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On Composite Classical and Keynesian Microdynamic Adjustment Processes: A Comment*

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In their clear and stimulating paper, P. Flaschel and W. Semmler stress the role of composite systems in the stability analysis of long run positions. Going beyond than in their previous attempts (P. Flaschel and W. Semmler, 1987, 1989), they examine the adequacy of the connective — stability approach, a method especially adapted to large-scale systems. Then, looking for an increase of the stabilizing forces which operate in composite systems, they suggest the introduction of derivative-control terms in price and quantity adjustments. Lastly, with the help of numerical experiments, they undertake to explore the dynamical effects of these terms.

Composite systems are nowadays considered as providing an accepted formal account of the classical gravitation problem. The cross-dual part of these models captures competitive price adjustments to quantity disequilibria and overall quantity adjustments to price imbalances which represent weak forms of the Smithian transfers of capital. Cross-dual adjustments are combined with dual ones not only with reference to Keynes and Kalecki, but also because inter-industrial disparities of the rates of profit involve feedback effects from cross-dual quantity variations to prices, through the influence of the average rate of profit (R. Arena, C. Froeschle and D. Torre, 1984, 1988, L. Boggio 1991). Another property of composite systems emphasized by the authors in the text, is that they offer a standardized mathematical representation for a large class of models, whatever their theoretical foundations. The high level of generality of these models allows some accurate comparisons between classical and neo-classical approaches,

* This comment refers to the paper, with the above title, presented at the Workshop, and co-authored by W. SEMMLER and P. FLASCHEL. A modified version of the paper was prepared by W. Semmler for the present issue, but, as with most of the other comments which are published in this volume, Prof. TORRE had to base himself on the version read at the Workshop. We would like to reassure the reader, that differences between the two versions are immaterial, in so far as Prof. Torre's remarks are concerned [Editors' note].

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thereby indicating that the classical gravitation problem is neither self-evident, exotic, nor of secondary importance, since it contributes, like the business-cycle theory, to the analysis of the dynamics of production economies.

The first section of this comment will be devoted to the discussion of the dual and cross-dual quantity adjustments that P. Flaschel and W. Semmler consider in their composite system. In the second section, some new behavioral patterns will be introduced that might generate adjustment forces and exhibit the dynamic process we have in mind when we refer to gravitation from a classical point of view.

1. DUAL AD CROSS-DUAL QUANTITY ADJUSTMENTS IN CLASSICAL COMPOSITE SYSTEMS

The notion of connective-stability appears to be very useful for the analysis of large scale systems. However, as pointed out by P. Flaschel and W. Semmler, the method pioneered by Siljak does not lead to conclusive results as regards the dynamic properties of composite systems as dominated by cross-dual classical forces. At this stage of the analysis, two directions may be taken in order to carry out the exploration of the stabilizing forces which operate in composite systems.

(i) The first possibility is to consider strong quantity adjustments to quantity disequilibria. These adjustments are variations of supply in response to discrepancies between supply and demand. The speed of these adjustments depends on the form of the demand schedule, and on the way this demand is perceived by producers.

Classical accounts do not provide a fully unified definition of demand. Several models, integrating equation (4) of the text, consider that only intermediate demand is variable, while final demand is expressed by a constant vector like in input-output schemes; other attempts are made to restore some link of dependence between consumption and distribution; finally, demand is sometimes viewed as a decreasing function of prices, like in general equilibrium theory. In some of these models, final demand is constant over time or easily predictable by any observer. Despite this, naïve expectations are generally attributed to producers in the dual quantity adjustment while, concurrently, "awareness of disequilibrium" plays a large part in the stabilizing forces generated in general equilibrium models (D.O. Stahl II and F. Fisher, 1988). The weight of dual quantity adjustments would be more significative in classical accounts if such adaptive behavior patterns were considered as well. A sufficient condition for asymptotic stability in the composite system is, as emphasized by P. Flaschel and W. Semmler, "that the stability characteristics of the keynesian sub-systems... dominate the off diagonal interaction coefficients" (P. Flaschel and W.

Semmler 1991). Thus, as in Keynesian macroeconomics after the lucasian revolution,[1] gravitation theory would probably gain in predictability if the models used integrated more rationality.

(ii) Secondly, the quantity adjustment to price imbalances, which constitutes the classical core of the dynamic system, has to capture more adequatly some of the specificities of production economies where exact symmetry among the cross-dual subsystems is not fulfilled. One of the major difficulties of classical quantity adjustment was pointed out some years ago by I. Steedman (I. Steedman, 1984): the sign of the difference between market and natural rates of profit is not always the same as the sign of the difference between market and natural prices. Then, the use of prices as indexes of profitability is generally illicit. In the text, the difference between actual prices p' and "normal" costs $(1 + r)A'p + w'$ is considered as relevant (cf. equation (3)) thereby avoiding the critique by I. Steedman. However, no convincing argument is provided in order to choose the relevant variable for the normal rate of profit (the general rate could be picked out, as the average one, the actual one, or the expected one...). Besides, if the average rate of profit is selected, the cross-dual system is no longer linear, and, if linearity is discarded, a general theory for the analysis of the dynamic properties of the model is no longer at hand. The only outlet would be to increase the weight of stabilizing forces in the system so as to reduce the frequency of dynamic divergences of prices and quantities inside some range of variation of the parameters. This investigation once again leads to the introduction of derivative-control terms.

These terms have indeed both the property of generating stabilizing forces that seem active even when non-linearities are considered,[2] and of portraying rather well some features of the competitive process in production economies. In such frameworks, effective output is frequently bounded by the productive capacity or by the available level of fixed capital. Discontinuities, irreversibilities and rigidities are visible indications of these technological constraints. They prevent the reallocative process of productive capital from being as strong and complete as it would if it was only guided by profitability criteria. Before the exact consequences of these phenomena can be definitely understood with the help of adequate investment functions, continuous approximations could be used for the inception of some analyses. These functions would cancel out the local effect of discontinuities, but hamper the classical quantity adjustment, by supposing that output would change not only according to the level of extra profit, but also in response to upturns or downturns in profit. That could be the rationale for the

[1] See for example the contribution of the so-called "New Keynesian Economics", pioneered by the works of J. Stiglitz, to the analysis of wage and price rigidities.

[2] If the results obtained by numerical experiments are confirmed in further analysis.

introduction of control terms by P. Flashel and W. Semmler in the text. Of course, other investment functions may capture more closely the effect of capacity constraints on the variation of output. However, these functions generally involve non linearities and, then, leave little hope for analytical methods.

2. BEHAVIORAL PATTERNS AND CLASSICAL COMPOSITE SYSTEMS

When referring to Mas Collel's papers on general equilibrium stability, Flaschel and Semmler suggest that the classical and neo-classical worlds are not very far apart insofar as the formal transcription of dynamic models is concerned. Then, two different directions for further analysis may be opened. The first would result in improving the analytical methods in use today for investigating the properties of large scale systems. An analysis of this type, applied to a topic of this kind, may be fruitful as it is liable to draw the attention of specialists coming from different disciplinary and theoretical horizons.

The second direction would only focus on the specificities of classical dynamics; it would contribute to the elaboration of analytical and mathematical methods which are the most relevant from the classical point of view. There is no definitive incompatibility between these approaches, both exemplified by P. Flaschel and W. Semmler: connective-stability is a notion of general interest and the content the authors give to the derivative — control terms captures rather well some outlines of the classical gravitation problem. The second part of this comment will concentrate on this second direction of analysis.

The Sraffian model still remains the most serious candidate to represent the classical point of view in formal analysis.[3] It rationalized an economy founded on the production of a quantitative surplus, the distribution of which between wage-earners and capitalists influences the relative prices of commodities. This theory of prices reveals the role of intermediate structures in an aggregative perspective. Industry, with its reference to the level of "long run" prices, then becomes the relevant productive unit. Similarly, final demand which has some influence on technical choices (N. Salvadori, 1982), determines the level of long-run quantities by affecting the effective consumption and investment decisions of social groups.

These classical specificities must be preserved in dynamic models since they operate as fundamental assumptions for the analysis. However,

[3] As emphasized by A. RONCAGLIA, this model looks like a photograph of the economy at a moment of time (A. RONCAGLIA, 1977, p. 172). This explains why in this system quantities are given. However, gravitation theory is not the only way to introduce variations of quantities in this model. Other analytical paths are surveyed and compared in R. ARENA, 1990.

behavioral patterns are far more present in dynamic schemes than they are in the Sraffian static model. Dual and cross-dual adjustments as such may be the consequence of behavioral assumptions. Microeconomic behavior also determines the sensivity of consumption to current price and the expectations formed by the producers. One of the major interests of composite systems might be their use for exploring the ways to integrate rational or semirational behavior, their exposure to technological and institutional constraints, and the feedbacks it generates on these structural components of the economy. That's why today there are some attempts to take firms and capitalists into consideration in the same model (G. Duménil and D. Lévy, 1991 a). One must go further and dissociate industries from firms. A major improvement would be to reconcile classical reproduction rules with some Keynesian behavioral assumptions, as been suggested by many authors (R. Arena, 1982, G. Duménil and D. Lévy, 1990, and C. Bidard 1991).

In this line of analysis, the influence of money-wages may be examined (I. Kubin 1991, D. Torre 1990). Moreover, a more specific form could be conferred to dual quantity adjustments, in accordance with the disequilibrium theory method introduced by J. P. Benassy. When in some industry, demand comes shorter than supply, producers reduce their own intermediate demand. In turn, other supplies are then constrained as a consequence of the shift of demand they face. An iterative process of adjustment begins and it stops only when no additional quantity constraint is perceived by the firms.

Indexation and "spill-over" effects determine dual prices and quantities adjustments. As P. Flaschel and W. Semmler claim, these adjustments are founded on Keynesian mechanisms; however, the beginning and the end of these adjustments are contained inside each period of analysis, *i.e.* the production cycle of the model in its sequential form. From one period to another, only cross-dual adjustments are active and, conversely, only dual-ones inside each period. Then, Keynesian adjustments are relevant in the static part of the model and classical adjustments in the dynamic one. This dichotomization may contribute to strenghten the microeconomic foundations of the model without introducing more formal complexities in its dynamic part.

As G. Duménil and D. Lévy argued in previous works, "in the classical account, economic agents adapt to disequilibrium" (G. Duménil and D. Lévy, 1987). Adaptive behavior which includes rules of thumb as well as rational decisions, affects intertemporal choices through investment in fixed capital and inventories in finished goods. Special attention might be given to these components of the cross-dual quantity adjustment. Their influence on the properties of dynamic processes are still not fully clarified. The role of fixed capital can be captured rather well in derivative-control terms but specific ways to integrate inventories have yet to be found. Most of the

stabilizing properties attributed to them in the literature are established by the use of the linear-quadratic model (K. West, 1986, D. Torre, 1990 b) frequently adopted in partial analysis. In other accounts, the speculative motives which prevail in a large class of stockpiling strategies, generate typical properties such as non unicities of stationary equilibria or endogeneous cycles (G. Laroque, 1989). Inventory cycles introduced years ago by F. Lundberg, L. Metzler and R. Goodwin are then recovered in rational models. Speculative behavior cannot be discarded from cross-dual quantity adjustments in the classical approach, and investment in inventories, financial capital transfers (F. Cartelier, 1981) which are both present in the classical analysis, must be considered in further attempts.

Much has to be done before the classical gravitation theory is considered by mainstream economists as a general approach of long run quantity variations. But if one day this goal is reached, it will be clear that P. Flaschel and W. Semmler were stepping in the right direction when they suggested considering composite-systems as the good instrument for improving the analysis of classical gravitation theory.

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