

The Case for a Monetary Analysis : an Outline of *Money, Markets and Capital*¹

Jean Cartelier

<1> Motivation of the book

The book is about pure economic theory, *i.e.* that part of economic knowledge whose main requirement is to be logically coherent and hopefully relevant. In general, economic theory is not falsifiable (think to Debreu's Theory of Value). Although neglected nowadays – empirical studies are more fashionable – pure economic theory is the only way to make economic reality intelligible and to give some sense to economic relations. This is especially true for theories whose ambition is to give an account of the whole of economy (general equilibrium, for instance). Logical coherence of a theory does not guarantee its relevance but a lack of coherence surely prevents any set of propositions from being considered as being a theory.

The main purpose of the book is to provide a quasi-axiomatic version of what Schumpeter calls *monetary analysis* in his *History of economic analysis*, an alternative approach to *real analysis* which encompasses all value theories; in short, James Steuart preferred to Adam Smith, Keynes preferred to Arrow-Debreu if personalizing the opposition between these two general paradigms may help a reader.

A decisive turning point in the evolution of economic thought occurs in 1776, nine years after Steuart's *Inquiry*. Two major attacks against what was the dominant paradigm at the time:

- (i) money is not wealth; wealth is made of commodities; evaluation of wealth requires a determination of prices; *economic theory coincides with value theory*; to get rid of money is the motto of that “new view”. It is a decisive step in order to deal with the heart of the matter e. g. real wealth
- (ii) economic theory is not elaborated for the Prince but to make clear that a market economy stands by itself (autonomy vis-à-vis of politics); *market ensures a self-regulation of the economy*; supply and demand in markets is the framework in which economic theory has to be developed

By contrast, the former paradigm (Steuart's *Inquiry*) turns around money circulation and was addressed to the Prince (Steuart's *statesman*); market does not ensure self-regulation of the economy; making sure that the economy is viable is the job of the statesman.

¹ Cartelier, Jean, (2018), *Money, Markets, and Capital. The case for a Monetary Analysis*, Routledge

<2> Money as the stumbling-block of value theory

Money, a conventional type of wealth, creates logical difficulties for value theoreticians who mainly deal with ‘natural’ goods supposed to be elements of the *commodity space* postulated at the very beginning of any value theory².

Following the mainstream view, economic relations are interpreted as allocating scarce ‘natural’ goods among individuals through voluntary exchange. Accordingly, economic theory starts from a *commodity space* postulate (Euclidian space R^l in competitive general equilibrium, continuum $[0,1]$ or natural numbers N in some search models). Individuals are defined in a second step as initial endowments and utility functions³.

It is shown in the first part of the book that value theories (or real analysis) do not meet the fundamental requirements for making a market economy intelligible. Any theory of a market economy should mimic at least three basic features of a market economy: decentralization, *a posteriori* coordination and equivalence. Value theory does not. That failure has something to do with the *a priori* exclusion of money and with the many pitfalls of the the so-called ‘integration of money in value theory’. Modern value theoreticians, in spite of their great cleverness and skills, did not succeed in introducing money in their models of a market economy, even if they have pointed to many deep and interesting problems. Taking money seriously certainly could remedy that failure but there is no room for it in value theory. This makes the case for a radical change of paradigm.

A quick view on the history of economic thought shows that we have less to invent a new paradigm than to rehabilitate an old one which was dominant before Adam Smith and before value theory took the lead. Restoring that old tradition implies *a refusal of the commodity space postulate*, a radical and difficult decision indeed. Correlatively, we should cease to think of economic relations as concerning goods or commodities and stop to conceive of individuals as commodity allocations and utility functions. Money postulate – unit of account, minting process and means of payment – has to substitute for commodity space postulate. Individuals should accordingly be thought of as *accounts* in which *payments* inscribe quantities of *monetary units*. A monetary analysis should replace a real analysis. What does it mean?

<3> Two alternative sets of postulates

	General equilibrium theory	Monetary analysis
Basic postulate	Commodity space R^l	Nominal unit of account (\$)
Active individuals	Preferences defined on R^l	Accounts where quantities of \$ are written down
Relations	Generalized exchange: permutation of commodities	Dollars transfers from an account to another for settlements of debts
Conditions of relations	Positive initial endowments ($\in R^l$)	Eligibility for the minting process

² ‘Summing up, a commodity is a good or a service completely specified physically, temporally, and spatially. It is assumed that there is only a finite number I of distinguishable commodities’ (Debreu, *Value theory*, p.32). Similar quotations may be found in Sraffa or Marx.

³ Production techniques and industries are postulated in Classical versions of value theory (Sraffa).

Table above shows how opposed are real and monetary analysis.

As a consequence, instead of a matrix of individual excess-demands, a *matrix of payments* will represent economic relations. Consequently, general accounting (flows-of-funds and balance-sheets) will provide the empirical stuff which monetary analysis will deal with.

So far so good, but why prefer monetary to real analysis? Three main reasons may be mentioned at this stage: (1) a monetary analysis meets the three basic specifications of a market economy (ii) it allows for dealing with many kind of economic relations contrary to modern value theory which is limited to voluntary exchange (iii) a monetary analysis may introduce a new view about dynamics, namely viability versus Lyapunov type of dynamics.

<4> Ability to reproduce the basic characteristics of a market economy

Let consider the three basic features of a market economy:

1. The most obvious requirement is to allow for *decentralization*. Individuals freely determine what, how, why and how much they produce or consume subject to technical and budgetary constraints. Those actions are not mere intentions, they are *effective*. As no one can read minds, *individuals have to make their actions known to other people*
2. The outcomes of the combination of decentralized actions are not known beforehand. Consequently, market coordination is only *ex post*. This is a consequence of individual freedom and of *general interdependence*. A consequence of decentralization is that agents take their decisions without knowing for sure what others are doing at the same time. More precisely, *there is no general bargaining taking place prior to individual payment decisions. Coordination between agents takes place once all agents have taken their decisions.*
3. Individuals are free and autonomous. The consequence is that their mutual relations are ruled by *equivalence*. No individual can oblige another individual to do something; each of them is only subject to the mutual compatibility of the actions of everybody else. *Equivalence in exchange is a straight consequence of assuming free individuals having the same rights and the same condition.*

The three features above – decentralization, *ex post* coordination and equivalence – may be largely accepted as being three basic characteristics of a market economy by contrast to other forms of social organization (traditional, feudal, centrally planned economy, etc.). These specifications should be met in any economic theory claiming to give an account of the workings of a market economy. *Any economic theory should exhibit these three properties in order to be accepted as a possible theory of a market economy.*

Value theory, competitive general equilibrium theory, does not meet that condition. As it is well-known but not sufficiently stressed, modern value theoreticians cannot deal but with equilibrium situations. They impose equilibrium conditions in order to solve their systems of equations. *Equilibrium conditions make a priori individual decisions mutually compatible.* Consequently, modern value theoreticians are constrained to interpret any effective empirical situation as an equilibrium, even for the Great Depression or the 2008 crisis. We may reasonably raise some doubt about that type of intelligibility and look for another.

Beyond the ‘technical reason’ of the presence of equilibrium conditions in value theory models, there is a philosophical stance. Economic relations are viewed as purely horizontal and binary ones.

They stand by themselves without any vertical principle or sovereignty. Equilibrium is a self-sustained situation as Nash's definition makes it clear. We may also reasonably have some reluctance to accept that stance. *Monetary analysis develops a very different approach both at the technical and at the philosophical level.*

Reasoning along matrices of payment does not impose equilibrium but only *solvency*, which is totally different.

Let consider the two payment matrices below

$$M = \begin{pmatrix} 0 & m_{12} & \cdots & m_{1I} \\ m_{21} & 0 & \cdots & m_{2I} \\ \cdots & \cdots & \cdots & \cdots \\ m_{I1} & m_{I2} & \cdots & 0 \end{pmatrix}$$

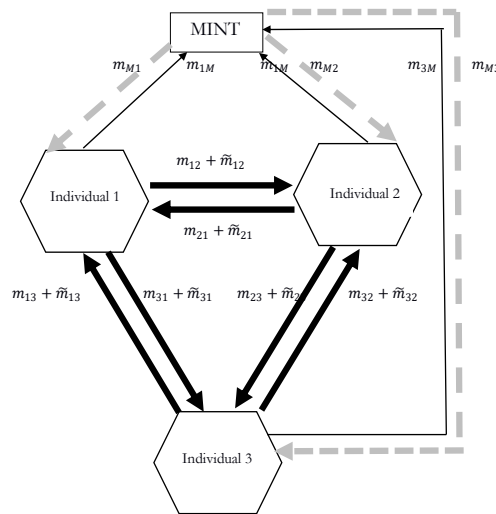
$$\tilde{M} = \begin{pmatrix} 0 & m_{12} + \tilde{m}_{12} & \cdots & m_{1I} + \tilde{m}_{1I} \\ m_{21} + \tilde{m}_{21} & 0 & \cdots & m_{2I} + \tilde{m}_{2I} \\ \cdots & \cdots & \cdots & \cdots \\ m_{I1} + \tilde{m}_{I1} & m_{I2} + \tilde{m}_{I2} & \cdots & 0 \end{pmatrix}$$

The first one displays the payments that active individual individuals have freely carried out under the constraint of the minting process (or Mint) which represents the vertical component of that market economy. The sum of the i th row of that matrix signals the amount of monetary units individual i tells to be worth under the constraint of the minting process (money spent has to be paid back at the end of the market). But each m_{ij} is both an expense (for i) and a receipt (for j). Therefore the sum of column i signals the *social evaluation* of individual i made by all other individuals ($1, \dots, I$).

In the general case, some individuals experience an excess of expenses over receipts (deficit individuals), some others experience an opposite situation (excess individuals). This is the unavoidable consequence of *decentralization*. By contrast, the sum of expenses and receipts over all individuals is the same (the algebraic sum of deficits and excesses is equal to zero). Three consequences ensue:

- (i) Deficit individuals must get some means of payments in order to pay back the bank and to avoid bankruptcy
- (ii) There is always a sufficient amount of means of payment to meet that condition
- (iii) In a market economy however where individuals are free to spend their means of payment, nothing guarantees that excess individuals will make available surpluses to those who need them

Thus, everything can happen. Let consider two cases: either some (or all) deficit individuals incur bankruptcy or each deficit individual get an amount of means of payment sufficient to square his/her account (at the cost of some losses of wealth). The first case may be dubbed a *crisis* while the second one may be called a *viable situation*.



Let consider thereafter *viaible* situations only. Payments squaring the accounts are *constrained payments* by contrast with the *free payments* of the first matrix. Constrained payments are reported in the second matrix. When accounts are squared, the sum of the *i*th row is equal to the sum of the *i*th column. The gap between private and social evaluation is cancelled, each individual is univocally evaluated *thanks to the transfers of wealth effectuated through constrained payments*. Coexistence of free and constrained payments in the second matrix exhibits the *a posteriori* aspect of market coordination.

At an *empirical level*, one may object that it is difficult to distinguish between free and constrained payments. This is perfectly true but

- (i) we have to overcome that difficulty in order to preserve the intelligibility provided by a monetary analysis, the only one which accounts for the three basic features of a market economy (decentralization, *a posteriori* coordination and equivalence); in empirical investigation we may accept some compromises, in economic theory we cannot
- (ii) we may succeed in distinguishing voluntary and constrained payments thanks to the huge amount of experience and knowledge of people whose job is to evaluate firms, to rate equities and to give advices to the authorities; a task still to be done

Monetary analysis can describe economic situations without any reference to equilibrium while value theory is limited to deal with equilibrium situations only. Beyond that fact lies the philosophical dissent about the very nature of a market economy alluded above. According to value theoreticians, the so-called law of supply and demand is supposed to guaranty global stability. If that were true (and if convergence toward equilibrium were fast), it would make little difference between out-of-equilibrium and equilibrium situations. But, as it is well-known (and discovered thanks to an internal critique of value theory) global stability cannot be proved. Horizontal relations, as they are supposed to characterize a market economy, are not sufficient to regulate it. For Steuart and for Keynes, a market economy exhibits some verticality or sovereignty. Statesman or investment socialization are necessary to manage a market economy. In *Money, Markets, and Capital*, sovereignty lies in the minting system. Decisions of the monetary authority, and the reactions to them, determine the evolution of the economy over time. It comes as no surprise that

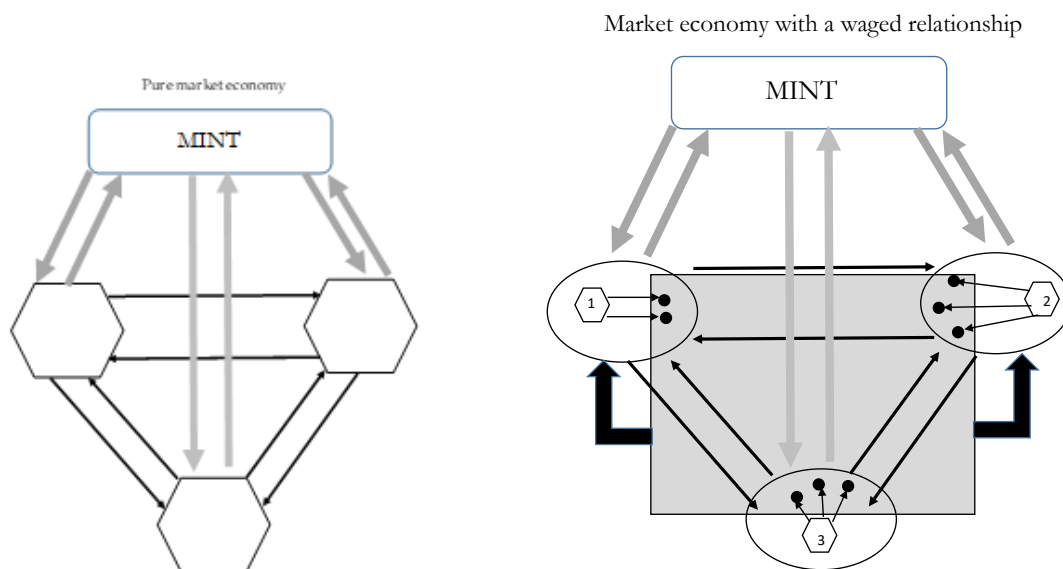
the dynamic of a market economy is not conceived of in the same terms in real and in monetary analysis (see below <7>).

<5> Monetary analysis accounts for the plurality of economic relations

Voluntary exchange is the unique type of economic relation allowed for in modern value theory. In spite of various considerations for asymmetry of information or differences of conditions, general equilibrium models deal with voluntary exchange only⁴. By contrast, in a monetary analysis many types of economic relations may take place. Each of these relations corresponds to *a specific form of money circulation*.

A decisive point is *whether people have or not a direct access to means of payment issuance* (say to the Bank). Those people who have a direct access are called *active individuals* because they are able to initiate their market-oriented activities. The others are called *non-active individuals*. They cannot do what active individuals do; they depend upon the latter for their very economic existence.

At least, three forms of circulation may be distinguished according to the orientation of the active individuals (two of them exhibit a particular type of dependence). When active individuals do not pay anything to other people, they remain the only ones who exist economically speaking. They share the same condition. Therefore, the form of circulation, shown in the schema below (left), corresponds to a pure market economy. When active individuals are not oriented toward market and pay non-active individuals for a private purpose, the form of circulation (not shown below) is a domestic one (it may be compared to what Smith calls non-productive labour). When active individuals are oriented toward the market (they try to sell something in the market) they pay non-active people in order to associate them to their own activity and for their own account, the form of circulation corresponds to a waged relationship market economy (it may be compared to what Smith calls productive labour). It is shown below (right).



⁴ In principal agent models, for instance, difference of conditions are exogenous and we do not know why some are bosses and some others are workers. They do not support any general view about the whole economy.

<6> Keynes and monetary analysis

Monetary analysis provides (but real analysis does not) an endogenous theory of the division between entrepreneurs and wage-earners. This is a necessary condition for proving what may be called *Keynes' conjecture* (involuntary employment equilibrium under perfect competition and flexible prices and wage). Keynes demonstration relies upon the refusal of the 'second classical postulate' which amounts to adopt a different budgetary constraint for entrepreneurs and for wage-earners. Consequently, Walras Law, which contradicts Keynes' conjecture, becomes a *Restricted Walras Law*, which excludes the so-called "market for labour" of the sum of budgetary constraints over entrepreneurs and wage-earners. *Restricted Walras Law* is perfectly compatible with Keynes' conjecture.

As a matter of fact, monetary analysis gives the appropriate framework for what Keynes pretends to do (chapter 4 of *General Theory*):

In dealing with the theory of employment I propose therefore to make use of only two fundamental units of quantity, namely, quantities of money-value and quantities of employment. The first of these is strictly homogeneous, and the second can be made so. (...) Thus, if E is the wages (and salaries) bill W the wage-unit, and N the quantity of employment, $E=N.W$ (Keynes, p. 41)

Quantities used by Keynes are either monetary ones or quotients of monetary ones. In Keynes writings there is no commodity space postulate to be found! Monetary analysis is the paradigm in which the most radical critique of the first welfare theorem of general equilibrium theory should be conceived.

In the same spirit, Keynes most typical propositions are put forth and proved along the book.

<7> Dynamics: asymptotic properties versus viability

In accordance with their naturalist view of economics, value theoreticians conceive dynamics as the study of asymptotic properties of a rule of adjustment. Does the economy tends toward an equilibrium position when time tends to infinity when it follows an *a priori* given law of adjustment (supply and demand or specie-flow mechanism, for example)? The answer to that question is given by dynamic models *à la* Lyapunov.

Searching for asymptotic properties of a given law of regulation does not correspond to the spirit of monetary analysis. Determining the domain in which viability of the economy may be obtained is the typical manner stability is understood by monetary analysis. Steuart thought that was the proper job of the statesman. Nowadays it is possible to deal with that question in formal terms thanks to the mathematical theory of viability.

Formally, if $x(t)$ is the vector describing the state of an economy at time (t), supposed to be influenced by $u(t)$, academic economists represent the dynamics of that economy by a system of type :

$$\begin{aligned}x'(t) &= F(u(t), x(t)) \\ u'(t) &= G(u(t), x(t))\end{aligned}$$

where $G(\cdot)$ has some *a priori* properties which will hopefully ensure the global stability of the economy. Academic economists are interested in the asymptotic properties of the dynamical system: do the trajectories converge towards an equilibrium, thanks to the special properties of (\cdot) ? Various models of *tâtonnement* and *non-tâtonnement* are built along this view. An automatic rule, such the so-called "law of supply and demand" or the "gold specie mechanism", is designed to do the job without any arbitrary intervention of a policy maker.

Very opposed is the theory of viability. Its starting point is a set of *a priori* viable states of the economy which encompasses equilibria and out-of-equilibrium situations as well. Let $K := \{0 \leq x(t) \leq x_{max}\}$ be that *constrained set* and $U := \{a \leq u(t) \leq b\}$ the set of all *a priori* actions the statesman can decide. The dynamical system is now :

$$\begin{aligned} x'(t) &= H(u(t), x(t)) \\ u(t) &\in U \end{aligned}$$

The issue is no longer the asymptotic properties of the system but the existence of situations such that it is ever possible for the statesman (or the Bank) to fix $u(t)$ keeping the economy in the constrained set, which means keeping the economy viable over time. Formally, we are looking for the greater subset of the constrained set such that $x(t) \in K$ for all $t > 0$. Such a subset is called the *viability kernel*. While the economy is in the viability kernel, there exists at least one action of the statesman which makes possible for the statesman to keep the economy in a sustainable state in the future. Of course, this does not guaranty that the statesman will succeed: it may exist at time (t) only one appropriate decision among an infinity of others, all of which will be proved to be not successful. But at least one right decision exists and the statesman may find out which it is. The art of government consists in keeping the economy or the society in a state where something can be done. By contrast, when the economy leaves the viability kernel, whatever the statesman may do, the economy will cease to be viable in the future. No appropriate strategy is to be found. Sooner or later, the economy will collapse.

According to the metaphor of viability, the statesman is nothing but the set of actions allowing the economy to be viable over time. There is no *a priori* law, no automatic rule which may replace the discretionary actions of the statesman. When the viability kernel is not empty, the statesman may be able to keep the economy going in a sustainable position for ever.

Viability theory deals with the possibility of keeping economy alive, in equilibrium or out of it as well. It implies some sovereignty. The institution in charge of that task is the monetary authority (the Bank). The Bank is not outside the economy. It is presupposed at the very beginning of the analysis. It is an intrinsic part of it where sovereignty resides. Like Steuart's statesman the Bank : (i) is a component of the economy as individuals are, even if it is not on the same footing (ii) its actions is neither exogenous nor arbitrary, as standard economists try to suggest.

In order to illustrate the point, let consider a Harrod-modified model

Following Aubin (1997, p. 46-48), we have the system:

$$g'_K(t) = bg_K(t) - \gamma \quad b > 0$$

$$-c \leq \gamma'(t) \leq c$$

subject to:

$$0 \leq g_K(t) \leq n$$

Note that instead a unique equilibrium, the economy exhibits a locus of managed equilibria $g^{K**} = g^{K*} + \frac{\gamma}{b}$ where the economy is in equilibrium although entrepreneurs have not found the right rate of growth of investment. Thanks to the action of the authority – Steuart would have said the statesman – a steady-state exists for any admissible level of γ .

The problem viability theory deals with is to find viable subsets \mathcal{S} of the constraint set \mathfrak{N} defined by $0 \leq g_K(t) \leq n$ where a viable trajectory is always possible, *i.e.*, subsets \mathcal{S} satisfying the following viability property: for all $(g_K(0), \gamma(0)) \in \mathcal{S}$ there exists a state-control solution $(g_K(t), \gamma(t))$ of control system above starting at $(g_K(0), \gamma(0)) \in \mathcal{S}$ and satisfying $0 \leq g_K(t) \leq n$ for any $(t) > 0$.

In plain terms, we are looking for all the pairs $(g_K(0), \gamma(0))$ from which it is possible through an appropriate action on γ (satisfying constraints imposed on the speed of change) to keep over time the economy into the constraint set \mathfrak{N} . If there exists such a non-empty subset \mathcal{S} of \mathfrak{N} it does not mean that economy will always survive for all (t) but only that it is always possible to keep a chance to survive.

The figure below, borrowed from Aubin⁵, shows the viability kernel of our simple economy, *i. e.* the greatest \mathcal{S} satisfying viability property. It is delimited by curves H and L which are such that at each point maximum variation of γ allows the economy to keep evolving inside \mathfrak{N} .

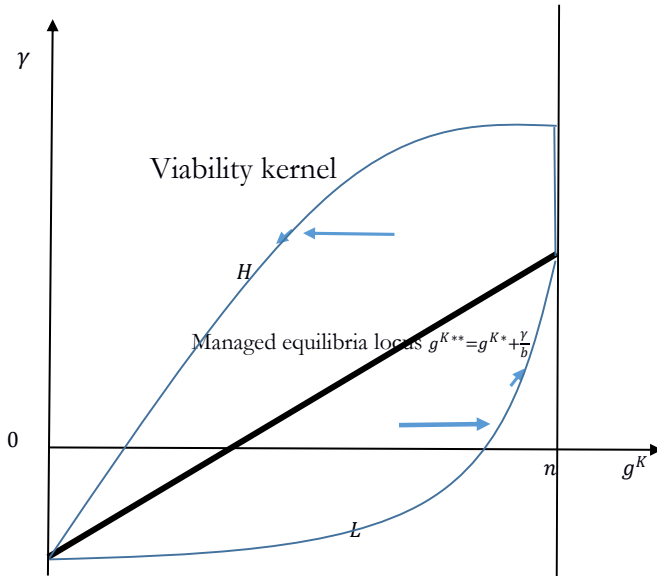
Directions of the trajectories without any change of γ are shown by the arrows which exhibit the intrinsic instability of the system (razor-edge). Instability may be mitigated by an active policy of the authority but there is no guarantee of success. While the economy keeps evolving into the viability kernel it is possible for the authority to keep alive the system even if nothing ensures that it will find the appropriate values of the control.

According to the graph, below (above) the managed equilibrium locus, a cumulative process of growth leads the economy toward its higher (lower) sustainable frontier n (0) along the curve L (H) γ raises (decreases) at its maximum velocity such that the economy keeps being viable. The viability kernel displays all the couples (rate of growth of capital, γ) for which there exists at least one solution for maintaining the economy in a sustainable situation. Outside the viability kernel nothing can be done except radically changing the rules of the game.

More than a technical innovation in the tools of economic dynamics, the viability approach obliges us to change our minds and our views about economic regulation.

⁵ See J. P. Aubin (1997), p. 47

Graph Viability kernel



Inside the viability kernel all situations are viable but only those in the segment $g^{K**} = g^K + \frac{\gamma}{b}$ are equilibria. Starting from any point inside the viability kernel at t_0 , it is possible for the authority to find out how to manipulate controls for keeping the economy viable for any $t > t_0$. But nothing guaranties that the authority will succeed in finding out the right manipulation. Economics is an art not a science.