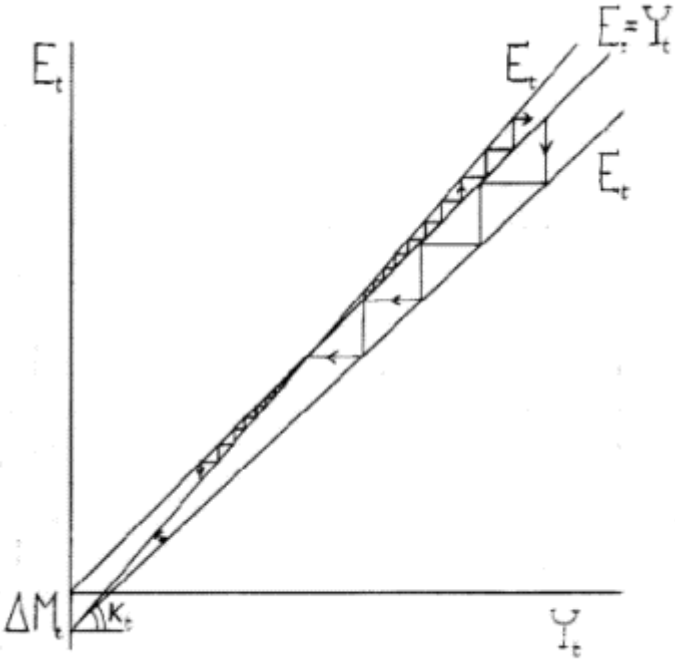

Fig.5

radical structural change which is inverse to that leading to the shift from the recovery to the boom: the equilibrium switches again in the first quadrant and becomes dynamically stable. As soon as k^*_t manages to get out of the dangerous zone, the recovery starts as k_t may increase under the pressure of competition and the financial solidity may continue to increase.

What we have seen so far is a model describing the cyclical fluctuations of the private sector of an economy seen exclusively from the point of view of its financial constraints, namely exclusively in reference to the actual and expected cash flows of financial units. The results obtained cannot be immediately and lightheartedly translated in terms of the usual aggregates which characterize the received macrodynamic approach to economic cycles. However, no doubt, cash flows are nothing but the financial side of real transactions; therefore the results obtained through the above model of financial cycle have a bearing on the usual real aggregates. In order to understand the real implications of the financial cycle we need assumptions on the real behavior of the financial units and on the cyclical behavior of specific real aggregates, namely consumption and investment in its main components. In this paper we limit ourselves to a few preliminary hints on the line of research which may be pursued. If we adopt the usual assumption that consumption is relatively stable throughout the cycle, the fluctuations of k_t depend mainly on investment which is strictly correlated to k^*_t. The financial fragility of an economy increases in the boom exactly because investment increases sharply pushed by euphoric expectations and by a cash flow multiplier k_t greater than one; the ensuing increase in both k_t and k^*_t somehow captures in this framework the implications of the accelerator mechanism. However the model here presented is unable to discriminate between real and financial investment. Therefore in the absence of an apt portfolio theory we cannot establish to what extent the fluctuations of investment have real effects. The next step of the preliminary analysis here suggested is the co-ordination of the model here presented with a portfolio theory sensitive to financial constraints and therefore consistent with the theory here outlined. In any case the financial approach here sketched may play a role in understanding the timing and the asymmetries of the cyclical fluctuations of a sophisticated monetary economy, in particular as far as financial crises are concerned.

5. Remarks on a few implications of the suggested approach for analysis and policy

The main purpose of the paper is the conceptual clarification of an approach to cyclical fluctuations which is radically different from the traditional ones.

The model suggested in this paper is in a sense the polar opposite, both in method and in substance, of the real business cycle approach which has dominated economic research in the last

fifteen years. The real factors of cyclical fluctuations are here considered exclusively as a source of financial disturbances (unexpected falls in profits and therefore in the cash inflows of a certain unit), while the financial factors, ignored or underplayed in real business cycle models, are here central. The approach here presented is also sharply different from the monetary equilibrium business cycle which has been very influential in the late 1970s and early 1980s as the crucial role of money is not restricted to the generation of shocks by a discretionary monetary policy and would persist even under fixed monetary rules, while what is really crucial is the interplay of the financial constraints of decision units over the cycle. As for the method, it is in sharp contrast with that of both streams of equilibrium business cycles as the path of the economy typically develops outside equilibrium that may be reached only for a fleeting instant, while dynamic and structural instability play a crucial role.

The approach here outlined is more similar to the macrodynamic approach which has dominated in the literature after the *General Theory* and before the takeover by the equilibrium business cycle approach since the dynamic path of the whole economy is based on behavioral rules which do not imply the continuous maximization of the objective function of the individuals and therefore equilibrium is not granted throughout the cycle. In particular in this view the economic cycle is produced by the interactions of two basic behavioral rules, the multiplier and the accelerator, the financial version of which plays a crucial role also in the approach here suggested. As we have seen the second part of the model (equations 6\7) may be interpreted as the financial counterpart of the multiplier, while the pro-cyclical behavior of k^*_t captures the pronounced pro-cyclical behavior of the investment with some analogy with the accelerator. However, the orthodox macrodynamic approach sees the cycles as fluctuations around a dynamically stable equilibrium and the possibility of structural instability is completely ruled out while in the present approach a feasible equilibrium does not always exist and instability, both dynamic and structural, plays a crucial role. The closest analogy may be found with the heterodox macrodynamic approach which is based on the dynamic instability of equilibrium contained by floors and ceilings. However in the present approach the upper and lower turning points of the cycle are endogenous while nothing prevents the addition of ceilings and floors when the values of k_t and k^*_t overcome given thresholds. In addition a feasible equilibrium does not always exist and when it exists it is not always dynamically stable; what determines the dynamic properties of the system and its sharp structural changes is its dynamic instability which depends on its financial fragility.

The approach to cyclical fluctuations here suggested has far reaching implications also for policy. First it confirms the opinion expressed by Keynes that the best regime for the ordered explication of economic activity in sophisticated monetary economies is a slightly inflationary one

(see, e.g., Keynes, 1936, p.271). This does not imply an endorsement for inflationary policies whose social costs cannot be studied within this fixprice model but which are well-known, also because the advantages expressed in this model are related to the sign and to a margin of safety vis-à-vis possible shocks: the argument in favor of an inflationary regime based on the present model supports only a stable and moderate rate of inflation not superior to, say, 2%. As for contracyclical policies, while the equilibrium business cycle approach considers them useless if not counterproductive and the orthodox macrodynamic approach considers them in principle capable of stabilizing the economy, the present approach does not deny some role for contracyclical policies in moderating the cycles but they are of course unable to tackle the crucial cause of cyclical fluctuations: structural instability. This may be mitigated and controlled only by structural measures able to act on the cyclical behavior of k_t and k^*_t such as more efficient rules of prudential regulation of the most important financial units. A thorough discussion of the most efficient structural measures to be taken to stabilize an economy characterized by structural instability requires a more detailed model which enters into the institutional, organizational and technological details of a certain economy clearly localized in time and space and goes therefore beyond the scope of this paper.

6. Concluding remarks.

The model presented and discussed in this paper has aimed to suggest the preliminary step of a formal approach to the study of cyclical fluctuations in a sophisticated monetary economy quite different from the existing formal approaches. The limitations of the analysis developed in this paper are quite severe: we mention in particular the assumption of exogenous prices, the missing distinction between real and financial investment and between different categories of units (households, firms, banks, etc.), the separation between cyclical fluctuations and development. If the approach here outlined can withstand fundamental criticisms, these and other limitations must be removed in order to allow a safe descriptive or prescriptive application to the real world. However, in our opinion, an accurate scrutiny of the potential virtues of the approach here suggested is justified because it promises to capture an aspect of modern economic activity which is becoming increasingly important in sophisticated monetary economies but is neglected or underplayed in existing approaches to economic cycles: the crucial impact of financial constraints on the cyclical fluctuations of the entire economy. Increasing productive and technological flexibility is obtained through financial institutions and devices that increase at the same time the financial fragility of the economy.

In this paper we have tried to show why and how the endogenous cyclical fluctuations of financial fragility not only produce recurrent financial crises but also affects the timing of the real cyclical fluctuations of the whole economy. The exact structure and measure of the real effects of financial crises and fluctuations depend on a host of factors which have been completely ignored in this paper: the policy rules adopted in a certain economy, its technological and institutional structure, its consumption and investment behavior, etc. However, the financial fluctuations change in a crucial way the environment to which the economy has to adapt. In order to understand why and how this happens we need a method radically different from the prevailing one in cycle theory, i.e. a method able to analyze the crucial role of disequilibrium behavior, instability and structural change in a sophisticated monetary economy. In this paper we have tried to move a preliminary step in this direction.

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