Thwarting systems and institutional dynamics,

or how to stabilize an unstable economy.

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Introduction

Starting in the middle of the fifties, and for the next forty years, Hyman Minsky developed an original business cycle theory based on an endogenous and financial conception of economic fluctuations, and more specifically, on the "financial instability hypothesis"[1]. The complexity and the richness of Minsky's analysis, associated with an almost total lack of formalization on his part, has not made the understanding of his approach any easier. It somewhat also explains the comparative disregard with which his theory of fluctuations has been considered until recently.

In the last ten years, various economists have begun to consider this problem worth tackling and have attempted to provide a modeled version of the financial instability hypothesis. With this aim in view, they have been using analytical methods derived from mathematical work on nonlinear and chaotic dynamical systems[2]. The results they obtained have been very stimulating. In their models, non-linearities combined with relations depicting financial arrangements are not assumed in an *ad hoc* fashion. Actually, non-linearities allow a good description of the behaviors Minsky analyses in his theory of investment. More than anything else, these models quite faithfully account for one of the essential aspects contained in Minsky's approach, namely that the economy is subject to "financial dynamics", insofar as it evolves along a succession of phases of comparative stability and instability. The idea being that, contrary to what is asserted by new classical economists, this succession of phases is induced by endogenous processes and financial phenomena.

However, a closer examination of Minsky's analysis leads to consider these nonlinear models with a critical eye or at least to suggest a substantial enrichment of their assumptions. Indeed, these models neglect another essential aspect of the financial instability hypothesis, an aspect I propose to call "institutional dynamics". The latter characterizes the influence of institutional mechanisms and of the interventions of public authorities on the dynamics of market economies. These institutional factors affect the nature of the business cycle in a way that is ambivalent. On the one hand, they act as "thwarting systems" whose purpose is to counteract and to contain the naturally explosive amplitude of economic fluctuations. On the other hand, they themselves can change into and become factors of instability and inefficiency.

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[1] See H.P. Minsky, 1975, 1982, 1986.

In this contribution, it is shown that this ambivalence of institutional factors appears early in Minsky's first works, more precisely in the late fifties. The argument is developed in two main steps. First, on the basis of Minsky's analysis, I investigate the actual form that fluctuations analysis can take, explicitly including the institutional context that governs interactions between economic agents (I). I then look at the reasons why the stabilizing effects of a given institutional structure are not immutable. In order to remain effective, the institutional structure must, on the contrary, change endogenously in response to actions by private agents in the economy (II).

I. Thwarting Systems or the need to "stabilize an unstable economy"[3]

For Minsky, the various institutional mechanisms that make up contemporary market economies are central features in determining economic fluctuations. Their role is to "halt" and then correct the dynamic process at the origin of the economy's "endogenous" behavior, which is assumed to be incoherent. Concretely, this procedure amounts to introducing new initial conditions into the system and therefore modifying the behavior of markets and altering the parameters entering into economic agents' decisions. This means of characterizing the change in economic activity is interesting on more than one count. First it ties back in with and supplements a certain type of model of business cycles developed in the 1950s (point A). Secondly, it provides a relevant theoretical framework within which to analyze the role of stabilizing institutional mechanisms occurring in contemporary financially sophisticated economies (point B).

A. Reinterpreting growth models with "ceilings and floors"

The business cycle models proposed by Minsky in the late 1950s[4] drew heavily on models of interaction between the multiplier and the accelerator developed some years previously by Hicks[5] and Goodwin[6]. Being aware of the inherent limits of linear macroeconomic models of the type proposed by Samuelson[7] and of the fundamentally non linear nature of economic activity, Hicks and Goodwin

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[2] For instance, we have R. Franke and W. Semmler, 1989, Peter Skott, 1994, or D. Deli Gatti and M. Gallegati, 1993.

[3] To cite the title of one of the main works of Minsky, 1986.

[4] H.P. Minsky, 1957a, 1959.

[5] J.R. Hicks, 1950.

[6] R. Goodwin, 1951.

[7] In the linear model of Samuelson, 1939, regular, self-sustaining oscillations appear only for very special values of parameters characterizing the multiplier and accelerator. Apart from these values, the model is not very satisfactory for explaining the occurrence of self-sustaining fluctuations and accounting for the evolution of the different economic series, where, as is known, irregular fluctuations with hardly any damping are observed. This mismatch between empirically observed fluctuations and theoretical results of linear models emphasizes an absolutely general property of this type of formalization: its inability to account for persistent fluctuations, i.e. fluctuations that are neither damped nor amplified.

introduced constraints into business cycle models, to act as bounds to expansion or depression. Now, mathematically, this procedure comes down to introducing what can be termed "type-1" non linearity into the model. Type-1 non linearity is thus defined by the introduction of constraints which the unstable solutions of a linear structure system run up against.

In view of the obvious kinship between these growth models with constraints and Minsky's approach, it seems necessary to recall briefly the main assumptions underlying them and the way they generate economic fluctuations. However, it seems more judicious, if we are to highlight the effects of institutional mechanisms, to present these models in a slightly different form from that initially proposed by their authors and given in the standard textbooks on macroeconomic dynamics.

This particular presentation, which is the one utilized by Minsky himself, consists in highlighting the influence of "initial conditions" (and their variations) on the movement of time series generated in linear models with constraints. Resorting to this type of reasoning has the advantage of emphasizing that the shape of the paths obtained in these models is the outcome of dynamic processes divided into a series of stages. At each stage, the values taken by an economic variable serve as the initial conditions in determining the next value. A dynamic process is then termed "unconstrained", in Minsky's terminology[8], when the initial conditions of the following stage are generated endogenously by the process itself. In contrast with this, any process wherein the initial conditions of the next stage differ (because of influence from features exogenous to the process) from those that the process would have generated naturally are said to be "constrained". Type-1 non linearity therefore appears in the form of functions defined "piecemeal", the specificity of which is to undergo variations when new initial conditions are defined.

Having made this preliminary remark, we can examine briefly the general behavior of models of interaction between the multiplier and the accelerator. These are usually characterized by a consumption function of the form $C_t = aY_{t-1}$ [a standing for the marginal rate of consumption and Y_t denoting the net national product in period t] and by an induced investment function of the form: $I_t = b(Y_{t-1} - Y_{t-2})$ [where b represents the accelerator]. When introduced into the equilibrium condition $Y_t = C_t + I_t$, these relations yield a second-order linear difference equation:

$$(1) \quad Y_t = (a+b) Y_{t-1} - bY_{t-2}$$

This latest equation means that when the value of the reaction coefficients a and b and the values of Y_{t-1} and Y_{t-2} (the initial conditions) are known, it is possible to determine recursively any solution Y_n (where n is a previous or subsequent period) to the system. In addition, we know that the solution to (1) is of the form:

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[8] P. Ferri and H.P. Minsky, 1992.

$$(2) \ Y_t = A_1 U_1{}^t + A_2 U_2{}^t$$

where U_1 and U_2 are the roots of the associated characteristic equation $U^2 - (a+b) U + b = 0$ and A_1 and A_2 are constants depending on the value of parameters a and b and on the initial conditions[9].

Solving equation (2) yields different types of dynamics depending on the value of the parameters, namely: (a) monotonic convergence of net national product toward an equilibrium value (if the roots are real and of absolute values less than unity); (b) damped fluctuations: the system is stable and converges towards the long-term equilibrium level of Y_t by values that are alternately less than and greater than this equilibrium value (if the roots are complex and their modulus is less than unity); (c) explosive fluctuations: the amplitude of fluctuation of national output increases around the equilibrium value at each period (if the roots are complex and their modulus is greater than unity); (d) instability in the form of monotonic divergence or regular explosive growth, the national product diverging increasingly from the equilibrium level (if the roots are real and greater than unity in absolute value).

Unlike Samuelson's analysis[10], which investigates the range of different solutions set out above, Hicks concentrates exclusively on parameter values which when combined give either accelerated growth, or amplified fluctuations [cases (c) and (d) above]. Hicks therefore situates his approach in a configuration such that both roots U_1 and U_2 are greater than unity with $U_1 > U_2 > 1$. He further assumes that there is a maximum growth rate ("ceiling") of the economy which we shall note as g (this gives therefore $Y_t = Y_0 e^{gt}$ when the ceiling is effective) and the dominant root U_1 is very much greater than the growth rate of the ceiling income. Finally, both roots U_1 and U_2 are such that $U_1 > U_2 > g > 1$.

Under these assumptions, the economy would evolve in the following way. Let us suppose that the economy is initially defined in such a way that it generates two consecutive incomes Y_0 and Y_1 ($Y_1 > Y_0$) such that both these incomes are less than their corresponding "ceilings" and that, in addition, $U_1 > Y_1/Y_0 > U2$. These initial conditions determine positive coefficients A_1 and A_2 (with, in addition, A_2 being much greater than A_1 because U_1 is assumed to be much greater than g[11]). Equation (2), characterizing the dynamics of the system, then generates an explosive type evolution over time.

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[9] If m is the effective growth rate of income, then for any two successive dates chosen as initial conditions, $Y_1 = mY_0$. This therefore gives (since $Y_1 = A_1 U_1 + A_2 U_2$ and $Y_0 = A_1 + A_2$):

$A_1 = (m-U_2) + (U_1-U_2)Y_0$

$A_2 = (U_1-m) / (U_1 - U_2)Y_0$

Assuming that values a and b are such that $U_1 > U_2 > 1$ (i.e. the case of explosive time series in an unconstrained system), it follows that:

$U_1 > U_2 > m$, therefore $A_1 < 0$ and $A_2 > 0$

whereas

$U_1 > m > U_2$, therefore $A_1 > 0$ and $A_2 > 0$.

[10] P.A. Samuelson, 1939.

[11] Cf. footnote 9. This characteristic implies that during the early periods (t small), the weight of U_2 is predominant in determining the dynamic evolution whereas during subsequent periods, it is the root U_1 that tends to dominate. It ensues that the income growth rate finishes by converging towards U_1 when t goes to infinity.

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However, after a certain time, let us say the period n, the income generated in accordance with equation (2) finishes by levelling out at a higher value than the ceiling corresponding to that period. At that juncture, the constraint becomes effective and the income realized is no longer determined by the previous equation (2) (specifying the unconstrained dynamics) but, for two successive periods, by the equation:

$$(3) \ Y_1 = gY_0$$

This takes us back to a situation where $Y_1/Y_0 = g < U_2$. The prominent feature is that the coefficient A_1 of the dominant root U_1 will change sign and become negative in the new solution equation (2) which will prevail. This change in sign indicates the start of the "rebound" of the path against the ceiling, i.e. the turnaround point of the cycle. A cumulative depression process results from this. The economy is henceforth subjected to change that is guided essentially by the negative term of increasing absolute value: $A_1(U_1)^t$.

This explosive downward movement of income can only be slowed if there is a lower limit, a "floor", to counter the process generated by the unconstrained dynamics, as with the ceiling examined above. As in Hicks's model, the floor may consist in setting a maximum value of disinvestment by firms. When this maximum value is reached, the realized value Y_t is different from that obtained with equation (2) previously. A new solution equation then determines the change in the economy. This new equation is characterized this time by a negative and comparatively large coefficient A_2 and by a positive and comparatively small coefficient A_1. As in the previous case, there then comes a point where the cycle reverses. A new expansion phase arises, which is initially moderate and then explosive. It continues until the economy "rebounds" again on the ceiling for the reasons described previously and so on and so forth.

When we compare the general form of Hicks's model with that of the models proposed by Minsky in the late 1950s, the two approaches look very similar on the face of things. In both cases, the authors have opted to take non linearities into account by introducing constraints on booms or slumps, in the form of "floors" or "ceilings". These models are therefore capable, as we have just seen, of generating persistent fluctuations from an unstable solution of the Samuelson model.

Nonetheless, this apparent similarity conceals a marked difference in interpretation between the two economists. This difference depends mainly on the exact sense each gives to the constraints that stabilize the dynamics of the economy.

In Hicks's model, common sense justifies the existence of these constraints: real investment cannot be negative, hence the existence of a "floor" (determined by the growth of autonomous investment and the size investment due to depreciation). In addition, output, consumption and investment are limited

by the bounded availability of natural ressources, labor and productivity gains. Hence the existence of a "ceiling".

Things are very different for Minsky. Of course, Minsky does not deny that such constraints can influence the level of economic activity. Nevertheless, he does not think they are primordial in explaining the cyclic dynamics observed in market economies. He argues that floors and ceilings reflect primarily the set of institutional mechanisms set up by public authorities in order to confine the amplitude of economic fluctuations within reasonable bounds. This is why Minsky terms these institutional arrangements "thwarting systems".

The original idea developed by Minsky is therefore that the main purpose of these thwarting systems is to modify the initial conditions governing the future evolution of economic time series during phases of explosive expansion or cumulative depression (or to speak in nominal terms, during periods of intense inflation or deflation). As we have emphasized, such changes in "initial conditions" have the effect of inverting the sign of the dominant root of the equation that solves the oscillator model. Consequently, the movement of the economy ends up slowing down and reverting to the opposite direction. Depression or deflation is thus converted by an "institutional" type floor, into a moderate and then explosive recovery, which in turn runs up against an "institutional ceiling". The time series observed thus appear to be the outcome of incessant "rebounds" of economic dynamics, hitting alternatively the ceilings and floors generated by the institutional thwarting mechanisms set up in the economy.

Such a model, explicitly integrating the role of institutions on the changes in economic activity is interesting in more than one way. First, unlike Samuelson's oscillator type unconstrained linear models, it accounts for the complexity of changes of capitalist economies over time that Minsky highlighted. This evolution is made up of "*steady growth [when $U_1 > g > U_2$], cycles [when $U_1 > U_2 > g > 1$], booms, or depressions [when $g > U_1$]*"[12]. In other words, this linear model with constraints "*exhibits the features of chaotic models, including the sensitivity of the time series that is generated to initial conditions*"[13].

Secondly, unlike usual linear models with constraints which spirit away institutional thwarting systems[14], this model makes it easier to understand the role played by institutional changes and interventions by public authorities on economic dynamics. In Minsky's model, the policy and institutional dependence of the floors and ceilings can be made quite precise. The "incoherence" of economic paths [in particular the occurrence of explosive, amplified changes leading to either very

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[12] H.P. Minsky, 1959, *op. cit.* p. 134.
[13] P. Ferri and H.P. Minsky, 1989, p. 138.

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large values (even infinite) or… negative values] inherent in unconstrained linear models can thus be countered by setting up institutional thwarting mechanisms. Under these circumstances, "*business cycles can result either from the values of the "U's" being complex, from regular interventions that contain the economy between "floors and ceilings" if the "U's" are greater than one, and from introductions of energy from outside if the "U's" are less than one*"[15].

In Minsky's approach, the concrete stabilizing procedures of economic activity that are able to lay down new initial conditions and to contain the amplitude of time series are essentially the concern of the government, via its budgetary policy, and of the central bank, through its role as lender-of-last-resort.

B. "Big government", lender-of-last-resort and stabilizing economic activity

Minsky views budget deficit and interventions by the central bank as lender-of-last-resort (the Fed in the US) as extremely effective instruments with which to stabilize economic fluctuations. Even if they do not lead to a situation of full employment, these instruments help limit variability to the fall in income and liquidity during economic recessions and during the onset of a financial crisis.

Let us consider the role of budget deficit first. In Minsky's theory, investment is the essential determinant of economic activity. This investment is largely influenced by aggregate (realized or anticipated)[16] profits. It follows, he emphasizes, that "*a main aim of policy is to constrain the variability of profits*"[17]. Now, recalls Minsky, in a closed economy, these aggregate profits are, in accordance with the approach utilized by Kalecki[18], equal to the sum of investment and of budget deficit. Consequently, this deficit, by supporting aggregate demand when private investment flags, allows a lower limit (a "floor" to continue with the vocabulary of linear models with constraints) for profits, wages and current production prices[19]. In other words, "*policy will be stabilizing if a shortfall of private investment quickly leads to a government deficit and a burst of investment quickly leads to a budget surplus*"[20]. This stabilization of actual and expected profits is crucial to ensure the continuity of the economic system. It is utilized in particular to maintain the viability of debt structures and therefore the level of private investment. In fact, "*once rational bankers and business men learn from experience*

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[14] Such as Hicks's model examined earlier but also Goodwin's model, 1951, based on a non linear accelerator.

[15] P. Ferri and H.P. Minsky, 1989, p. 137.

[16] Cf. in particular H.P. Minsky, 1986, chapter 7 & 8.

[17] S. Fazzari and H.P. Minsky, 1984, p. 107.

[18] M. Kalecki, 1971.

[19] For analysis of the relationship between profits and the fixing of wages and current production prices, cf. Ferri and H.P. Minsky, 1984 and H.P. Minsky, 1986, chapter 7.

[20] S. Fazzari and H.P. Minsky, 1984, p. 107-108.

Thus the presence of a "big government", characterized by a budgetary policy that is very sensitive to variations in overall profits is necessary to improve the stability of the economy. Nonetheless, isolated action of this type of policy may prove insufficient during periods of economic turmoil. True, public deficits partly offset the reduction in profit flows resulting from a fall in investment and in this way maintain current production prices and consumer goods prices. However, these deficits do not make it possible to counteract directly, during an economic crisis, the drop in another type of price, and one which is essential in Minsky's investment theory, namely the price of capital assets. This latter price is dependent upon the amount of money in circulation but also on more subjective variables such as liquidity preference, the debt level that is judged acceptable or the expected profits of different agents in the economy[22].

It is necessary then to turn, as a supplementary step, toward a second type of "institutional thwarting mechanism", the role of the central bank as lender-of-last-resort[23].

The main purpose of this type of intervention is to counter the "debt deflation" phenomena or at least the different forms of financial instability that contemporary market economies have experienced, especially in the last decade. In the case of the US, which Minsky gives precedence to, one obviously thinks of the financial market crash of October 1987, the Federal Savings and Loan Insurance Corporation (FSLIC) debacle and the extreme fragilization of junk bond markets. Through their sheer scale and the difficulties experienced in correcting them, these different examples emphasize the idea that the stability of the current financial system cannot be based exclusively on government budgetary policy.

For Minsky these phenomena also emphasize the necessity for an extended interpretation of the role of lender-of-last-resort. This is why he distinguishes three aspects of this type of intervention in his approach[24]. First, in the event of insufficient funds on the money market (generally synonymous with substantial falls in the value of claims utilized by agents to obtain liquidities), the central bank must intervene by increasing the amount of money in circulation. Secondly, during the financial restructuring period that follows a crisis, the central bank must take care to favor recourse to long-term rather than short-term borrowing by acting accordingly on interest rates. Finally, the central bank is responsible for guiding the development of the financial system, both through regulations and through

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[21] H.P. Minsky, 1992, p. 12.

[22] Cf. H.P. Minsky, 1975, 1986.

[23] In the US, the central bank includes not only the Federal Reserve system but also the different insurance-deposit organizations.

banking system controls so that the impact of "speculative" banking operations (notably excessive recourse to liability management) can be restricted.

There is no denying that, in the last twenty years, the "endogenous" aspect of central bank policy has been considerably reinforced, in accordance with the approach advocated by Minsky and contrary to the claims of the monetarist school[25]. Its function as lender-of-last-resort has extended constantly to new institutions and new instruments[26]. By the end of the 1960s, the Fed had to intervene to protect the municipal bond market. In 1970 it had to guarantee the commercial paper market. In the 1980s it had to intervene during the foreign debt crisis, during the Continental Illinois bankruptcy and during the financial market crash. In each of these situations, the Fed (which is supposed to follow a "monetarist" policy) provided liquidity and was compelled to validate to some extent many risky financial practices.

The analysis of institutional constraints of the system thus marks the clear opposition between Minsky's approach and the "Smithian" conception of economic behavior characterizing current business cycle theories of neo-classical inspiration. The idea highlighted by this author is that the institutional structure of contemporary economies contains a number of regulatory mechanisms, which are exogenous to the market, whose actions prevent the free exercise of the internal dynamics of the economic system. In this context, each specific institutional structure will have the effect of producing realized values (asset values, income flows) that are different from those that would have been determined by unconstrained internal dynamics. The central bank in particular intervenes almost daily on the money and financial markets in its activity as lender-of-last-resort. The main implication of these interventions is to prevent the present results obtained on these markets from becoming the initial conditions that will govern future dynamic processes. Thus when the central bank intervenes in the money market to shore up a failing financial institution or to stabilize the foreign exchange market, the values of the interest rate, of asset prices or of exchange rates will differ from the values determined by the working of the market alone.

III. The ambivalence of institutional thwarting systems

The line of argument developed in the previous section implies that in the long run, the satisfactory working of the economy is dependent on the "accuracy" of the regulating structure set up by the public and monetary authorities. Now, the effects of an intervention structure are not immutable: its capacity to stabilize the amplitude of economic fluctuations and to compel market agents to undertake moderately risky actions varies greatly over time. This is so because "*profit-seeking agents learn how a*

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[24] H.P. Minsky, 1986.

[25] On this point, see the useful paper by B. Friedman, 1992.

regulatory structure operates and because regulation means that some perceived opportunities are not open to exploitation, there are incentives for agents to change their behaviour to evade or avoid the constraints"[27].

This means that some institutional interventions and mechanisms, that were initially stabilizing, may change into factors of instability and inefficiency. One need only recall the Savings and Loan debacle and the powerlessness of the FSLIC when confronted with problems of financial instability in the 1980s to be persuaded of this: a regulation and intervention structure which was at first effective can begin to backfire if the political and institutional decision-makers do not take adequate account of the behavior of market agents in response to the institutional changes they are up against.

This basic aspect of the effects of interaction between market dynamics and institutional dynamics appears to be a key element in Minsky's cycle theory. This issue was investigated in depth by the author's very first publication titled "*Central Banking and Money Market Changes*"[28].

In that paper Minsky develops an approach based on a money supply function reflecting, on the one hand, complex interactions between the central bank and private banks on the money market and on the other hand the institutional dynamics derived from such interaction. In order to examine the role of commercial bank behavior on the money market, the author reasons firstly on the assumption that the central bank conducts a restrictive monetary policy. He argues that if economic expansion generates fears of inflation, the monetary authorities may be led to apply this type of policy, which is liable to entail interest rate rises which reflect, during such periods of upturn in activity, "*a vigorous demand for financing relative to the available supply*"[29]. Minsky then envisages two cases: the first consists in reasoning on a stable institutional environment. In this case Minsky acknowledges that *"a tight money policy will be effective and the interest rate will rise to whatever extent is necessary in order to restrict the demand for financing to the essentially inelastic supply. [...] This can be represented as a positive sloped curve between velocity and the interest rate*."[30].

This assumption of institutional stability is, however, not the one that the author favors, having regard to the major changes occurring on the money market in the early 1950s, characterized in particular by the substantial development and boom in the federal funds market and "repurchase agreements". Minsky contends that these changes reflect "institutional instability" which is driven mainly by the maximizing and innovating behavior adopted by commercial banks.

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[26] Cf. A. Wojnilower, 1987.

[27] H.P. Minsky, 1992, p. 17.

[28] H.P. Minsky, 1957b.

[29] Ibid. p. 163.

[30] Ibid. p. 172.

Restating and supplementing the analysis of Schumpeter[31] (1951) on the question, Minsky emphasizes that the search for market power is a fundamental determinant in innovation: banks are viewed as enterprising firms that innovate to improve their profitability. The idea behind this is that as financial institutions innovate, the financial system changes, imagining new ways of financing the maximizing behavior of other institutions. Consequently, the innovators who develop new financial instruments, new financial usages and new financial institutions are rewarded in the form of monopoly rents which vanish only with the propagation of the innovations. More specifically, the mechanism studied by Minsky in 1957 works as follows. Interest rate rises act as a signal for the private operators in the money market who interpret these increases as new opportunities for profit. In particular, in the case of commercial banks, the interest rate rise induces an increased opportunity cost of idle balances for those establishments with excess reserves on hand. It is therefore in their interest to lend such reserves on the federal funds market. Likewise, banks with deficit reserves can take advantage of the gap between interest rates on federal funds and the discount rate; the former, observes Minsky being never greater than the latter[32]. For identical reasons, non bank financial institutions such as government bond houses are encouraged to borrow through repurchase agreements from nonfinancial corporations. This operation is made easier in periods of high interest rates, the non financial corporations turning away from non remunerated demand deposits and therefore seeks to place their funds in more profitable liquid assets[33].

To sum up, the rise in interest rates creates a favorable environment for the emergence and development of institutional innovations. Now, these innovations have an important implication: they increase the velocity of money and, in itself, the quantity of money on offer to potential borrowers.

There are two essential reasons behind this fundamental relationship that emerges between increased velocity and increased quantity of money. Firstly, it is clear that the increased recourse by banks to the federal funds market produces an increase in the volume of demand deposits for a given amount of central bank money: "*a given volume of reserves now supports more deposits*"[34]. Secondly, the innovation process described implies henceforth that for a given volume of demand deposits, banks increase the amount of loans granted to firms[35]. Commercial bank assets undergo two important changes: (1) a fall in the proportion invested in short-term government bonds, such as Treasury Bills; this is a consequence of the rising share being held by nonfinancial corporations following the increase

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[31] J.A. Schumpeter, 1951a.

[32] H.P. Minsky, 1957b, p. 164.

[33] As Minsky points out, in mid 1956, nonfinancial corporation funds became the major source of financing for government bond houses.

[34] H.P. Minsky, 1957, p. 171.

[35] Ibid. p. 163.

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in rates; and (2) reduction in loans granted to government bond houses which are increasingly financed, as we have seen, from these nonfinancial corporations through repurchase agreements. It can be seen then why Minsky rightly assimilates these different changes in bank balances generated by the innovation process to an increase in bank reserves[36] and why the velocity and the quantity of money vary jointly during the expansion phase of economic activity.

These different changes on the money market therefore engender institutional instability which is reflected concretely by a shift to the right in the relationship linking interest rates and the velocity of money. This leads eventually to an upward stepped money supply curve similar to that in the figure below.

The increasing parts of the curve represent the effect on the interest rate of a restrictive monetary policy in a stable institutional environment. However, this movement does not last indefinitely: interest rate rises (from r_0 to r_1) generate profit opportunities, innovations on the money market and therefore institutional instability reflected by the shift of curve I to II. This gives rise to a horizontal plateau (a - b) characterizing the period during which institutional innovation propagates.

Interest rate

Quantity of money
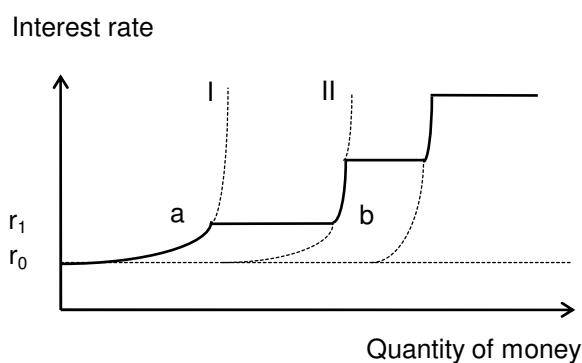
Banking innovation and the money market rate

During this period, the effects of the restrictive monetary policy on the interest rate are completely offset while the velocity and the supply of money seem to be infinitely elastic. As Minsky emphasizes, in such a context, the effectiveness of monetary policy for controlling monetary aggregates is very low and, to react to inflationary fears, the central bank has no other solution than to act directly on banking system liquidity. It therefore tries to reduce reserves sufficiently to offset the increase in the velocity.

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[36] Ibid. p. 170.

This reaction by the central bank to the maximizing and innovating behavior of commercial banks has the effect of directing interest rates up again, and consequently, recreating eventually the entire process described above, hence the succession over time of increasing portions and horizontal plateaux as shown in the graph.

In this way, the behavior of commercial banks in response to profit possibilities and to the policy conducted by the central bank does not allow the central bank to set the interest rate at the level it judges desirable. The change in the interest rate is largely dependent upon the series of phases of institutional stability and instability induced by the behavior of commercial banks in response to stabilization policies conducted by the monetary authorities.

This interest rate also appears to be "pro-cyclic": on the assumption used here, the interest rate rises simply reflect the dynamic process that is set up between the innovations of commercial banks and the reactions in the form of restrictive monetary policy of the central bank during the expansion phase of economic activity. The rise in interest rates on the money market and the institutional innovations of the commercial banks finish up by fragilizing the banks' balance sheets. This fragilization leads to increased preference for liquidity on the part of banks and revaluation of what are deemed acceptable debt ratios for borrowers. Accordingly, banks are led to restrict their lending policy on the credit market. This is reflected in the fall of the supply of finance and in the increase of interest rates on the market for loans. Greater financial constraints are then liable to have dramatic consequences in terms of economic and financial instability if they arise in an economy dominated by agents with an already fragile financial structure.[37]

These problems which are inherent to intervention by the monetary authorities, much as the difficulties encountered by organizations such as the FSLIC in the US, are not, however, an argument in favor of "laissez-faire" or for rejecting institutional thwarting systems. On the contrary, they suggest the conclusion that "*intervention cannot be frozen in time but must adapt as institutional and usage evolution takes place ; successful capitalism requires both a structure of regulation and a sophisticated awareness of the way profit seeking drives the evolution of structures and behaviour*"[38]. In other words, while "*thwarting systems are analogous to homeostatic mechanisms which may prevent a system from exploding*"[39] they are not mechanical for all that.

In this context, any incapacity of the public authorities to interpret correctly the change in their economic environment and more particularly to take account of the consequences of their interventions

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[37] For a more extensive development of this point, cf. E. Nasica, 1997.
[38] H.P. Minsky, 1992, p. 17-18.
[39] Ferri and H.P. Minsky, 1992, p. 84

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on the behavior of private agents can have harmful consequences on macroeconomic dynamics. Three types of difficulties are liable to arise.

A first problem arises when policy-makers have to rely on the data drawn from time series generated, precisely, by a potentially explosive system that is constrained by interventions and institutional mechanisms. These data may give the misleading impression that they result from a "naturally" stable dynamic process and cannot suitably support policy-making. In a setting of this sort, economists and policy-makers may mistakenly conclude that a system is endogenously stable and that institutional thwarting mechanisms are useless. In addition, once the problems of macroeconomic instability have seemingly been eliminated, the public authorities may become prone to take measures in order, for example, to improve the microeconomic efficacy of the system. In finance, scrutiny of contemporary market economies shows that such a policy usually takes the form of a process of deregulation and of slackening of the constraints (notably in balance sheet management) weighing on the operators of the money and financial markets. The periods of great financial instability experienced by Western countries and by Japan in the early 1990s emphasize the adverse effects induced by this quest for microeconomic effectiveness to the detriment of the stability of the system as a whole. Events have provided a harsh reminder that, in accordance with Minsky's approach, inflexible and short-sighted action by the public authorities leads to a weakening of the stabilizing mechanisms set up in the past and to the creation of an environment conducive to the triggering of a financial crisis.

Secondly, Minsky emphasizes that the large injections of liquidity associated with interventions by the government and monetary authorities are inflationary, as they inject purchasing power into the economy more quickly than they encourage the creation of new production[40]. The combination of fragility of the system and anti-deflationary intervention therefore introduces an inflationary bias into the economy. The problem is that it is very difficult to control inflation in "financially sophisticated" economies. Cost inflation acts on the price level of current output. Now, as Kregel[41] shows, monetary policy appears to be an overwieldy instrument for combating inflation and may aggravate recession and lead to increased unemployment. This policy appears *a priori* more effective for controlling "speculative inflation" of the prices of capital assets by acting directly on variables such as interest rates and financial system liquidity which are directly involved in determining this type of price. Nevertheless, the effect of a restrictive monetary policy on the prices of assets remains difficult to predict accurately: these prices also depend to a large extent on potentially volatile expected profits in

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[40] Cf. B.M. Friedman, 1992. This reflects a problem that Minsky often pointed out: the necessity for the Federal Reserve to act as lender-of-last-resort may often be incompatible with its others objectives, in particular with keeping the inflation rate down.

[41] J.A. Kregel, 1992.

an uncertain environment. Consequently, any attempt by the monetary authorities to hold down inflation (e.g. interest rate rises) on the financial markets may well force expectations to be revised downward and trigger behavior leading to marked instability of the system.

Thirdly, it is clear that even if actions taken by public authorities can offset financial instability in the short run, they do not necessarily drive the economy toward a stable situation of full employment. Their interventions also tend to validate fragile financial structures that have come into existence and, as an effect, to sustain or even amplify the problems associated with such structures. This is so because rational agents, observing a rise in the level of financial fragility at the macroeconomic level, will be prone to adopt financial behavior that will become increasingly risky, and engage in more debt. Such behavior is explained essentially by the fact that potential costs associated with risky financial practices of private agents are, to a very large extent, "socialized": it is the task of the public authorities (the government, the central bank) rather than of the private agents themselves to absorb the costs inherent in the increase of the budget deficit or intervention as lender-of-last-resort.

Finally, the inclusion of the role of institutional mechanisms implies that Minsky's theory does not simply describe the cycle as a mechanical phenomenon of succession of phases of the type: increasing financial fragility → financial crisis → gradual return to a more safety and soundness of the financial system. This is so because, as a rule, financial crises thwarted by institutional mechanisms do not develop all their effects (debt-deflation, widespread bankruptcies, disappearance of agents with more fragile financial structures, etc.). As a consequence, the natural tendency towards greater financial fragility is temporarily mitigated but is in no way reversed. Fragilization on the contrary takes the form of a sustained trend, permanently transforming the fundamentals of the economy and behavior of agents within the system. Such a tendency , in an economy that is becoming increasingly fragile in the long run, makes it necessary then for there to be greater frequency and extent of actions taken by the public authorities aimed at offsetting the emergence of instability until the time comes when the crisis can no longer be contained, as it is noted by Minsky.

Thus in "financially sophisticated" economies on which Minsky concentrates, the natural tendency of the system to generate periods of great instability may be controlled in part by thwarting systems. Nevertheless, such systems cannot lead to a stable equilibrium with full employment. Downward instability (debt-deflation) tends to transform under the effect of institutional thwarting processes set up by the public authorities into upward instability (characterized by a sustained trend toward excessive borrowing, increased interest rates and persistent inflationary pressures).

Conclusion

For more than two centuries, there have been two opposing conceptions of the evolution of economic activity. In his memorial of Wesley Mitchell, Schumpeter distinguishes between those economists who hold that "[...] *the economic process is essentially non-oscillatory and that the explanation of cyclical as well as well as other fluctuations must be sought in particular circumstances (monetary or other) which disturb that even flow*" and those holding that the "*economic process itself is essentially wave like - that cycles are the form of capitalist evolution*"[42].

The analysis in this work, while it does not fundamentally challenge this distinction, shows that it must nevertheless be substantially completed if the institutional factors that constitute contemporary market economies are to be integrated explicitly in business cycle analysis. The taking into consideration of the institutional dimension of economic dynamics emphasizes that there is room within contemporary analyses of economic fluctuations for a new family of business cycle theories. It would fits somewhere in between the purely exogenous conceptions of New Classical Economics and those purely endogenous ones underpinning recent nonlinear models. It implies that the economic process is not "fundamentally non oscillatory" just as it is not "cyclic in essence". This different way of analyzing fluctuations is stimulating for many reasons.

First, it allows to explain the complexity of the evolution of contemporary economies. Such modeling can incorporate both steady growth and regular business cycles as possible transient characterizations of economic time series, but, in addition, it does not exclude the emergence of the potentially "incoherent" (or chaotic) dynamics created by the interaction of economic agents. Accordingly, the effective character of the transformation of potential incoherence into realized incoherence is dependent, mainly, on the various institutional thwarting systems characterizing the economic system under consideration[43].

This kind of approach also has the merit of renewing the treatment of the relations between institutions and economic activity, which is something that we do not find in traditional macroeconomic models. In New Classical Economics, it is postulated that governmental institutions can only disturb the operation of otherwise clearing markets. On their side, Keynesians of the IS-LM synthesis consider economic policy as entirely exogenous. The analysis referred to in this paper shows on the contrary that the public authorities (the government, the central bank) react in an endogenous way to the behavior of private agents. They thus create a true "institutional dynamics" which interweaves with the real and financial dynamics of the economy and changes the "unconstrained" results of the latter two.

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[42] Schumpeter, 1951b, p. 252.

[43] The necessity to integrate the "institutional" dimension and the thwarting systems is not really taken on board in recent non linear models of the financial instability hypothesis with the notable exception of the model proposed by S. Keen, 1995.

The essential consequence of this permanent interaction between institutions and markets is that the economic system never reproduces itself identically[44]. In this context, the emplacement of adequate institutional thwarting mechanisms becomes extremely complex and demands increased vigilance on the part of the public authorities. Vigilance is necessary as the stabilization processes put in place at a certain time may eventually prove to be highly destabilizing. The "institutional" changes imposed by the public authorities on the initial conditions of dynamic processes generate constrained time series or, more precisely, "truncated" business cycles. The same is notably true when stabilizing mechanisms that have been instituted have the effect of guarding, for a comparatively long period, against a financial crisis or a deep depression. In this case, stability becomes destabilizing: private agents tend to become less risk averse and to adapt their maximizing behavior to the new institutional structure that gradually comes to prevail, thereby gradually undermining the stabilizing capacity of this structure, which causes the effects of the crisis to be amplified when it eventually breaks out. The extent of the problems raised by the bailing out of the US Savings and Loans Associations and more recently the difficulties faced by the central banks and the International Monetary Fund in containing the crisis in the Asian markets are painful evidence of this idea. They also strongly underline the need for contemporary business cycle theorists to integrate the institutional dimension of economic fluctuations into their analyses, in accordance with the view developed by Hyman Minsky.

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[44] Consideration of institutional dynamics is thus akin, from the point of view of its consequences on the decision-making environment, to the "crucial decisions" of Shackle (1955) and the non ergodic stochastic processes of Davidson (1982-83).

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