Out of Equilibrium: Bases, Basics, Policies, and Accounts

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Abstract

New regulation of EU cohesion policy prescribes ex ante impact evaluations. These imply a vision of the working of a process of economic change. A theory of change based on the concept of equilibrium (which is a situation in which by definition change is not liable to occur) being paradoxical, the present article aims at presenting bases and basics of Amendola's out-of-equilibrium approach in a perspective that is instrumental in the above-referred concrete policy issue. Accordingly, after reviewing the essentials of John Hicks' concern with the construction of an out-of-equilibrium approach, the key concepts at play in Amendola and Gaffard's out-of-equilibrium model are summarized and, after considering the resulting perspective on policy making, and touching on EU official framework for institutional accounts, the sequence of accounts implicit in the out-of-equilibrium model is eventually derived.

JEL codes: B52, C80, E61, O20.

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1 Introduction

European Structural and Investment Funds constitute the most important public source of investment in the European Union. Extensive issues in designing and running policy interventions have cleared the way for important changes in the understanding and organisation of monitoring and evaluation. In the current cycle (2014-20), regulation (n.1303/2013, artt. 47-57) drops emphasis on absorption of funds; focus is on the consistency of a subsidized interventions contribution in attaining planned outcomes. On that account, the European Commission plans on building the world biggest archive in *impact evaluations* by 2023 (art. 114(2)).

Scheduled evaluations are of ex post, interim, and ex ante character. Ex post evaluations focus on an impact quantitative dimension so they can be carried out with that set of econometric techniques[1] constituting the so-called *counterfactual approach* to impact evaluation. Interim evaluations are based on ex ante evaluations, which focus on the qualitative structure of a policy intervention, namely on the 'how and why' a policy is expected to contribute to a given policy objective. Techniques to highlight an intervention logic are nested under the label *theory-based approach* to impact evaluation (Evalsed, 2013). Interest in this approach originates in the Barca Report (Barca, 2009) seventh pillar, namely the need of a greater discipline in devising policy interventions so involve a *learning strategy* on their outcomes. Such a discipline-effect is the kernel of both the so-called place-based approach to development policy and the current cycle in EU cohesion policy.

Of course, ex ante evaluations imply a vision of the working of a process of economic change. Mainstream visions pose a number of methodological issues essentially due to the fact that they are (directly or indirectly) based on the concept of 'equilibrium'. Equilibrium is a situation where no incentive to revise expectations and plans is produced, so that no impulse to change unfolds. As it happens, economic change is in the nature of a learning process, that is a process through which ex ante non-measured or non-measurable risks are however prudentially considered and sequentially measured. In equilibrium-based approaches, instead, all learning is deemed either unmeaning (rational expectations) or shocking (adaptive expectations). Either way, an actual agent's essentially prudential bearing is transformed into an abstract attitude to maximize a given variable (essentially utility or profits).

Few among so-called heterodox, or critical, economists have bothered to subordinate the *pars destruens* of their work to a *pars construens*. Someone who would ever care to make a registry of such *rarae aves* should not fail to mention Mario Amendola. In his joint work with Jean-Luc Gaf-

[1] Difference-in-differences; propensity score matching; discontinuity design; instrumental variables. See Evalsed, 2013, ch. 8.

fard, Amendola has made an important contribution to the perpetuation of the pioneering research program started by John Hicks in which economic change is to be analysed as an out-of-equilibrium process. Economists can hardly pose an objective more heterodox or critical than giving all notion of equilibrium up. However, geography of the schools in economic thinking is none of Amendola's business. On a pure theoretical ground, the burden of the out-of-equilibrium method begins and ends with the analysis of a sequential process. Amendola's key interest is in the statecraft[2], instead. Accordingly, these pages aim at presenting bases and basics of his out-of-equilibrium (i.e., sequential) approach in a perspective that is instrumental in a concrete policy issue.

The remainder of the article is thus organized as follows. Sec. 2 reviews Hicks' concern with the construction of an out-of-equilibrium approach. Sec. 3 summarizes the essential concepts at play in Amendola and Gaffard's out-of-equilibrium model. Sec. 4 synthetically considers the resulting perspective on policy making. Touching on EU official framework for institutional accounting, Sec. 5 derives a sequence of accounts implicit in the out-of-equilibrium model. Sec. 6 concludes.

2 Hicksian bases

I have elsewhere argued that the labyrinthine history of Hicks' theoretical production is to be regarded as a sequence of pioneering attempts to emancipate from the notion of equilibrium ((Bianco, 015a)). Although his traverse analyses have inspired endeavours to detail more and more precise conditions for successful convergences to the new steady state, he is utterly unconcerned about traverse per se. He defends inquiries into conditions for the convergence to a new steady state until one looks no further than such a state; yet, 'I *for one* am glad to be rid of it' (Hicks 1977, p. 192, *my it.*)[3]. To him, traverse analysis is as an instrument of exploration for a more ambitious task: 'the study of the Impulse that an innovation gives' (ib.).

The key theoretical function Hicks attaches to innovation is to be understood under the light of his methodological distinction between the 'single period theory' and the 'continuation theory'. Both apply to the analysis

[2]Amendola and Gaffard have applied their model to a good deal of policy issues. This strategy was instrumental in criticizing policy myths and solving apparent puzzles. The gamut of issues the model has been applied to includes: the impact of Keynesian and Monetarist stabilization policies, the impact of an innovation as opposed to a routine choice, the impact of an innovation under different hypotheses on the strength of human and financial constraints, or under different monetary regimes, wage regimes, firms' mark-ups, and market structures.

[3]The steady state is irrelevant both as starting and final edge of a process of change. Not only '[o]n the Austrian approach, one can start out of equilibrium straight off' (Hicks 1970, p. 258), but convergence is bound to take so long that 'before that time had elapsed, something else (some new exogenous shock) would have occurred' (Hicks 1977, p. 195).

of a process of change assumed to be in the nature of a learning process. However, learning can be considered either in an *ex post* or in an *ex ante* perspective. In the former case, the object of investigation is an *actual* co-ordination failure. Its cause can be determined *counterfactually*, as the difference between ex-post results and past expectations. Such a causal determination technique is referred to as single-period theory since it yields perfectly robust outcomes when applied to one period taken in isolation.

In the ex ante perspective, learning is to be considered as the outcome a *possible* coordination failure, instead. That is why, in Hicks' own words, the continuation theory is concerned with 'the effects of the events of a first period upon the expectations and plans which themselves determine the events of its successors' (Hicks 1982, p. 223), i.e., with the ways how possible mistakes can have an effect on learning and hence on planning. Ex ante costs of learning (changes in expectations) and planning (changes in plans) are essential and connected pillars in a liquidity-constrained agent's behaviour: since the exhaustion of existing arbitrage opportunities (speculation) entails a great deal of learning costs, a liquidity constrained agent is compelled to produce new opportunities. Differently from the analysis of pure arbitrage, the theory of liquidity-constrained agent's innovations calls the equilibrium concept benefits into question.

Equilibrium is a situation in which no endogenous stimulus to innovate expectations and hence plans is produced. As it happens, in an equilibrium-based theory ex ante learning costs are not a fundamental issue:

> Elementary economic analysis, which culminates in the determination of the conditions for equilibrium, assumes, when it does deal with change, that the change has not been foreseen, but that, when it takes place, everyone can count on the new conditions being maintained. Such an assumption naturally leads to paradoxes. (Hicks 1932, p. 59)

While via the standard assumption that the opening and the closing position of a process of change are equilibrium positions one is led to derive the conditions for the convergence to the new steady state, Hicks (1970, 1973) devised his neo-Austrian theory of capital in order to consider a process that begins and concludes in an out-of equilibrium position. The economy is conceived as a population of plans of action whose sole common feature is the existence of one period at least (the first one) in which a new plan can yield no immediate result: during its *gestation lag*, a plan generates nothing more than anticipations (sunk cost). As it happens, the whole sense of the role of the neo-Austrian approach *within* the framework of the continuation theory is encapsulated in a fragment of the *Theory of Wages*:

> When a market is not in equilibrium, costs of transference cannot be spread over an indefinite period. Even if it is certain that the change will be a change for the better, it is not certain (and indeed it is

> highly improbable) that the new position will long continue to be the best attainable. It would be highly imprudent to change unless the cost of changing would be covered by the gain within quite a brief period. Costs of change, therefore, become a vastly more important influence on action than they would be under conditions of stationary equilibrium. (Hicks 1932, p. 59)

Such an influence, while is being reverberated beyond the single period, is a fundamental trait in 'the study of the Impulse that an innovation gives'. Such an impulse is primarily a matter of wealth-effects associated to the sunk costs of decisions based on new expectations and plans. As it happens, always such decisions involve conjecture about the extent to which future learning episodes (and relative wealth-effects) can, within the planning span, affect their course. That a plan viability is therefore what a liquidity-constrained agent is compelled to be essentially interested in[4] is the reason why Hicks called his out-of-equilibrium approach 'the Continuation theory'.

3 Out-of-equilibrium: basics

In a private conversation I had with him several years ago, Mario Amendola complained about the very title of his first book with Jean-Luc Gaffard, where their out-of-equilibrium model was first exposed. *The Innovative Choice*, he observed, evokes a distorted image of its substance. An extract of that book encases both the model theme and a hint at the reason of his discontent with that title:

> The way in which the economy actually functions, embodied in the existing productive capacity, depends on the skill of human resources which reflect the characteristics of the environment. A modification of the environment as a source of technology is then the outcome of a learning process which changes the characteristics of human resources, and can *only* come about as the result of an innovative *choice* that triggers off a process of innovation interpreted as a sequential process of research and experimentation. In such a context, which is fundamentally uncertain, the idea of a *choice* between given alternatives whose outcome is more or less known is *meaningless*. (Amendola and Gaffard 1988, p. 84, *my it.*)

In isoquant-based production theory, the technique is implied in the production function, i.e., in the isoquant itself, which is a relation of a given output with a gamut of inputs. Given endowments, the set of possible production options (the *optimal* one among them) is simultaneously determined

[4] He/she is always facing 'the double problem: on the one hand he must estimate what the course of demand will be [i.e., learning], and on the other he must correct the excesses and deficiencies of stock that result from past mistakes [i.e., planning]' (Hicks 1965, p. 95).

and the solution to all economic problems is reduced to a question of intertemporal substitution. If one aims at allowing for the liquidity constraints imposed by fixed capital and other 'frictions' alike, a short- vs. long-term equilibrium approach à la Marshall is generally involved. Needless to say, uncertainty/learning management and hence liquidity risk management are not far-reaching questions. Yet, the fact that inputs (expenditure) actually precede outputs (receipts) implies that an attempt at empowering the capital structure is not a mere input-substitution question: at the core of Hicks' neo-Austrian theory of capital lays the fact that innovation implies a distortion in that structure—at least temporarily, costs grow more than proceeds.

Hicks' most relevant theoretical contribution in continuation theory was the first formal demonstration ever of the condition for a machinery effect[5] à la Ricardo to take place (Hicks 1970). In that article, Hicks also exposes for the first time his neo-Austrian theory especially devoted to innovation analysis. This was based on the sole relation that can be always established in a passage from old to new capital goods: the one between a capacity to produce final output and its cost. Theoretically speaking, indeed, no physical specification of any capital good is involved (Hicks 1977, p. 193). Via a generalization of Hicks' assumption about the time profile of a production process, Amendola (1972) and Patriarca (2012) show that a Ricardo effect does not rely on the technological properties of a new technique but, more simply, on the mere construction of new capacity.

Amendola and Gaffard (1988) have managed to drop another far reaching assumption by Hicks: the Full Performance hypothesis. This is no less than a perfect knowledge assumption, which a definitely unconstitutional norm in continuation theory. By giving this up, learning and planning can be joined; the most often, Hicks kept them apart in monetary and capital writings respectively. In the out-of-equilibrium model, decisions about the level of idle balances (financial reserves) to hold are of critical importance. While absent in his neo-Austrian writings, such a junction of liquidity management and the neo-Austrian capital theory was given by Hicks (1990) a determining role in his suggestion for unifying the two main threads in macroeconomic thinking, namely the Smithian and the Keynesian—within which consumption and investment are characteristically regarded as antithetical or transposable elements of demand respectively. The key to Hicks' proposed unification is the possibility of drawing on reserves as soon as a distortion in the capital structure occurs.

Finance is not the only limit to innovation, yet. Under the full performance hypothesis, or any other equilibrium assumption in the sphere

[5]The machinery effect consists in the appearance of temporary unemployment as a result of shortage of capital (higher construction costs without savings to cover them) following a technological change.

of production, innovation consists in the adoption of a new yet well-defined transformation scheme of inputs into outputs. Basically, the problem of such an adoption is reduced to a 'game', that is a choice set with pre-determined results, the optimal one among them. From an analytical standpoint, innovation is instantaneously accomplished, so that dynamic efficiency appears to rely on labour being fully available for new allocations, i.e., on 'qualitatively undecided' skills. Yet, as emphasized by Adam Smith in chapter 1 of modern economic theory, technical progress actually relies on specialization, a qualitative deepening, capabilities being increasingly less available for reallocation. As it happens, for any attempt at innovation to be successful an appropriate learning process must actually take place. On theoretical grounds, for innovation to be deemed a learning process – so that its results are not pre-determined but defined step by step, as the sequence of decisions and learning actually unfolds – it is necessary to consider *both* the sunk costs of machine building and labour learning: an attempt at change (innovation) is constrained not only by available finance but also available learning capabilities (Amendola 984a).

Out-of-equilibrium, the technique cannot be deemed a well-defined transformation scheme of inputs into outputs; rather, it is a *learning capability*, a heterogeneous, particular, specific human resource: 'the expression of a potential capacity to manage the change' (Amendola and Gaffard 1988, p. 64) that 'contributes [in interaction with other 'techniques'] to determine the character and the direction of the change and is itself changed as the process goes on' (Amendola 984b, p. 364). The evolution of a learning capability is paused only during the period after which this is perfectly co-ordinated with the other techniques—i.e., in equilibrium. Out-of-equilibrium, instead, the technique reorganizes itself. Considering the role of sunk costs, idle balances (liquidity risk) and learning altogether,

> We can therefore interpret the increase in the demand for liquid positions that immediately follows the breaking of a sequence [i.e., a disequilibrium] as the behaviour of an agent who, while having doubts on the existing model (i.e. on the way the economy is working), is not yet fully convinced that the model must be discarded and replaced by something new and completely different [learning by waiting]. When (and if) such a conviction is reached, the adequate response to the search for flexibility ... can be but an innovative choice [learning by doing], and the most important problem then becomes that of the viability of such a choice, strictly related to the determinants of the evolution of the process of innovation. (Amendola and Gaffard 1988, p. 43

Out-of-equilibrium, constraints associated to the sunk costs of learning and planning are of paramount importance. Since such costs can be covered only in following periods, the idea of a succession of 'choices between given alternatives' must be abandoned: the fundamental uncertainty associated

to the fact that a policy outcome is sequentially determined implies that a sequence of maximizing choices can result in a substantial accumulation of liquidity risk and hence in bankruptcy. In order to keep sunk costs associated to frequent planning updates at arm's length, businessmen's actual decisional principle is the viability of a plan, instead. As a business needs be governed within limits expected to demarcate a safety zone[6], the out-of-equilibrium model investigates how, and under what conditions, an intended process of change – whose viability is secured through a sequence of choices essentially aiming at relaxing both the human the financial constraint – can be accomplished.

4 Out-of-equilibrium: policy-making

A plan viability conditions do not only depend on individual sunk costs, though. An innovation calls for an adequate amount of internal and external financial resources to cover the sunk costs associated to the distortion in productive capacity; no less essential, however, are *future* financial resources, namely consumers' spending: an innovation that eventually generates its own financial resources is definitively what a viable innovation is meant to be. Therefore, an entrepreneur cannot afford considering the environment as a merely exogenous variable: a new technique needs adjusting to the technology, just as this can be modified by the introduction of a new technique. Out of equilibrium, there is no wall to divide the technique and the technology, the firm and the market, the micro and the macro: in a nutshell, *learning is macro-founded*.

As it happens, innovation consists in a learning process that modifies both technique and technology. An innovation is viable if, and only if, a new coordination among the agents involved is established: an innovator has to succeed in harmonizing the flow of monetary funds in a direction that is consistent with the establishment of a new convenient order. The coordination of producers and consumers' learning is the kernel of a viable innovation.

In this context, market competition is to be interpreted à la Hayek, namely as a behaviour that lays new information on the market. Innovation, namely a distortion and a subsequent attempt at harmonizing productive capacity, is an outstanding instance of Hayekian competition. This can be more or less effective; not, as is the case with Walrasian competition (the mainstream perspective on competition), more or less perfect. Whereas Hayekian competition relates to market behaviour, Walrasian competition relates to a market situation in which all incentives to rivalry are exhausted. Such an irenical perspective on competition is condensed into a price vector

[6]Interestingly, the management of means within the limits imposed by an end is what Aristotle means by 'natural chrematistics'.

resulting in an efficient allocation; in the Hayekian perspective, prices must be knocked off that pedestal: prices are an instrument, not the sole possible, to make an innovation viable. As in fixprice à la Hicks, price changes consist in acts of policy, i.e., in *coordination measures*; not, as in the mainstream view, in a coordination (equilibrium) condition.

Sunk costs, competition and coordination constitute the context within which fixprice behaviour is to be understood. It is only when sunk costs are irrelevant, that is when liquidity constraints are irrelevant, that Walrasian competition and its full-coordination hypothesis can be pertinent. In presence of liquidity constraints, the price-mechanism is liable to be much less efficient. For example, sunk costs undermine the influence of the interest rate on investment decisions. As it happens, the bank rate affects only the time taken by an entrepreneur's investment to pay for itself (Hicks 1989). In its turn, the (liquidity-constrained) lender is concerned not only with profits, but also – and more fundamentally – with the liquidity risk implicit in his/her loans. Actually, the interest charged on borrowers is such that a lender's liquidity risk is somehow reduced through a suitable mix of currently available liquidity and future profits. As a rule, *coordination cannot be assured by the impersonal mediation of the price-mechanism: due to liquidity constraints, too often substitution effect are weak as opposed to the income and wealth effects implied by the liquidity risk implicit in sunk costs*[7].

Out of equilibrium, liquidity risk management and hence money are theoretically and analytically essential. As is widely understood, in equilibrium-based theories the role that is played by liquidity risk is not basic. Out of equilibrium, money is not a veil: available liquidity plays a key role in the determination of the eventual outcome of an attempt at change. Being logically unthinkable ex ante, alleged 'natural' values (prices, interest rates, unemployment, output...) are of no analytical value: natural values are thinkable only ex post... when they are politically[8] useless. In the out-of-equilibrium perspective, all future outcome is endogenous, determined by the actual steps by way of which coordination is *sequentially* found, or lost, track of. Out of equilibrium, the only exogenous parameters are past outcomes: an out-of-equilibrium sequence is analytically *irreversible*, indeed. This is not the case with an equilibrium-based analytical perspective on change.

A ready comparison with the principles of mainstream macro-economic thinking is here worthwhile[9]. Its paradigm is 'growth', interpreted as the long-term potential output (full performance): in such a long run, consumption and production are mutually consistent and hence in equilibrium

[7] '[O]ne needs to pay little attention to interest rates, changes in which emerge as consequences of changes in liquidity' (Hicks 1977, p. 79).

[8] In the sense of Hayekian competition.

[9] For a thorough comparison see Amendola and Gaffard (2006).

(full coordination). The cycle is due to coordination failures (disequilibria) arising out of bad prices (cf. Walrasian competition) ascribed to market frictions. Market deregulation (lack of frictions, or rigidities) and capital productivity[10] are thus the 'fundamentals' (fundamental parameters) of the competitiveness of an economic system. Endogenous growth theory allows for a third fundamental, namely agents' preferences about technical progress. In doing so, agents' behaviour can be given an axiomatic foundation: given rational expectations, all the time agents inter-temporally optimize their (pre-determined) choices outcomes. This third fundamental makes equilibrium a condition an economic system all the time *does* stick to[11].

However growth is considered, exogenous or endogenous, growth is determined by capital productivity, in a one-way relation. That the opposite never applies is an implicit equilibrium assumption in the production domain: coordination issues do never arise, as if new productive capacity could be made instantaneously, namely as if all costs were here and now (analytically) covered by proceeds, so that liquidity risk associated to capacity building (both in the machine and the learning sense) seems to be of no rational consequence. Failing liquidity risk, fluctuations are deemed reversible, and economic change a-sequential: in methodological parlance, economic dynamics is disengaged from the irreversible character of historical time. In such an artificial environment, it is natural to believe that the seeds of liquidity risk are sown by frictions (whose abatement is the task of so-called structural reforms[12]) and not, as it actually is, by the sunk costs of learning and capacity building.

Coordination relying on mutually consistent learning, the intensity at which relative measures unfold—that is *competition intensity*, is not a neutral coordination factor. Outcomes being sequentially determined, excessive price volatility shows up as a symptom of substantial uncertainty. As it happens, policies must aimed at learning a new form of coordination, i.e.,

[10]Implicit in the production function, productivity of capital is an index of the technological frontier.

[11]New-Keynesian 'rigidities' can determine deviations from the equilibrium (natural) fluctuations as defined in New-Classical RBC models.

[12]As it happens, Keynesian and Monetarist policy views share a common interpretation of change as an 'instability' (mismatch of supply and demand for final output) so that, in both cases, economic policy is a 'stabilization policy'. In a Keynesian world, the effect of a final demand constraint is a disinvestment which entails a more than proportional ('accelerated') recession, which is to cause a further regression of the final demand constraint and so on, in a vicious circle that can only be stopped with an injection of exogenous demand. In a Monetarist world, instead, instability has always and everywhere a monetary origin because, **Keynesian uncertainty not subsisting in demanding final output**, output prices basically depend on money supply. As a 'wrong' money supply results in 'wrong' prices, best policy is no (discretionary) monetary policy (Lucas 1975), i.e., mere inflation-targeting. Likewise, the natural (structural) levels of output and unemployment constituting a first best, fiscal policy has just to set the seal on structural reforms, so that agents can behave according to fundamentals only.

at adapting organization to new relevant knowledge. All such policies are always instruments, never an end in itself: as with prices or market structures, there is no organizational norm and, more generally, no coordination measure that can ex ante be deemed per se (i.e., always and everywhere) 'optimal'. The only relevant objective is a convenient coordination, which is to be attained via a sequence of constrained and constraining coordination measures.

A guiding principle in mutual learning coordination managing can be identified, though: the need to relax the human and financial constraints underlying sunk costs. Such costs implying a rise in liquidity risk, the availability of reserves to manage such a risk is of paramount importance. From a policy perspective, the main function of money is buying others' collaboration. In this sense, a viable competition intensity shall be a positive function of available liquidity (i.e., gradualism is better than shock therapies) and, in an attempt at generalization, it could be maintained that – provided that appropriate learning sequentially materializes – viability requirements are the less stringent the less stringent liquidity constraints are.

5 The out-of-equilibrium model: an accounting perspective

Amendola and Gaffard's (1988, 1998, 2006) analytical model is based on a system of interacting behavioural equations by way of which what happens on the way of an out-of-equilibrium process of change can be simulated. In the model characteristic ex ante perspective, such simulations are not meant to generate ready-cooked solutions to the policy problem, but to assist the policy-maker in weighting and considering the impact of a hypothetical policy intervention on the human and financial imbalances characterizing a process of change driven by learning-by-doing. A policy intervention to exert a dampening effect on such imbalances shall play a positive role for the viability of such a process.

These pages aim at approaching the out-of-equilibrium model from a new standpoint: its accounting structure. The sequence of accounts implicit in the model allows drawing not only a schematic synopsis of Amendola and Gaffard's sequential model itself (whose original notation is accordingly preserved), but lays the groundwork for practical policy application, too. That is why ESA2010 (Eurostat 2013) accounting codes[13] are attached to the relevant items. As observed in Sec. 1, EU cohesion policy introduces ex ante

[13] AF.2, stock of currency and deposits; AF.4, stock of loans; AN.122, stock of work in progress; AN.123, stock of finished goods; B.10, changes in net worth; B.90, net worth; F.2, transactions in currency and deposits; F.4, loans; D.42, distributed income from corporations; P.11, transactions in market output. P.2, intermediate consumption—in the neo-Austrian perspective on capital (as opposed to the Walrasian one with which the ESA is essentially concerned with), this includes compensation of employees (D.1); as a

and interim impact evaluations. These are especially meant to highlight the policy intervention ex ante logic so to go beyond the ex post, counterfactual slant characterizing the classical econometric approach to policy evaluation. The consequential slant of the out-of-equilibrium model can play a positive role in maturing an ex ante approach to policy evaluation.

The out-of-equilibrium model assumes a monetary economy with a single financial asset (money). Focus is on the interactions between producers (firms, S.11) and consumers (households, S.14) of non-financial goods and services, although the possibility of financial support (f_t) by a third party is explicitly allowed for. The overall object of analysis, namely a process of change, consists in a sequence of elemental periods. These, in their turn, consist in a sequence of decisions by means of which producers and consumers interact. In the simplification here proposed, the 'period' is made up of two 'episodes': the former focuses on producers' decisions, the latter on consumers' decisions.

As for producers, it is here assumed that a production plan lasts two periods. Capacity that is created now can only be utilized in the subsequent period: $(\omega_t^c, \omega_{t+1}^u; B_t^c, B_{t+1}^u)$, with $B_{t+1}^u \leqslant B_t^c$; ω_t^c and ω_{t+1}^u are monetary wage funds (capital), i.e., respectively, the cost to build and exploit a productive capacity of B_{t+1}^u unities of final output. In other words, while current output resulting from B_t^c is always nil, ω_t^c is the monetary anticipation required to be in a position to produce, in the next period, B_{t+1}^u unities of final output. Of course, omegas constitute households' labour income.

The period t starts (LS) with producers and consumers endowed with a given amount of monetary and non-monetary resources inherited from the previous period. Households, whose role is to finance consumption plans lasting one period, dispose of a certain amount h_{t-1}^h of idle balances. Firms, whose role is to finance production plans lasting two periods, dispose of a stock M_t of internal monetary resources – amounting to the sum of the proceeds from final output sales in the previous period (m_{t-1}) and residual reserves (h_{t-1}^f) – and a stock of non-monetary resources, namely finished goods (o_{t-1}) and usable capacity (B_{t-1}) valued at past output prices (p_{t-1}). A certain degree of liquidity risk is implicit in this non-monetary stock.

Let us now pass to consider the course of interaction. The period is thus split into two 'episodes': producers accomplish their sequence of decisions in the former episode; households in the latter. Producers start by making a purely distributive decision[14] concerning the portion of M_t that is taken out to finance non-production plans (c_t). In the present setting, such a take-out

consequence, productive capacity is considered as P.52, i.e., as a change in inventories; P.3 is final consumption expenditure (no corresponding asset is recorded as, for sake of simplicity, consumption is here supposed to take place within the period).

[14]It should be noted that in earlier versions of the model this distributive decision did not come first. The correction adopted in Amendola and Gaffard 2006 is analytically to the point and allows important accounting simplifications, too.

can only finance be destined to households' consumption plans. The whole of what remains $(M_t - c_t)$ goes to finance production plans. Yet, financing production plans implies something more than mere putting money into 'inputs': a certain portion (ρ) of idle balances *must* be hold as a reserve fund being available should downward risks on the plan materialize.

The desired amount of a reserve fund $h_t^{f,d}$ $[= \rho\,(M_t - c_t + f_t)]$ depends on a producer's conjecture about the prospect uncertainty. Basically, such a conjecture depends on his/her plans, namely the amount of capacity the producer aims at consuming (utilizing) or creating anew. Such an amount, in its turn, depends not only on the costs of inputs (wage fund, ω_t) but also on a conjecture about the state and possible evolution in final demand (d_t), which in its turn contributes to determine the selling price (p_t), the producer' capacity to borrow (f_t), and his/her acceptance of the price i_t to pay for external finance (footnote 21). Such a complex determination of desired reserves, investment, disinvestment, indebtedness, terms of trading (and something more that here is not considered for sake of simplicity[15]) reflects the complexity of an entrepreneur's decisional problem.

[15]For example, it is here assumed that firms are not constrained by available human resources, which is a simplification hiding important qualities of the model. It is here also assumed that the desired level in the finished product stock is zero: that is why current supply (s_t) here amounts to the sum of current output (q_t) and the existing stock of finished product (o_{t-1}).

LS	Opening balance sheet		
AF.2	$m_{t-1}+h^f_{t-1}$		
AN.123	$p_{t-1}o_{t-1}$		
AN.122	$p_{t-1}B_{t-1}$		
		B.90	$M_{t-1}+p_{t-1}(o_{t-1}+B_{t-1})$

LS	Opening balance sheet		
AF.2	h^h_{t-1}		
		B.90	h^h_{t-1}

LX.1	*Changes in balance sheet*		
		D.42	c_t
		F.2res	$h^{f,d}_t$
F.2	f_t	F.4	$f_t(1+i_t)$
		*P.2	$\omega_t=\omega^u_t+\omega^c_t$
P.52	$-p_tB^u_t$		
P.52	$p_tB^c_t$		
P.11	p_tq_t		
		B.10	$p_tq_t+p_t(B^c_t-B^u_t)-(c_t+h^f_t+\omega_t)-i_tf_t$

LX.1	*Changes in balance sheet*		
D.42	c_t		
*P.2	ω_t		
		B.10	$c_t+\omega_t$

LI	Interim balance sheet		
AF.2	$m_{t-1}+h^f_{t-1}$	AF.2	c_t
		AF.2res	$h^{f,d}_t$
AF.2	f_t	AF.4	$f_t(1+i_t)$
		AF.2	ω_t
AN.123	$p_t(o_{t-1}+q_t)$		
AN.122	$p_t(B_{t-1}-B^u_t)$		
AN.122	$p_t\,B^c_t$		
		B.90	$p_ts_t-f_t(1+i_t)+p_tB_t$

LI	Interim balance sheet		
AF.2	M^h_t		
		B.90	M^h_t

LX.2	*Changes in balance sheet*		
F.2	m_t		
P.11	$-p_ts_t$		
P.11	$\|\|p_to_t\|\|$		
		F.2	$f_t(1+i_t)$
		F.4	$-f_t(1+i_t)$
F.2	$h^{f,d}_t$	F.2res	$-h^{f,d}_t$
		B.10	$m_t+\|\|p_to_t\|\|$

LX.2	*Changes in balance sheet*		
		F.2res	$h^{h,d}_t$
		P.3	$m_t=min[p_td_t,p_ts_t]$
F.2	$\|\|h^{h,n}_t\|\|$		
F.2	$h^{h,d}_t$	F.2res	$-h^{h,d}_t$
		B.10	$h^h_t-m_t$

LE	Closing balance sheet		
AF.2	$m_t+h^f_t$		
AN.123	$\|\|p_to_t\|\|$		
AN.122	p_tB_t		
		B.90	$M_t+p_t(o_t+B_t)$

LE	Closing balance sheet		
AF.2	h^h_t		
		B.90	h^h_t

In the first episode (LX.1), firms originate these liabilities[16]: c_t, $h_t^{f,d}$, $f_t(1+i_t)$ and ω_t. These are corresponded by a pool of firms' assets[17] – made up of current output ($p_t q_t$) and capacity under construction ($p_t B_t^c$) to which disinvestment associated to capacity utilization ($p_t B_t^u$) is to be subtracted – and a pool of households' assets ($c_t + \omega_t$). At the end of this episode, firms and households' balance-sheets assume an *interim* configuration that is quite instructive: since $h_t^{f,d}+\omega_t = M_t - c_t + f_t$, producers' interim net worth (B.90) amounts to the sum of all illiquid (AF.4) items values. On the other side, households' interim net worth amounts to the sum of the values of all liquid (AF.2) items available in the system. As it happens, entrepreneurial decisions consist in a value transformation process associated to a liquidity transformation process, so that value is created if and only if the increase in liquidity risk associated to the sunk costs is so managed as to be *temporary*[18].

In the second episode (LX.2), households must decide about their consumption plans (d_t) and the degree of confidence ($h_t^{f,d}$) with which carrying them on[19]. Final consumption expenditure is determined by the effective demand principle: if demand exceeds supply (footnote 15) households are left with a stock of undesired idle balances ($\|h_t^{h,n}\|$)[20]; otherwise, firms are left with an undesired stock of finished product ($\|p_t o_t\|$). At this point, firms reimburse debt and everyone withdraws the unused parts of reserve funds. During this episode, liquidity moves the other way round: at the end, firms are more liquid, households less liquid.

Under such a set of assumptions, firms' and households' closing balance sheets (LE) are perfectly analogous to opening ones. The model that is here set out has many simplifications relative to Amendola and Gaffard's model. Most notably, the human resource constraint on the wage fund is not allowed for: although such a shortcut hides important features of the model, it seems to be quite consistent with current policy issues, in which financial constraints appear generally stronger than human constraints. Secondly, no explicit a rule governing market-determined price and wage changes is considered. Be it as it may – apart from a *deceiving* provision for the price to pay for external finance[21] – the accounting model here devised yields

[16]It is characteristic of the 'endogenous money' approach to banking theory, as opposed to the 'exogenous money' approach, the view that economic units can only 'originate' liabilities (Bianco 015b).

[17]Nominal holding gains and losses (K.7) relative to o_{t-1} and B_{t-1} are here not explicitly differentiated.

[18]This point should be referred to Bianco (015b), in which both traditional banking and shadow-banking ('creative') are interpreted as liquidity transformation processes, i.e., as originate-to-hold (OTH) vs. originate-to-distribute (OTD) models of idiosyncratic liquidity risk management.

[19]In the original model, $d_t = (1-\sigma)M_t^h$ and $h_t^{h,d} = \sigma M_t^h$.

[20]The double bar notation is to stress that such a stock exists only if greater than zero.

[21]If a financial sector is to be allowed for, what is to be taken into account is not the interest rate charged on a borrower's asset of f_t but the discount rate on a borrower's

a simplified yet consistent accounting image of Amendola and Gaffard's sequential model.

6 Conclusion

The theoretical mainstream looks at learning in an ex post perspective only. The attempt at escape from paradox in the resulting theory of change was a key trait of economics during so-called 'years of high-theory' (from the Great Depression until WW2). Abundant pleas for a 'higher', namely more prudential theory, have characterized debate following the Great Financial Crisis, too. In this context, rational expectations hypothesis is a typical target of criticism. Under such an assumptions, agents' errors are deemed *random*, i.e., unmeaning, so that plans are never worth a revision. In other words, the sunk costs of changing expectations and plans are assumed away. An adaptive expectations hypothesis, however, appears to be no more than the other side of the same coin: when *no* provisional error is unmeaning (all learning is shocking), sunk costs of changing expectations and plans are *de facto* assumed away, too. Rational expectations can be regarded as a more fundamentalist version of the same 'iso-quantistic' inspiration.

Conventional policy narration before the crisis rather assumed rational expectations. In the consensus view, learning in the private sector was unmeaning, financial operations just a veil; each and every problem arose out of a lack of information or attempts at electoral cheating by the public sector. Yet, one of the most severe financial crisis ever did happen after years of unquestioned application of policy principles in tune with that narration. Such policies have produced little more than a feeble real growth accompanied by an extraordinary expansion in shadow banking. The European Central Bank, while having to be unconcerned ('autonomous') with the real economy, can well plan action (jointly with the Bank of England) to repair the securitization market (BOE and ECB 2014).

Yet, a sound theory of securitization was, and still is, unavailable (Gorton and Metrick 2012). Such a privation must be a reflection of the phenomena detailed by Pagano (2014), namely the ineffectiveness, and consequent poor or perverse impacts, of stereotyped theoretical models and policy interventions. Building on 'endogenous money' views, I have elsewhere devised an interpretation of both traditional and shadow banking as distinct procedures of idiosyncratic liquidity risk management with equilibrium conditions giving place to viability conditions (Bianco 015b).

Ex ante impact evaluations call for a theory of change. It is one of Amendola's key teachings that any such a theory is to be derived following a sequential, out-of-equilibrium approach. All equilibrium theory, being based on a coordination assumption, is prevented from displaying any

liability of f_t.

heuristic power as a theory of change: its function can be no more than definitional, namely with the model way to arrange existing information. The accounting version of his model here presented emphasizes the liquidity risk dimension in Amendola's theory of change. I deem this a first step towards a macro-financial out-of-equilibrium model. Reference to official codes in institutional accounting is to be considered as a hint at the verification of both data per se and the consistency of accounting definitions under the input-output framework (with which official accounts are especially concerned with) and the out-of-equilibrium approach.

The sequence of two episodes here devised highlights the coordination issues that characterize a single period in an out-of-equilibrium sequence. Two of such issues here arise: one between investment (construction) and disinvestment (utilization), another between disinvestment and consumption. In the former episode, firms' learning constraint is relaxed while the financial constraint is strengthened; vice versa in the latter episode. Moving constraints reflect liquidity shifts between institutional sectors. Changes in reserve funds are evidence of learning, which is the fundamental driver of change.

As for learning analysis, it should be considered a recent legal standard, namely that all reserve funds must have a determined nature: explicit reference to those activities whose risks are granted by any of such a fund is mandatory. Taking this standard into consideration implies that households and firms' reserve funds are divided into two parts, so that single out reserve funds devoted to manage downward risks, and cover associated sunk costs, pending on running and new plans respectively. Consistently with the *esprit des lois* in EU cohesion policy, such a distinction can lay the groundwork for monitoring and evaluating the learning dimension of cohesion policy outcomes.

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