Second Best Analysis in a Non-Modigliani-Miller World

Financial implications of real economic disequilibria

Massimo Cingolani – EIB*

11th International Conference – Credit 2012

Sovereign Risk and its Consequences for Financial Markets, Institutions and Regulation

Venice, Italy, 27-28 September 2012

* Opinion expressed are personal. Second draft : 09.09.12 ; version dated : 09.09.12

Table of Contents

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Introduction.

Admati et al. (2011) discussed at the Credit conference of last year the question of the capital adequacy of banks and, for a good part of their paper, developed the idea that the financing structure being irrelevant in a Modigliani Miller (MM) world [1], many of the arguments against a regulatory increase of equity in banks are misplaced. Whatever one may think about this contention, it has the merit to call for being rigorous about the consequences of the market efficiency hypothesis, an essential property of the "equilibrium" notion used in the finance literature, a key variant of which is provided by the MM results.

Welfare analysis, as developed in particular in the literature on the second best, also makes reference to a concept of equilibrium that draws upon a notion of efficiency.

Section 2 introduces the discussion on the parallel between the Arrow-Debreu inter-temporal equilibrium and the Hayekian-Hicksian notion of temporary equilibrium, noting that a condition for the two to coincide is that rational expectations prevail.

Section 3 of the paper further discusses the analogies between these notions of equilibrium and the related efficiency concepts, concluding that the two notions of efficiency coincide in an Arrow-Debreu intertemporal equilibrium.

In section 4 a parallel is drawn between the analysis of the second best and a "dynamic" or "sequence" economy, where temporary equilibrium diverges from the inter-temporal Arrow-Debreu first-best equilibrium. In this case, when rational expectations do not hold, "short-term equilibrium prices" of goods produced and assets accumulated diverge from the Arrow-Debreu equilibrium prices. Prices thus generate a "disequilibrium",

[1] "In fact, what is currently understood as the Modigliani–Miller theorem comprises four distinct results from a series of papers (1958; 1961; 1963). The first proposition establishes that under certain conditions, a firm's debt–equity ratio does not affect its market value. The second proposition establishes that a firm's leverage has no effect on its weighted average cost of capital (that is, the cost of equity capital is a linear function of the debt–equity ratio). The third proposition establishes that firm market value is independent of its dividend policy. The fourth proposition establishes that equity-holders are indifferent about the firm's financial policy". (Villamil, 2008)

which could in principle be measured by their distance from the general equilibrium maximum efficiency prices.

Section 5 argues that setting prices based on a no-arbitrage assumption in a sequence economy where rational expectations do not hold will be in itself a cause for a further divergence of prices from their "equilibrium" A-D value.

In conclusion the argument developed in this paper implies that by not being sufficiently critical to the concepts of asset pricing under a no-arbitrage assumption, the economic profession facilitated the emergence of the financial crisis. All efforts should now be concentrated on building a finance theory that holds under more realistic "disequilibrium" assumptions.

General Equilibrium: inter-temporal vs temporary.

There are different ways to define equilibrium in economics, corresponding to different economic schools (Milgate, 2008). For example Marglin (1984) looks at a growth model studied in the long run, which is characterized by a simple linear technology. Within this framework he shows that depending on the choice of essentially the same variables and their grouping between endogenous and exogenous ones, three different variants can be derived, the respective solution of which yields to a different definition of equilibrium and of its properties: one which is illustrative of the neo-classical approach, a second which is closer to the Keynesian approach and a third which is typical of Marxian analysis.

Even restricting attention to the mainstream neoclassical approach, there are significant nuances in the definition of equilibrium and in the characterization of its efficiency properties between "real", "monetary" or "finance" equilibria. These may be traced back to Hicks's notions of "futures" and "spot" economies (1979 [1939], pp. 136-140). In Hicks' spot economy it is assumed that all transactions are for immediate delivery, without forward trading. All transactions thus relate to the same date. If the environment is stable, the concept of a spot economy translates naturally into the notion of stationary state equilibrium, where expectations are always realized, therefore permitting to achieve equilibrium recursively in every period.

At the other extreme, in Hicks' "futures economy" everything is fixed up in advance, with all goods being bought and sold forward. This allows achieving not only that "current demand and supplies be matched, but also planned demand and supplies" (Hicks, 1979 [1939], p. 136).

The "spot economy", where only spot markets are cleared by current prices, corresponds to Hicks notion of *Temporary Equilibrium*, whereas a pure "futures economy", where all markets spot and forward are cleared by the relevant prices, defines what Hicks calls *Equilibrium over Time*. Arrow (1953) and Debreu (1959) later formalized the latter into what became known as the Arrow-Debreu notion of *Intertemporal General Equilibrium*. *Temporary Equilibrium* remained instead associated with the names of Hayek (1928), Lindhal (1928) and Hicks (1939) himself. It sets the basis for the notion of General Equilibrium developed by Mc Kenzie (1954), retained also in Arrow (1953) and Arrow and Hahn (1971), that is still the reference for modern finance.

Under the assumptions of the single good, "week-economy", retained by Hicks (1939), intertemporal general equilibrium and temporary equilibrium coincide under perfect foresight:

> *"By examining what system of prices would be fixed up in a futures economy, we can find what system of prices would maintain equilibrium over time under a given set of changing conditions. Economists have often toyed with the idea of a system where all persons trading have 'perfect foresight'. This leads to awkward logical difficulties, but the purpose for which they have invented such systems can be met by our futures economy. Whenever the question is asked: What movement of prices, if it had been expected, could have been carried out through without disequilibrium? this is the sort of way it can be tackled" (Hicks, 1939, 140).*

This point is retained also by Magill and Quinzii (2008) when they generalize Arrow's (1953) definition of sequential markets with the concept of *spot-financial market equilibrium*, a variant of temporary equilibrium for which they identify an additional condition that is needed for its coincidence with the Arrow-Debreu intertemporal equilibrium:

> *"…the financial markets must be complete, and agents must correctly anticipate at the initial date the spot prices of every good and the payoff of every security at every date-event in the future." (2008, p. 2)*

In other words, in addition to the spot prices for current goods, for a temporary equilibrium to coincide with an intertemporal equilibrium, there must also exist a set of securities traded in forward markets open at the same time as those of current goods that cover completely every possible future condition of the economy in any of its contingent states (the forward price of an umbrella delivered tomorrow in case it rains is different from that in case of a sunny day). Magill and Quinzii (2002 [1996], p. 36), define the *correct expectation equilibrium* is such a way:

> *"… that this concept permits agents to hold different probability assessments regarding future events: in case where all agents hold common probability assessments the concept reduces to the equilibrium referred to in macroeconomics as a* rational expectations equilibrium*"*

For these authors when the assumption of correct expectation is removed one obtains temporary equilibrium:

> *"Removing the assumption of correct anticipations leads to the theory of temporary equilibrium, which focuses on the minimal conditions on agents' expectations of future prices which permit current markets to clear. Maintaining the assumption of correct anticipations of future prices while dropping the assumption that financial markets are complete leads to the theory of general equilibrium with incomplete markets…" (Magill and Quinzii 2008, p. 3)*

However, in Grandmont's model of a sequential economy, which generalizes the concept: "the temporary equilibrium method includes self-fulfilling expectations as a special case" (2008, p. 7), which seems more logical, since in temporary equilibrium expectations enter into the picture and amongst the various assumptions that can be made, there is also that they are "correct". Apart from this small point of detail, both entries of the *New Palgrave* agree on the fact that the temporary equilibrium is "intrinsically timeless" (Grandmont 2008, p. 5), or "essentially static" (Magill and Quinzii, 2008, p. 2).

Finally Malinaud (2008) observes that a condition necessary for the coincidence between intertemporal and temporary equilibria is that that time is infinite, which implies also "infinitely lived firms" and consumers. In this respect Petri (2004, pp. 75-77) notes the logical contradiction of assuming a period of time that potentially extends to the infinite future, and the assumption generally retained in the intertemporal equilibrium literature that the number of firms is fixed and therefore that there is no free entry, which seems to point towards a short-period or even what he calls "very-short-period equilibrium".

Equilibrium, efficiency and second best.

The world of intertemporal general equilibrium is a first-best world, where prices are such that the allocation of the resources is optimal in the sense of Pareto. The Pareto optimality implies that it is not possible to modify the allocation of the given resources obtained after exchange and/or production resulting from the given market prices without decreasing the utility of at least one or the market participants. It is the notion of efficiency that is at the core of the mainstream model of the model of a market economy, implying what Allais (1971) calls the "marginal equivalencies". It can be expressed verbally as the condition that all "the marginal rates of substitution of all agents between all pair of goods are equalized" (Magill and Quinzii 2003, [1996], p. 64). Whenever the temporary and intertemporal equilibria coincide, the property of maximum efficiency extends also to the corresponding temporary equilibria of the model of a sequence economy, as demonstrated originally by Arrow (1953). As discussed above, this requires that:

- there exist complete markets where spot and forward prices are established competitively;
- expectations are correct (or rational);
- entreprises and consumers are infinitely lived.

These strong assumptions characterize the first best Pareto optimality. To relax them, the second best literature introduced some additional constraints in a model where they are in fact maintained. The "general theorem for the second best" asserts that:

> *"… if there is introduced into a general equilibrium system a constraint which prevents the attainment of one of the Paretian conditions, the other Paretian conditions, although still attainable, are, in general, no longer desirable" (Lipsey and Lancaster, 1956-57).*

This theorem means that, compared to the "first best" benchmark of intertemporal general equilibrium with complete markets, if some additional constraints are added that limit optimization possibilities of agents, and, as a result, there is more than one departure from the first best conditions for maximum efficiency, removing one distortion only does not necessarily bring to a welfare improvement.

The second best brought interesting applications, particularly in the public sector, taxation and for the pricing of public goods (Kolm, 1970; Guesnerie, 1975, 1980). However, in his survey, Bohm (2008) criticizes the dependence of the optimum of second best on the particular set of constraints retained, or, in other words, for the lack of generality of the results obtained by this literature. For this author, the main "general" consequence of the second best theorem, which he interprets as a "negative result", is that economists should be prudent when giving policy advice based on the first best, a piece of wisdom that is not always followed by the public choice literature and even less in applied policy work.

The finance literature chose the alternative route of relaxing some of the equivalence conditions above, and notably the assumption of market completeness, while referring always to a benchmark concept of temporary equilibrium characterized by first best intertemporal efficiency, notably in Hart (1975), Geanakoplos and Polemarchakis (1986), Magill and Quinzii (2003, [1996]) and others.

This literature defines a *financial market equilibrium* based upon a particular notion of efficiency that rests on the assumptions of *no arbitrage* in the pricing of securities. Magill and Quinzii (2003, [1996], p. 69), define the absence of arbitrage as follows:

> *"... in an environment where investment opportunities have constant returns to scale, there are no arbitrage opportunities if there does not exist an investment strategy which gives a positive payoff in at least one state with non-negative payoffs in all remaining states."*

In other words, in a sequential economy with spot and forward markets, where securities exist that allow trading on future needs, there should not be investment strategies with zero price that bring positive payoffs. In the absence of arbitrage, there exist "a positive vector of state prices under which investment in every security makes a zero profit" (Magill and Quinzii, op. cit. p. 75). A financial market equilibrium is then defined as a "no-arbitrage equilibrium, which is a constrained Arrow-Debreu equilibrium" (ibid. p. 83 and theorem 10.3, p. 85).

When markets are complete, the financial market equilibrium corresponds to an Arrow-Debreu intertemporal equilibrium (ibid. theorem 10.6, p. 87, as well as Arrow, 1953 and Debreu 1957, ch. 7). When markets are incomplete there is no correspondence, therefore financial market equilibria are not Pareto optimal (ibid. theorem 11.8, p. 102). However, in a two period economy with one good where the security structure is given, the financial equilibrium is "constrained Pareto optimal" (ibid. theorem 12,4, p. 104), therefore it is in some sense a "second best" optimum (see also DeMarzo, 1988).

No arbitrage is an efficiency condition for security prices according to which these prices reflect all available information. It implies that the price of a security is equal to the present value of the discounted stream of its expected future cash flows. This crucial equilibrium condition, whose deterministic variant was already clearly identified in Allais' "law of present value"[2], is sometimes expressed by the statistical property that the price of securities follows a martingale (Le Roy, 2008). By definition it excludes the non-existence of bubbles in asset prices.

One can note that the market efficiency hypothesis, derived from the no arbitrage assumption and implying that prices reflect all available information, is retained by all major theoretical models used in finance, including the Capital Asset Pricing Model and the Arbitrage Pricing Theory, and represents the basis for the pricing of all financial securities, including that of all forms of derivative products. Translated into corporate finance, the no arbitrage assumption gives rise to the famous Modigliani-Miller results, which actually were at the origin of the whole no-arbitrage concept (for a critique of the "normalizing" role of the MM results, see: Pasinetti, 2011). The world of efficient markets is thus a world of constrained Pareto optimization, where both the perfect expectation and no-arbitrage assumptions prevail and where enterprises are indifferent between financing themselves by equity or by debt.

Relevance of the Efficiency Market Hypothesis (EMH).

As reviewed above, the definition of a financial equilibrium when markets are incomplete retains the two complementary assumptions of no-arbitrage and perfect forecasts, which is the equivalent of the rational expectations hypothesis when market are complete. However, several results obtained in the last decades, and the 2008-2011 crisis itself, have called for a critical discussion of the rational expectations hypothesis (REH)[3].

1. Non-ergodicity: Davidson (1982-1983) has argued forcefully that the way to model correctly the uncertainty that is the foundation for Keynes' concept of effective demand, is to assume a non-ergodic model, i.e. a stochastic model where both the

[2] "A l'équilibre, la valeur d'un bien durable à un instant donné est égale à la somme des valeurs actuelles à cet instant de ses revenus futurs" (Allais, 1994 [1943], p. 337).

[3] Which to date remains nonetheless hegemonic in macroeconomics and finance, as it has been since the ninety-seventies. The New Classical rational expectations revolution was associated with the names of Robert E. Lucas Jr., Edward Prescott, Thomas Sargent, Robert Barro etc and it is retained also by the New Keynesian theorizing of Michael Woodford and others.

errors and the parameters of the model depend on time. In this case rational expectations are impossible and hence there is no way to assume them as endogenous to the model, as the REH requires.[4]

2. Failure to achieve eductive stability: Intrinsic uncertainty linked to the parameters of the model should be distinguished from extrinsic uncertainty, which is due to the choice of actions by the other agents[5]. To coordinate themselves, agents in a decentralized economy must address both type of uncertainties, which requires the synchronization of their actions beyond the short term (spot prices) and thus the coordination of their expectations on the medium and long-term future. In order for a market economy to work, there must be a collective image of the future that helps coordinating those plans in the medium and long-term. From this perspective a crisis can be defined as the time when the collective image of the future prevailing until then collapses, generating a brutal break in the path followed by the economy. Modern economic theory retains the assumption that expectations are rational in the sense of Muth (1961), implying that agents do not make systematic mistakes about the future. The *Rational Expectations Hypothesis* (***REH***) thus implies the continuous coordination of expectations around a self-fulfilling image of the future. It therefore does not really foresee the possibility of a crisis, (or maybe only as triggered by sunspot phenomena). However theory has shown that coordination in the face of extrinsic uncertainty cannot rely only upon REH equilibria, since these are not stable if a criterion such as that of "eductive stability" is retained[6]. In particular:

   - New Financial Instruments: Guesnerie-Rochet (1993) have shown in a simple inventory model with two goods and no production close to the original one of Muth (1961) that the unique REH equilibrium is such that opening a *futures* market for the storable good decreases the variance of its price, thus confirming the result of Friedman that speculation is good. However in this case the likelihood of this REH equilibrium decreases due to a reduction in its stability, assessed in "eductive" terms. Therefore speculation and increasing the supply of new financial products can be destabilizing in the sense that they make the RE coordination less plausible.

   - Prices and the transmission of information: Desgranges, Geoffard and Guesnerie (2003) have used the same model used in the literature of the 70's and the 80's on

[4] Davidson (2009 [2007], p.184) notes that Hicks wrote him in 1983, after having read his piece on rational expectations that: "I missed a chance of labelling my own point of view as non-ergotic" (p. 186). Similarly, Robert Solow wrote to Davidson in 1985: "I have always admired that article of yours on non-ergotic processes and thought it was right on the button". Douglas North also agreed on the importance of non-ergodic processes in his book *Understanding the Process of Economic Change* (North, 2005, p. 19).

[5] Guesnerie (2001, p. 124). The developments in this point 2) draw freely on the minutes taken at a conference of Prof. Guesnerie at European Investment Bank in Luxembourg on 22.04.2010. The author is grateful to Prof. Guesnerie for having reviewed these minutes [and authorized their use]. See also Guesnerie (2011a and 2011b). Other conferences of the same series at EIB were published in Seccareccia (2011-12), where a list is also available.

[6] The eductive test of stability consists in checking that the REH respects a property similar to the *conjectural equilibria* retained in game theory that keep the equilibrium stable after agents have taken into account the fact that other agents behave according the REH hypothesis. See Guesnerie Roger (1992a and b).

the role of prices in the transmission of information to show that even when unique REH equilibria exist, the aggressive search of information can kill their eductive stability. In other terms one cannot trust too much the market if everybody else trust it too much: trusting it leads to dismiss your individual information and if everybody does that, the market will receive little information, a contradiction.

- Long-lived agents: Willem Buiter (2009) criticized the *Efficient Market Hypothesis*[7] and the associated REH that underlie mainstream economics because of the implicit assumption of long-lived agents retained (in fact with infinite life), in particular in the literature on *Real Business Cycles*, which asserts that all shocks are exogenous and the economy adapts instantaneously finding immediately the REH optimal equilibrium[8]. Evans, Guesnerie and Mc Gough (2011) show that with long-lived agents, the coordination of expectations around a Real Business Cycle equilibrium is dubious if its plausibility is assessed with the criteria of eductive stability. The long life assumption implies notably that long-lived agents take into account their permanent income rather than their present income, which kills the argument for the Keynesian multiplier. However, Keynes comes back through the window: since expectational coordination is weaker in this RBC model when the long-lived assumption is retained. There is no collective image of the future, close but not identical to the "true", self-fulfilling, image, which is able to trigger a common knowledge of the self-fulfilling image. An expectational crisis" is unavoidable in the model retained.

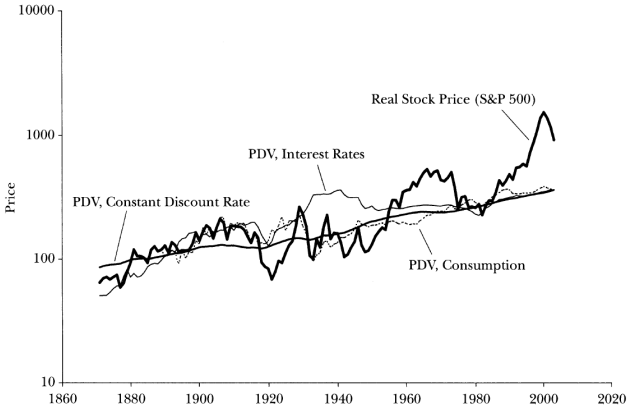
3. Empirical evidence: Although these are only two of the main "anomalies" that have been found so far, both the equity premium and the excess volatility puzzles provide substantial empirical support to the evidence that the group of assumptions retained under the Efficient Market Hypothesis (EMH) are not supported by facts:

   - The equity premium puzzle derives from the fact that over decades the return to equity exceeds substantially the long-term risk-free interest rate, which indicates a failure of arbitrage to reach equilibrium in the rate of return of various assets. The equity premium in the US is estimated between 6-7% per year for periods going back over 100 years and 13% in more recent years. The original article of Mehra, R., and E.C. Prescott (1985), showed that the premium was not compatible with estimates of households risk aversion derived from neoclassical theory. Shiller and Campbel (1988) showed that equity returns failed to reflect the discounted rational expected flow of dividends.

[7] In the words of Buiter: "This is the hypothesis that asset prices aggregate and fully reflect all relevant fundamental information, and thus provide the proper signals for resource allocation".
[8] The alternative hypothesis is retained in the *Overlapping Generation Models* (***OLG***), in which the multiplicity of equilibria prevents the emergence of a unique REH. In these models the literature surveyed in Guesnerie (2002) op. cit. shows that the coordination of expectations by the markets can fail because of *"sunspot" equilibria*.

Excess volatility: "The efficient markets model can be stated as asserting that the price $\mathbf{P}_t$ of a share equals the mathematical expectation, conditional on all information available at the time, of the present value $\mathbf{P}_t^*$ of actual subsequent dividends accruing to that share. $\mathbf{P}_t^*$ is not known at time t and has to be forecasted. Efficient markets say that price equals the optimal forecast of it. Different forms of the efficient markets model differ in the choice of the discount rate in the present value, but the general efficient markets model can be written just as $P_t = E_t P_t^*$ where E_t refers to mathematical expectation conditional on public information available at time t. … It follows from the efficient markets model that $\mathbf{P}_t^* = \mathbf{P}_t + \mathbf{U}_t$, where $\mathbf{U}_t$ is a forecast error. … The variance of $\mathbf{P}_t^*$must equal the variance of $\mathbf{P}_t$ plus the variance of $\mathbf{U}_t$, and hence, since the variance of $\mathbf{U}_t$ cannot be negative, that the variance of $\mathbf{P}_t^*$must be greater than or equal to that of $\mathbf{P}_t$. … If one computes for each year since 1871 the present value subsequent to that year of the real dividends paid on the Standard & Poor's Composite Stock Price Index, discounted by a constant real discount rate equal to the geometric average real return 1871-2002 on the same Standard & Poor Index, one finds that the present value, if plotted through time, behaves remarkably like a stable trend. In contrast, the Standard & Poor's Composite Stock Price Index gyrates wildly up and down around this trend." (Shiller, 2003, pp. 84-85). Shiller (1981) and Leroy and Porter (1981) argued that that the stability of the present value through time suggested that there was excess volatility in the aggregate stock market relative to the present value implied by the efficient markets model.

Real Stock Prices and Present Values of Subsequent Real Dividends
(*annual data*)



Notes: The heaviest line is the Standard & Poor 500 Index for January of year shown. The less-heavy line is the present value for each year of subsequent real dividends accruing to the index discounted by the geometric-average real return for the entire sample, 6.61 percent. Dividends after 2002 were assumed equal to the 2002 dividend times 1.25 (to correct for recent lower dividend payout) and growing at the geometric-average historical growth rate for dividends, 1.11 percent. The thin line is the present value for each year of subsequent real dividends discounted by one-year interest rates plus a risk premium equal to the geometric average real return on the market minus the geometric average real one-year interest rate. The dashed line is the present value for each year of subsequent real dividends discounted by marginal rates of substitution in consumption for a representative individual with a coefficient of relative risk aversion of 3 who consumes the real *per capita* nondurable and service consumption from the U. S. National Income and Product Accounts. Real values were computed from nominal values by dividing by the consumer price index (CPI-U since 1913, linked to the Warren and Pearson producer price index before 1913) and rescaling to January 2003 = 100. Some of the very latest observations of underlying series were estimated based on data available as of this writing; for example, the consumer price index for January 2003 was estimated based on data from previous months. Source data are available on ⟨http://www.econ.yale.edu/~shiller⟩, and the further descriptions of some of the data are in Shiller (1989). See also footnotes 1, 5 and 6.

These results were discussed in the subsequent literature but to date the EMH remains unable to explain these puzzles. For instance Shiller (1981) concludes:

> *"After all the efforts to defend the efficient markets theory, there is still every reason to think that, while markets are not totally crazy, they contain quite substantial noise, so substantial that it dominates the movements in the aggregate market. The efficient markets model, for the aggregate stock market, has still never been supported by any study effectively linking stock market fluctuations with subsequent fundamentals."*

Similarly LeRoy (2008) concludes his survey of the matter:

"Most analysts believe that no single convincing explanation has been provided for the volatility of equity prices. The conclusion that appears to follow from the equity premium and price volatility puzzles is that, for whatever reason, prices of financial assets do not behave as the theory of consumption-based asset pricing predicts."

The consequences of no-arbitrage pricing in a non-MM world.

It was argued in the previous section that there are several reasons to refute the group of hypothesis that support the EMH, including fundamental uncertainty as modeled by the non-ergodicity assumption, eductive instability of REH, lack of explanation for the equity and excessive volatility puzzles.

Abandoning the EMH implies to turn to a temporary equilibrium model where, in addition to relaxing the assumption of complete markets, the perfect forecast assumption and the no-arbitrage assumptions that support the EMH are abandoned as well. These two assumptions must be dropped together since they support each other. In this case, the resulting equilibrium is such that the Modigliani Miller results do not hold, hence the financing structure matters for both corporates and banks.

If the world is a non-Modigliani-Miller world, where finance matters; what are the implications of pricing financial products under a no-arbitrage assumption in this world?

To start addressing this difficult question on can refer to the analogy between the intertemporal equilibrium and the temporary equilibrium. When there is coincidence between the two concepts, i.e. in a first best situation which holds under complete markets, perfect expectations and infinitely lived agents, a related property of maximum efficiency is given by the "no-profit" condition.

Indeed, in a truly dynamic model where free entry is allowed, under stationarity, profits should converge to zero. This is also clearly a condition for maximum efficiency in a static model. It is for instance retained by the prototype neoclassical model of Allais (1994 [1943], Annex IV pp. 139-151). Due to the fact that the number of firms is fixed in the intertemporal equilibrium model, and given the several assumptions needed to cross the bridge to temporary equilibria the confusion is entertained in the literature on the fact that profits can be positive in equilibrium even under perfect competition assumptions. However, strictly speaking, if the intertemporal equilibrium is to be interpreted as a long-run equilibrium, profits can be positive only in a short-term equilibrium under competitive conditions, or, in other words, in a second best environment.[9]

Without no-arbitrage the price of financial assets today is different from the sum of their discounted and risk-adjusted expected revenues. Let us assume that the difference is positive, in other words that the price of an asset held today by the households exceeds the sum of its future revenues. If this asset is sold in a future period, this can generate an increase in profits i.e. a move away from long-run equilibrium conditions. Three arguments are given below to support this conjecture, which should be investigated more

[9] Incidentally it is not clear why the literature on the stability of general equilibrium does not seem to consider the annihilation of profits amongst the convergence criteria for the return to equilibrium.

systematically and generalized in future research: an argument based on the analysis of structural dynamics of Pasinetti (1981), the results of a macroeconomic model of the monetary circuit developed by Parguez (1996) to study the unemployment effects of finance and an example developed originally and based on a model of the monetary circuit inspired from Graziani (2003). The common logic behind the three arguments is developed in Cingolani (2011), where it is argued that post-Keynesian economics and in particular its monetary variant of the monetary circuit can be viewed as a generalization of neoclassical economics under pure competition out of its zero profit, first best, no arbitrage equilibrium.

1) Insights from Pasinetti's structural dynamics:

Pasinetti (1981) provided a very general treatment of structural dynamics, which is an analysis applying to a "pre-institutional" multisector production economy where the dynamics of technical progress acts continuously to modify the composition of the output produced and consumed.

In this framework, the efficiency criteria he considers is that of full employment, which is only one of the several conditions necessary for the obtainment of the neoclassical equilibrium and therefore "generalizes" this equilibrium in a dynamic context.

For full employment to be achieved, all incomes distributed in the period must be spent, which is the case when "natural" prices and profits prevail. Natural rates of profit are such that they are different in each sector, and equal to the sum of the rate of growth of population and the per capita growth of consumption in that particular sector.

When these rates of profits and the associated natural prices prevail in the economy, an interesting result is the theoretical equivalence between labour embodied and labour commanded implicit in the natural prices, which validates a pure labour theory of value.

The point that is more relevant for the purpose of the present discussion is that when there is uniformity of the sectoral profit rates, in general the full employment condition will not be met. Pasinetti shows that if only a single profit rate prevails in the economy, the only way to fulfill the full employment condition is that this uniform profit rate be set according to a multisector variant of the so-called Cambridge equation (Pasinetti, 1962; Bortis, 1993). The latter in a single good economy states that the full employment rate of profit π_e is equal to the rate of growth of output (itself equal to the sum of the rate of growth of population g and the weighted average rate of growth of per capita consumption r*) divided by the propensity to save of capitalists:

$$\pi_e = \frac{1}{s_c}(g + r^*)$$

One can observe that when the rate of savings of capitalists is 1, in other terms when they invest all their profit without consuming any part of it, the above relation expresses

the neoclassical "golden rule" of capital accumulation, which states that on an optimal growth path the rate of profit is equal to the rate of output growth (Phelps, 1961 and 1965). This justifies the claim made above that the post Keynesian framework generalizes the neoclassical one, where an additional condition is clearly shown here that there is no consumption out of that financed by wages or, in other terms, that extra-profits above those necessary to finance real capital accumulation are zero.

For the purpose of the present discussion, the important conclusion is that when the uniform rate of profit diverges from π_e, either from below or from above, unemployment will develop, or in other words the more general concept of efficiency applicable to the dynamics of structural change will not be observed. The analysis of Pasinetti shows that in general this will be the case all the time.

In the case where c* is subject to uncertainty and forecast errors, prices under a no-arbitrage condition is equivalent to fixing the profit rate assuming that $s_c=1$, when this is not actually the case. Given that the condition for the uniform profit to approximate the natural rate of profit would not be respected, unemployment would necessarily develop as a consequence, determining an inefficiency created by arbitrage pricing in a non-Modigliani-Miller world.

2) A two goods macro-monetary model without technical progress

Parguez is one of the economists who contributed to the emergence of the monetary circuit theory. His model of 1996 discusses the link between financial profits and unemployment. Parguez uses this model to falsify what he calls the New Classical Political Economy, which corresponds to what is called today the New Consensus and its postulates. Without replicating the model of Parguez, which would be cumbersome, it is important to note in the context of the present discussion that his model, which has several important properties in common with model of the monetary circuit proposed in Graziani (1990), foresees a fourth unemployment regime in addition to the three regimes of the fix-price neoclassical model Malinvaud (1977). The four regimes are (Parguez, 1996):

"**1. <u>The Pure "Keynesian" Case</u>**: For a given supply of labour, the required employment is loo low because of a shortage of expected demand. This expected shortage of demand is the outcome either of too small a level of aggregate investment or of too high level of the saving rate. The insufficient amount of investment is explained by both the forecasted lack of consumption demand which is either the outcome of the Keynes effect or the result of the excessively high saving rate.

2. <u>The Pure "Classical" Case</u>: It corresponds to a case in which, ceteris paribus, the rate of return that would sustain full employment is below the required rate of return that would satisfy the set of financial constraints. The effective level of the rate of return determines both too low an amount of investment expenditures and too low a level of the employment multiplier. For a given amount of available labour, the more the

financial constraints are demanding, the higher is the required rate of return and the more probable is "Classical unemployment".

3. The "Classical-Keynesian" Case: Such an outcome will arise because a fall in the money-wage rate is associated with a rise in the rate of return. This drop in the money wage rate builds up expectations of a shortage of future demand. The "Classical" case, therefore, worsened by a "Keynesian" unemployment resulting from a fall in investment spending.

4. The "Rentier-Led" Case: This case is the result of both an increase in rentiers' share of aggregate income and a more constraining price target. Rentiers strive to increase their own income by pushing upwards (with the support of the Central Bank) the rate of interest. Abstracting from the impact on the required rate, of return, the rise in the rate of interest imposes a higher cost multiplier, k'_c, which increases unemployment, as shown by the employment function. For a given rate of saving, a rise in k'_c, signals to firms that they need a lower wage-bill, and thus a lower employment, to meet their short-term profit target. This negative impact of the rise in k'_c, is worsened by the required fall in the wage rate, for a given price constraint, whose effect is to engineer a "classical-Keynesian" unemployment".

The existence of the 4th regime shows the positive effect on unemployment of a rise in the level of rent.

3) A worked example from the monetary circuit

Assume an economy that produces and consumes widgets where labour productivity is 5 widgets per hour and where wages are equal to 10 euro per hour.

A temporary monetary equilibrium of the kind studied by the theory of the monetary circuit is assumed (Graziani, 2003). At the beginning of the day enterprises decide to employ workers for 8 hours, i.e. their expectations are thus that it is profitable to produce 40 widgets. They are ready to pay a salary of 10 Euros per hour and anticipate that households will save 20% of their incomes. Since unit labour costs are 2 Euros per unit produced, if they want to achieve a target 25% profit rate they must set the selling price of widgets at 2.5. Therefore households' consumption will be 64 Euros and savings 16 Euros. To balance their accounts at the end of the period, enterprises must borrow from households the total amount of their savings. These savings can be viewed as a security that gives right to 16 in time 1, state 0, for which to simplify the interest rate is assumed to be zero.

Since at a price of 2.5 households consume only 26 widgets, enterprises accumulate stocks for 14, which have a value of 36, but since they have a debt of 16 to households, their profit is 20.

At time 1, state 0, expectations are fulfilled, consumers receive the 16 from the security they bought in the previous period. With stationary demand forecasts, the rest of the variables remain more or less the same. Households' consumption and incomes increase and the profit rate decreases, indicating a tendency towards convergence to a long-term equilibrium with zero profits.

Eta Beta economy

Time 0

Entreprises

Stocks	20	Net worth	20
		Debt to HH	16

Households

Loan to E	16	Net worth	16

Economy

Stocks	20	Net worth	20
		Debt	16

Time	C	I	Δstocks	GDP
Time 0	64.0	0	36	100
Time 1	76.8	0	23.2	100

Time	W	P	Δstocks	GDP
Time 0	80	20	0	100
Time 1	80	20	0	100

Time	Prod.	Price	Δstock	GDP
Time 0	40	2.5	0	100
Time 1	40	2.5	0	100

	Concept	Calculation	Value		
			Time 0	Time 1 (s=0)	Time 1 (s=1)
(1)	Productivity (widget/h)	Exo	5.0	5.0	5.0
(2)	Daily working hours	Exo	8.0	8.0	8.0
(3)	Wages per hour (nominal)	Exo	10.0	10.0	10.0
(4)	HH savings expected	Exo	20%	20%	20%
(5)	Profit rate	Exo	25%	25%	25%
(6)	Daily production of widgets	(1)*(2)	40.0	40.0	40.0
(7)	Wage bill (daily)	(3)*(2)	80.0	80.0	80.0
(8)	Unit Labour Costs	(3)/(6)	2.0	2.0	2.0
(9)	Price	[1+(5)]*(8)	2.5	2.5	2.5
(10)	Value of production	(6)*(9)	100.0	100.0	100.0
(11)	HH Consumption expected (nominal)	[1-(4)]*(13)	64.0	76.8	51.4
(12)	HH Consumption expected (real)	(11)/(9)	25.6	30.7	20.5
(13)	Savings HH	(4)*(13)	16.0	19.2	12.8
(14)	Income HH	(7)+(13$_{-1}$)	80.0	96.0	64.2
(16)	Increase in stocks expected (N.)	(6)-(12)	14.4	9.3	19.5
(17)	Value of stock increase	(15)*(9)	36.0	23.2	48.6
(18)	Consumption Entreprises (nom.)		0.0	0.0	0.0
(19)	Consumption Entr. (real)		0.0	0.0	0.0
(20)	GDP	(7)+(14)-(13)	100.0	100.0	100.0
(21)	Workers share	[(11)+(13)]/(20)	80%	96%	64%
(22)	Entreprise share	100-(21)	20%	4%	36%

Assume now that the price at which security was sold in time zero was actually wrong. It was sold for 16 because it was supposed to give 16 in state 0, but in fact in state 1 it entailed a capital loss of 35. In this case households consumption and incomes decrease and enterprises accumulate unplanned stocks. The share of workers in total income decreases and that of enterprises increases, indicating a move away from equilibrium (away from the zero profit condition).

Conclusions.

The world of the Modigliani Miller theorem is a world where there is complete analogy between the static first best intertemporal equilibrium and the dynamic temporary equilibria that would be achieved in a "symmetric" sequential economy.

This correspondence requires complete markets to exists, perfect expectations and infinite lived agents. If these assumptions are relaxed, one obtains finance equilibria if markets are incomplete and "true" temporary equilibria if the assumptions of perfect forecast and no arbitrage are abandoned.

Both the current crisis, the critiques that one can develop on rational expectations and a number of unexplained empirical puzzles concerning the EMH justify that the economic reality does not respect the conditions for the market efficiency hypothesis.

In such circumstances, pricing securities under a no arbitrage assumption when in fact this assumption does not hold can bring the economy further away from equilibrium via distribution effect that increase of rent to the detriment of wages and entrepreneurial profits, that should be expected to increase unemployment in a monetary economy evolving out of the out of the neoclassical equilibrium. In other words, pricing under no arbitrage assumptions in a non Modigliani-Miller world could have contributed to the accumulation of economic and financial imbalances in recent years. This was illustrated in the paper based on three different arguments that concur in building an intuition that must be verified in the light of more systematic future analyses. It also points to the need of developing an alternative finance theory that holds out of the equilibrium conditions of the market efficiency hypothesis.

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