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Clower's *about-face* regarding the 'Keynesian Revolution'[1]

Abstract:

Robert W. Clower's article "The Keynesian Counter-Revolution: A Theoretical Appraisal" (1965) deeply influenced the course of Keynesian macroeconomics by contributing to the transition from IS/LM macroeconomics to fix-price theories. Despite this influence, no scholar proposed to explain its origins, with the notable exception of Roger E. Backhouse and Mauro Boianovsky (2013). They explained that the 1965 piece was the result of an independent research program rooted in the works of Clower during the 1950s. My paper aims to offer an alternative explanation. It is synthesized in the metaphor of an *about-face* to stress that a theoretical break is at the origin of this contribution. This break, initiated in the early 1960s, is characterized by a double change in perspective (individual equilibrium vs. individual disequilibrium, and compatibility vs. incompatibility between Keynesian and Walrasian theories). The intellectual context, particularly Don Patinkin (1956; 1958), will be invoked to trace the roots of this *about-face*. Consequently, rather than independency and linearity, I argue that dependency and non-linearity are the two salient features of Clower's intellectual path.

JEL Codes: B2, D5

Keywords: microfoundations of macroeconomics, disequilibrium theory, instability of the full employment equilibrium, Clower.

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Introduction

Robert W. Clower's article "The Keynesian Counter-Revolution: A Theoretical Appraisal" (1965) deeply influenced the course of Keynesian macroeconomics by contributing to the transition from IS/LM macroeconomics to fix-price theories. Despite this influence, no scholars proposed to explain its origins, with the notable exception of Roger E. Backhouse and Mauro Boianovsky (2013). They explained that the 1965 piece was the result of an independent research program rooted in the works of Clower during the 1950s. My paper aims to offer an alternative explanation. It is synthesized in the metaphor of an *about-face* to stress that the most salient feature of Clower's intellectual path is its non-linearity.

The "Counter-Revolution" paper is structured around two ideas, related to the notion of involuntary unemployment. The first idea was that John M. Keynes' *General Theory* (1936) should be rooted in a disequilibrium framework. Clower argued that involuntary unemployment portrayed situations in which workers failed to realize their standard optimization programs because of labor market non-clearing. The second idea was that the integration of Keynes' income analysis and Walrasian microeconomics was impossible. Clower stressed that in situations of involuntary unemployment, realized income was supposed to act as a constraint on workers' decisions to consume. According to him, this would be impossible so long as the tâtonnement hypothesis and the standard theory of the consumer were retained. Clower inferred that attempts to provide Walrasian foundations to Keynesian macroeconomics proposed by John R. Hicks (1939), Oskar Lange (1944) and Don Patinkin (1956) were blind-alleys. An alternative microeconomics had to be conceived. Clower's proposals were to introduce disequilibrium transactions in a general equilibrium model and to formulate the famous "dual-decision" hypothesis.

Backhouse and Boianovsky (2013) maintain that these ideas as well as the resulting proposals were the outcome of a research program that Clower developed during the 1950s, independently of Patinkin. They support this viewpoint thanks to the analysis of archival documents left by Clower at Duke University. In a series of unpublished manuscripts written in the mid 1950s, Clower formulated models in which he shaped various mechanical price and quantity adjustments. Backhouse and Boianovsky inferred that Clower was searching for "an alternative to the tâtonnement process" (2013: p. 49), a search leading naturally to the "Counter-Revolution" paper. Following Clower (1984)'s own afterthought on his earlier works, they distinguished three steps in his intellectual path. Considering as starting points his concern with "how markets work" and his dissatisfaction with the "excess-demand adjustment rules of established theory" (1984: p. 260), i) Clower would have been interested in the dynamics of "stock-flow" models, a market theory in which the adjustment rules depended on the stocks and the flows of commodities; ii) this would have led him to search for an alternative to the tâtonnement process as evidenced by the mechanical price and quantity adjustments formulated in the "N-Seller" models; iii) this, in turn would have found an echo in the Keynesian context and would have given rise to the "Counter-Revolution" paper.

Independency and linearity are therefore considered as the two salient features of Clower's intellectual path. Both claims can be challenged in light of some characteristics of the models developed by Clower. The "dual-decision" hypothesis and Patinkin's "spill-over" effect are based on the same logic. Patinkin described the behavior of entrepreneurs that failed to sell the quantity of goods they had planned. They would integrate the level of demand as an additional constraint and would redefine their labor demand. Clower described the income constraints imposed on workers' consumption when they failed to sell the quantity of works they had planned, which is simply the symmetric effect. This complementarity was stressed by Robert Barro and Hershel I. Grossman (1971) who pieced together these two mechanisms

to formulate the seminal fix-price model. According to Goulven Rubin (2005), this complementarity was not a coincidence. He showed that Clower was deeply inspired by Patinkin to whom he borrowed most of his concepts. As regards the linearity of Clower's intellectual path, it is enough to stress that the dynamic studies of "stock-flow" models fitted in the literature on tâtonnement economics. Lange (1944) and Paul A. Samuelson (1947) were his main references at that time. In view of this, it is difficult to imagine that the "stock-flow" market analyses paved the way for a reflection on non-tâtonnement and so, led to the 1965 piece.

Backhouse and Boianovsky (2013) distort Clower's intellectual path because their analysis of the archives are incomplete and superficial. They ignore important works: Clower's doctoral dissertation, a work prepared under Hicks' supervision from 1949 to 1952; *Introduction to Mathematical Economics* (1957), a book devoted to "stock-flow" market analyses that Clower co-written with the mathematician Donald W. Bushaw; and "Keynes and the Classics: A Reinterpretation", an unpublished manuscript probably written at the end of the fifties. Yet, these contributions are decisive to reveal the content and the aims contemplated in the three theoretical sequences identified by Backhouse and Boianovsky (2013). As it happens, the "stock-flow" models were the outgrowth of a project to microfound Keynesian macroeconomics that Clower outlined in his doctoral dissertation and developed until the publication of *Introduction to Mathematical Economics*. The "N-seller" models, mainly developed from 1954 to 1959, were the outgrowth of a project purporting to elaborate a theory of price determination allowing the unification of all forms of competition, from monopoly to perfect competition.

In contrast to Backhouse and Boianovsky (2013), I claim that there was a deep break between these two theoretical projects and the disequilibrium theory formulated in the 1965 piece. Indeed, in the 1950s, Clower was not interested by involuntary unemployment and,

more generally, by the issue raised by individual disequilibrium and its consequences. Then, up to 1960, he claimed that Walrasian and Keynesian theories were fundamentally compatible. In other words, the first Clower defended the equilibrium perspective and the kind of synthesis between Keynesian and Walrasian theories that he attacked in the 1965 paper. That is why the first two theoretical projects developed by Clower are considered as part of a research phase (Phase I) distinct from those in which he built his disequilibrium interpretation of the *General Theory* (Phase II). Clower's reconsideration of Keynesian economics, in a disequilibrium perspective, is a side effect of his reading of *Money, Interest and Prices*; his advocacy for a break with the Walrasian framework is explained by his own preoccupations for unstable dynamics and the contemporaneous developments of Patinkin (1956; 1958) and of Franck H. Hahn and Takashi Negishi (1962).

1. Equilibrium and synthesis perspectives: Phase I (1949-1959)

The development of Clower's first research phase is here presented with particular attention to the intellectual context. It is argued that the related theoretical works are characterized by an equilibrium perspective and an ambition to synthesize Keynesian macroeconomics with the Walrasian general equilibrium theory.

1.1 The "general theory of the trade cycle" (1949-1957)

The first phase of Clower's intellectual path opens with a project to provide microfoundations to Keynesian macroeconomics. Clower outlined it in his doctoral dissertation and developed it until 1957 through static and dynamic analyses of "stock-flow" models. These market models portrayed economies where the typical commodity was both consumed, produced, and held by individuals. They were deduced from microfoundations shaped by Clower in his doctoral dissertation in order to ground a theory of the trade cycle. This theory, inspired by Keynes (1936), was intended to include the post-Keynesian models as special cases. The rationale was

that its central feature, the articulation of stocks and flows, was the essence of capital accumulation processes. Two aspects of this project are here important. First, market-clearing is assumed all along the way. In the dissertation, when Clower turned to the issue of involuntary unemployment (which he considered as minor), he assumed a horizontal labor supply curve. So, Keynesian macroeconomics was compatible with market clearing, a perspective confirmed through Clower's static and dynamic analyses of "stock-flow" models. Second, the microeconomics underlying "stock-flow" models was viewed as an extension of those found in *Value and Capital*. So, Clower considered that the Walrasian and Keynesian theories were compatible.

1.1.1 Overview of the project[2]

Clower's doctoral dissertation *Theories of Capital Accumulation with Special Reference to their Ability to Explain the Experience of the U.S since 1870* (1952) aimed to "lay the foundation of a general theory of capital accumulation" (1952: p. 11). Put bluntly, the ambition was to offer the microfoundations of a business cycle model which would include the theories of Keynes and post-Keynesians (Roy F. Harrod, 1939; Hicks, 1950) as special cases:

> The writer began by examining the general pure theory of economic behavior (as expressed e.g., in *Value and Capital*) in an attempt to discover whether that theory was in any way inadequate as a foundation for capital accumulation theory. After making appropriate alterations to the general theory, the writer tried to fit various recent theories of capital accumulation [Reference to Keynes (1936), Harrod (1939) and Hicks (1950)] into it as special cases (1952: p. 8).

His "general theory of capital accumulation" resulted from a "reinterpretation" and an "extension of Keynes' views on the theory of the trade cycle" (1952: p. 11). The reinterpretation consisted of explaining fluctuations thanks to the variations of liquidity

[2] For a detailed presentation of this project, see Plassard (2015).

preference instead of those of the marginal efficiency of the capital (1952: pp. 80-83). The extension consisted of broadening the liquidity preference theory to physical assets (1952: p. 69) so that the trade cycles resulted from capital accumulation processes destabilized by speculative behaviors (1952: p. 79). To support this approach, Clower elaborated a macromodel structured on the articulation of stocks and flows of capital assets. In line with the liquidity preference theory, the valorization of the existing stock of capital assets was assumed to set the rate of interest (1952: p. 69). Depending on its level, there would be different flows of new investments and production. The point was that entrepreneurs' valorization of the existing stock of capital assets was subject to violent and repeated changes, because of speculative behaviors (1952: p. 79). Accordingly, the levels of investment, production and capital assets would never reach stationary positions (1952: p. 89). The trade cycle resulted from this instability, structurally related to the coexistence of stocks and flows. According to Clower, the same was true in post-Keynesian business cycle models. The instability was closely related to the acceleration principle, a relation linking the flow of output and the stock of capital assets (1952: p. 11). He inferred that the relation between stocks and flows of capital assets was the essence of capital accumulation processes. Since it was literally at the heart of his macromodel, he claimed to have elaborated a general theory of the trade cycle (1952: p. 184).

Clower intended to incorporate the relation of stocks and flows in the standard theory of choices and then, to undertake the derivation of Keynes and post-Keynesian business cycle models. To do so, he followed the main lines set out by Hicks in *Value and Capital.*[3] He repeatedly referred to the formulation of a general equilibrium model to demonstrate the compatibility between economic behaviors and aggregates. Clower proposed the "producer-consumer" theory of the firm to ground the "stock-flow" relation; that was inspired by the

[3] For an exhaustive presentation of Hicks' method, see E.R Weintraub (1979). For a short presentation, see K.D. Hoover (2012).

works of Leonid Hurwicz (1946) and Van de Graaff (1950) and basically consisted of introducing asset holding in entrepreneurs' programs. Yet he failed to offer a complete transcription of the resulting theory of markets; the connections between his theory of choices and aggregates remained essentially informal. This could explain at least partly why the jury refused to award him the degree of doctor when he submitted his dissertation, on May 1952. Retrospectively, Clower recognized that his thesis "was not in a form fit for publication" and "did not produce what he had hoped".[4] This would have led him to "develop healthier motivations", staying "six months at home not only with *Value and Capital* but also with Pareto and Walras".[5] This orientation is confirmed by the publication of a series of papers devoted to the development of "stock-flow" market analyses: "Business Investment and the Theory of Prices" (1953), "Productivity, Thrift and the Rate of Interest" (1954), "An investigation into the Dynamic of Investment" (1954a) and "Price Determination in a Stock-Flow Economy" (1954b). The last two paper were written with a mathematician specialized in dynamics, Don Bushaw.[6] This marked the beginning of a collaboration which culminated with the writing of *Introduction to Mathematical Economics* (1957), a book fully devoted to "stock-flow" market analyses.

The "stock-flow" models resulted from the recognition that at the microeconomic level, individuals made decisions concerning the quantities consumed, produced, and held for future disposal. A "stock-flow" market theory accounted for the determination of prices in abstract economies in which plans to produce and to consume goods in the current market period were distinguished from plans to hold the same goods at the end of the market period.

[4] The quotes are taken from a resume written by Clower in 1964. R. W Clower Papers, Box 1-2001-0088, Rubenstein Rare Book and Manuscript Library.

[5] The quotes are taken from a first version of the introduction of "Money, Markets and Method: Essays in honor of R.W. Clower" (1999). R. W Clower Papers, Box 1-1999-0352, Rubenstein Rare Book and Manuscript Library.

[6] Bushaw did his PhD in Mathematics under the supervision of Solomon Lefschetz, a mathematician specialized in topology. He defended his thesis in 1952. According to Mike Kallaher (professor at the WSU), his PhD contributed to the development of modern optimal control theory (see the WSU website).

Formally, there was a set of supply and demand functions (flow dimension) describing respectively the quantity produced and consumed during the current market period. And to that, Clower added a set of supply and demand functions (stock dimension) describing respectively the quantity inherited from the activities of past market periods and the quantities that individuals wanted to hold at the end of the current market period. Since the quantities inherited from the past were independent of current activities, Clower contended that the two sets of equations were independent. This meant that "a set of prices which equates flow supplies to flow demands, and so establishes flow equilibrium, may not also serve to equate stock supplies to stock demands, and so establishes stock equilibrium" (1953: p. 23). Two types of equilibria were therefore distinguished. The first one was temporary since the stocks available in the economy showed a tendency either to rise or to fall. For a given vector of prices, individuals would like to hold stocks of commodities different from the one inherited from the past. The stocks would be adjusted by the quantities newly produced and consumed in the market period. At the end of the market period everybody was supposed to hold the quantity of assets desired. For that new stock available, a new price vector would be set. The process would continue until the quantity of stocks and prices became stationary. This situation characterized the second type of equilibrium. From 1952 to 1957, Clower studied the static and dynamic properties of these models in order to know if the "stock-flow" market structure could be a relevant interface between the theory of choices developed in the dissertation and Keynesian theories of the trade cycle. In the absence of conclusive results, the project was finally abandoned.

Both these analyses and the doctoral dissertation will be used to stress Clower's equilibrium and synthesis perspectives. The insights (mainly informal) developed in the dissertation are necessary but not sufficient to maintain with absolute confidence that

individual disequilibrium and its consequences were outside the field of investigation and that the Walrasian theory remained Clower's base camp all along the way.

1.1.2 Employment fluctuations, individual equilibrium and tâtonnement dynamics

Involuntary unemployment was considered as a secondary issue in the "stock-flow" program of microfoundation. This concept was not even mentioned in *Introduction to Mathematical Economics*. An empirical argument justified this approach in the doctoral dissertation. Clower argued that it was not of fundamental importance to know whether workers were voluntarily or involuntarily dismissed during the downturn. The effect on economic activity would be the same. Accordingly, in the context of trade cycles studies, it would be enough to account for the fluctuations of employment:

> In practice, it is clear that large declines in employment may have the same influence on economic activity whether workers were voluntarily or involuntarily unemployed. We leave the matter at that (1952: p. 66).

In spite of this disinterest, Clower (1952) proposed a reflection on how to incorporate involuntary unemployment in a market framework. He claimed that there was no theoretical difficulty in leaving room for this result:

> One has to make a series of assumption to obtain a supply function equivalent to the one used by Keynes (i.e., a function of a form which permits one to talk about "involuntary" unemployment). However, since it is always possible to define *voluntary* unemployment by arbitrarily supposing that labor becomes absolutely inelastic in supply at some point on the supply curve, there is little point in pursuing such an exercise here (1952: p. 66 underlined by Clower).

To address involuntary unemployment, it would be enough to assume a horizontal labor supply curve. Each point on the perfectly elastic section of this curve was supposed to capture

Keynes' insights.[7] That solution, also advocated by Franco Modigliani (1944) and Lange (1944)[8] implied market clearing and so, that workers realized their standard optimization programs (De Vroey, 2004). At this stage, Clower therefore viewed involuntary unemployment as an equilibrium situation.

More generally, Clower considered that Keynesian macroeconomics could be rooted in a price theory in which all the markets cleared and so, in which all the individuals realized their optimizing plans. This clearly appears in the short appendix devoted to the "Keynesian system", in *Introduction to Mathematical Economics*. Bushaw and Clower aimed at deriving the standard IS/LM model from their "stock-flow" price theory (1957: p. 43). The equilibria on consumer goods market (c), capital goods market (a), labor market (l) and securities market (b) were presented following the syntax of their price theory. Their formalization depended on whether they were viewed as a stock, flow or stock-flow markets. The excess-flow-demand was expressed by X and the excess-stock-demand by X'. It is striking that all the markets cleared in their disaggregated system (1957: p. 46):

$$\begin{cases} X_a(p_a; p_b; p_c; p_l) + X_a'(p_a; p_b; p_c; p_l) = 0 \\ X_b'(p_a; p_b; p_c; p_l) = 0 \\ X_c(p_a; p_b; p_c; p_l) = 0 \\ X_l(p_a; p_b; p_c; p_l) = 0 \end{cases}$$

This equilibrium perspective is also contemplated in dynamics. As part of the study of the stability conditions of the "stock-flow" price theory, in discrete time, Bushaw and Clower (1957) insisted on the assumption that at any market period, all the markets cleared:

> This equation expresses the assumption that p_1 (t) and p_2 (t) assume values which make market demand equal to market supply at the beginning of each period (1957: p. 84).

[7] For a criticism of this viewpoint, see De Vroey (2004, 2005).

[8] "Involuntary unemployment in the Keynesian sense is not an excess supply of labor but an equilibrium position obtained by intersection of a demand and a supply curve, the supply curve of labor, however, being infinitely elastic over a wide range with respect to money wages, the point of intersection being to the left of the region where elasticity of supply of labor with respect to money wages becomes finite." (Lange, 1944: p.6)

The dynamic path of the economy would be determined by the variations of the stocks of commodities in the economy. It was assumed that the stationary equilibrium was reached when the net changes of stocks from periods to periods were nil (1957: p. 84). In continuous time, the dynamics was based on the same logic. Following economists like Lange (1944) and Samuelson (1947), Bushaw and Clower studied the stability properties of tâtonnement processes (1954b: p. 343; 1957: p. 101). So, the focus was on the dynamic of abstract economies in which disequilibrium transactions were excluded. Individual disequilibrium and their consequences were therefore out of the field of investigations in "stock-flow" market analyses.

1.1.3 The compatibility between Walrasian and Keynesian theories

In the introduction of his dissertation, Clower wondered about the compatibility between Walrasian and Keynesian theories. He claimed that the two theories were fundamentally compatible. Yet, the deduction of Keynes' macroeconomics would require modifying Walrasian microeconomics:

> From a formal point of view, is the *General Theory* a special case of established general equilibrium theory? Once again, there are essential differences between the two levels of analysis, differences which may not be reconcilable until the foundations of general equilibrium theory are broadened (1952: p. 5).

Clower undertook such modifications. The results appear in appendices, at the end of his dissertation. Appendices I and II presented the "producer-consumer" theory of the firm. Appendix III presented a reformulation of the standard theory of the consumer, inspired by the works of James S. Duesenberry (1949) on interdependent preferences. Clower sought to

account for the impact of the relative position of consumers in society on their patterns of consumption.[9]

In several chapters of the dissertation, Clower attempted to provide evidences of the compatibility between these microfoundations and Keynesian macroeconomics. This was mainly informal, particularly as regards the connections with the "general theory of capital accumulation". Actually, Clower only justified some of its properties. His specific theory of the consumer was used to justify the "floor" and the rising trend of the macromodel. The maintenance of the consumption, to keep up with the Joneses, would underpin the minimum limit of investment at which the economy would rebound. And since this "floor" was supposed to depend on the stock of capital assets accumulated and that this stock was likely to increase from one depression to another (1952: p. 43), it would grow over time thus describing a rising trend. The "producer-consumer" theory of the firm was used to justify the articulation of stocks and flows, the central feature of the macromodel. That was presented as a relevant foundation for the accelerator (1952: p. 57) and Keynes' theory of investment (1952: p.61). Clower became a bit more precise when he undertook the derivation of relations exposed in the *General Theory*. Though not detailed, a procedure of aggregation was followed. Starting from optimization programs, Clower claimed to deduce individual supply and demand functions and, by simple summation, to obtain their aggregated versions (1952: p. 61; p.63). Clower set these functions. They served to derive components of the aggregate demand. Clower considered that "Keynes explicitly assumes that entrepreneurs maximize profits" (1952: p.60) and that the theory of investment deduced from the "producer-consumer" theory of the firm was "equivalent to the theory of Keynes" (1952: p. 62). Likewise, Clower maintained that "his [Keynes] consumption analysis is consistent with the

[9] Clower presented in details these modifications of standard microeconomics in two papers: "Mr. Graaff's Producer-Consumer Theory: A Restatement and Correction" (1952a) and "Professor Duesenberry and Traditional Theory" (1952b).

usual pure theory of consumer behavior" (1952: p. 60). After a few manipulations on the demand for goods, Clower claimed to "arrive at the Keynesian propensity to consume, on its most familiar form" (1952: p.65). The *ad-hoc* manipulations of the supply and demand functions limited the relevance of Clower's demonstration. But the problem really lied in the absence of formalization of a general equilibrium model. In a program of microfoundations *à la* Hicks (1939), the formulation of a market theory was seen as a crucial step to demonstrate that macroeconomics could be deduced from the theory of choices.

"Stock-flow" market analyses were later developed to fill this gap. The walrasian flavor of the general equilibrium models could hardly be overemphasized.[10] Symmetry and market clearing characterized the system of equations (see 1.1.2). And though that was not clearly expressed, the simultaneity of decisions was assumed. In *Introduction to Mathematical Economics*, when Bushaw and Clower gave details on the exchange technology underlying their "stock-flow" price theory, they referred to a "central market authority" (1957: p. 31) expected to set prices so that supplies equaled demands (1957: p. 34).

Though largely implicit, connections with Keynesian macroeconomics were proposed both in partial and general equilibrium frameworks. In partial equilibrium, this concerned the liquidity preference theory (1954) and Keynes' theory of investment (1954a). Clower (1954) demonstrated that the dynamic path of the rate of interest was largely determined by the excess-stock-demand for bonds, not by the excess-flow-demand for bonds (p. 114). This feature was presented as a proof that the rate of interest was governed by speculative behaviors, not by saving and investment. Clower (1954a) demonstrated that given different levels of the rate of interest, the relation between the stock demand and the associated level of net investment could be used to obtain "a curve K(r) which Keynes would call schedule of marginal efficiency of capital" (p. 76). In general equilibrium, Bushaw and Clower (1954b)

[10] On the Walrasian representation of the functioning of a market economy, see De Vroey (1999).

referred to the project sketched in the doctoral dissertation. The "stock-flow" price theory could ground the "models based on the acceleration principle" (1954b: p. 328). The reason was dynamic. The articulation of stocks and flows would be a source of instability ignored in pure stock and pure flow models (1954b: pp. 341-342).

In *Introduction to Mathematical Economics*, Bushaw and Clower recognized that "the path from their own (or from any similar model) to the Keynesian system is rather tortuous" (1952: p. 44). But in the "Keynesian appendix", their "discussion [serves to] show that a path exists" (1952: p. 44). Starting from the disaggregated system exposed in 1.1.2, they made various assumptions and modifications to finally deduce the "Keynesian building block Y= C+I" (1957: p. 46) and standard Keynesian functions. Regardless of the rigor of this derivation, this proves that Clower considered that Walrasian and Keynesian theories were fundamentally compatible.

1.2 The "general theory of price determination" (1954-1959)

In parallel with his "stock-flow" program of microfoundation, Clower developed a second theoretical project purporting to set a price theory allowing the unification of all forms of competition, from monopoly to perfect competition. This emerged out of the debates on the realism of the Walrasian theory, held at Cambridge (Massachusetts) by Edward H. Chamberlin and Robert Triffin. In this project, the emphasis of Clower's equilibrium and synthesis perspectives requires to scratch the theoretical surface. As a matter of fact, Clower considered situations of individual disequilibrium and sought to account for the resulting market dynamics. But disequilibrium was not the issue. Actually, the main ingredients of disequilibrium economics were absent. For example, the consequences of disequilibrium trading (such as income effect) on optimizing behaviors were totally ignored. Then, although it is true that Clower shaped various adjustment processes different from the standard excess-

demands of the Walrasian theory, the goal was not to find an alternative to the tâtonnement hypothesis. His "general theory of price determination" is presented as an extension of the basic assumptions of the "traditional general equilibrium theory".

1.2.1 Overview of the project

Clower's project to build a "general theory of price determination" traces its roots in two unpublished manuscripts, written over the first half of the fifties: "On the existence of a General Theory of Price Determination" (1954i) and "Toward a General Theory of Price Determination" (1955). Then, Clower presented his main developments and results in the concluding chapter of IME, in three sections titled: "Toward a Generalized Theory of Price Determination", "A Unified Theory of Price and Quantity Determination" and "Monopoly and Competition: An Appraisal". Reflections in this area continued until the end of the fifties through unpublished manuscripts and one paper: "On the Microdynamics of Price Formation in N-Seller Markets" (1958?), "A Study of Elementary Learning and Response Mechanism in Dynamical Monopoly Model" (1958), "Inductive Inference and Business Behavior" (1959)[11] and "Some Theory of an Ignorant Monopolist" (1959i).

In his first manuscripts, Clower presented his project as a reaction to the debates held at Cambridge (Massachusetts) by Chamberlin and Triffin. His reading of *Monopolistic Competition and General Equilibrium Theory* would have been the original impulse. In this book, Triffin took up the criticism of his supervisor (Chamberlin) on the lack of realism of perfect competition. He proposed to integrate some elements associated to the monopolistic competition such as strategic behaviors and firms' interdependences, in the Walrasian theory (Marcuzzo, 2012). This would allow escaping from the partial equilibrium approach that characterized the standard monopoly theory whilst improving the empirical content of the

[11] R. W Clower Papers, Box 4, Rubenstein Rare Book and Manuscript Library.

general equilibrium models (1940: p. 4). In the conclusion of this book, Triffin recognized the complexities resulting from the incorporation of these features. He contended that the formulation of a price theory as simple and elegant as the Walrasian one would be consequently an elusive quest. Economists would have to consider this as "a philosopher's stone" (1940: p. 289).

Clower reacted to this abandonment. His works on "stock-flow" models would have led him to find the way to complete Triffin's project via the elaboration of a "general theory of price determination" including all forms of competition, from monopoly to perfect competition:

> As a result of recent work in the theory of competitive price, however, coupled with some thought-provoking remarks addressed to me by Professor Chamberlin, Professor Triffin's dictum no longer has to be accepted. On the contrary, *it is now possible to exhibit a consistent and unified general theory of price determination* (1954i: p.2 underlined by Clower)

The key to understand the project is the existence of analogies in the procedure of estimation of equilibrium prices. Clower considered that whatever the forms of competition structure, individuals (whether a "market authority" embodied by the figure of the broker, a seller or a group of sellers) would carry out such estimations trying to avoid unwanted stocks. In perfect competition, he pointed out that brokers were responsible for setting equilibrium prices following a tâtonnement process. He inferred that a broker could be viewed "as an actual unit of economic decision similar to consumer and business units" (1954i: p. 31), supposed to set prices following an internal equilibrium condition represented by a "desired excess-demand". The point was that the equilibrium condition of a broker did not match necessarily the market one. In this case, he would observe unwanted variations of stocks. This would be a signal to revise his estimation of equilibrium prices. The procedure of re-estimation would be at work until the brokers' "desired excess demand" and market excess demand would be

simultaneously nil. After having presented this procedure of estimation of equilibrium prices, Clower turned to non-competitive structures. He contended that, if the assumption of "demand certainty" was dropped, the process of price determination would appear to be analogous to the one at work in perfect competition. In a monopoly, the seller decided on the level of production by estimating the price at which he would sell the integrality of the production and maximize his profits. Of course, he may make mistakes, failing to correctly anticipate the objective demand. Accordingly, he would be forced to increase his stocks of goods or would not be able to exploit all the profit opportunities. So, a procedure of re-estimation would be launched until the internal equilibrium coincided with the market equilibrium. According to Clower, once this element of uncertainty was introduced in the standard monopoly theory, the extension to oligopoly model would be quasi natural. The difficulty would lie in the treatment of firms' interdependences. Because of the presence of such analogies in the adjustment processes, Clower thought he had proved the existence of a "general price theory" allowing the unification of all forms of competition.[12]

To undertake this unification, he proposed to set dynamic systems with various adjustment rules describing the behaviors of prices, outputs and realized sales:

> It will now be clear that the more general model is neither competitive nor non-competitive. Instead, it is a general theory of market adjustment (1954i: p. 43).

The difficulty was to define these adjustment processes in a sufficient general way to ensure the deduction of specific behaviors related to the market structures. Through the 1950s, Clower searched for the best formalization of these adjustment processes:

[12] Following Samuelson (1947), Clower quoted Moore's *Principle of Generalization by Abstraction* (1910) to justify this viewpoint: "Until a short time ago, however, neither proposition was ever required in such an explicit form as that it is presented in this paper. Although I was well aware of E.H. Moore's principle of generalization of abstraction, therefore viz., 'the existence of analogies between central features of various theories implies the existence of a general theory which underlies the particular theories and unifies them with respect those central features.' [footnote to refer to Samuelson (1947)], its relevance to the case in question was never clear." (1954i: p. 49)

> The purpose of this paper is to sketch a unified dynamical foundation for analyzing short run output, price, and sales behaviors in n-seller markets of the kind considered in accepted formal theories of monopoly, oligopoly and pure competition. Considered in the abstract, all of these theories seem to be concerned with a common conceptual problem: given a trading situation in which technically homogenous units of a single commodity are produced and offered for sale by one or more independent sellers to a mass of prospective buyers, *to formulate a self-contained, logically coherent, and intuitively satisfying description of the determination of the output, price, and sales of each seller* (1958?: p. 1, underlined by Clower)

Of course, the complexity of these dynamic systems made difficult the studies of their stability conditions. Most of the time, dynamic analyses were therefore absent. That problem of tractability was put forward by Clower to explain why it would be preferable to stick to the assumption of perfect competition (1957: p. 190). Since he was unable to find a way to simplify these models, the project petered out.

1.2.2 Disequilibrium was not the issue

Despite the diversity of models developed by Clower, the same experiment was proposed. Clower considered situations in which "individuals" (whether a "market authority", a seller or a group of sellers) set prices and made mistakes thus leading to disequilibrium transactions. For example, Clower (1957, 1958?, 1958, 1959, 1959i) assumed that N (N ϵ $\boldsymbol{N}$*) independent sellers produced in (t-1) a homogeneous good that they brought to the market in t. At the beginning of the market period, they set the price at which they undertook to deliver the goods during the market period. The market price was supposed to be the minimum of the prices set by sellers. Those who set higher prices would not be able to sell the quantity they had planned. Symmetrically, consumers would not be able to realize their consumption plans when the quantities sold at the market price were not sufficient. Accordingly, situations of individual disequilibria were considered in Clower's "general theory of price determination".

Yet, three features of these studies show that disequilibrium was not the issue. First, in all the papers mentioned, Clower excluded *ab ovo* the effects of disequilibrium transactions on individuals' choices. The sellers could not integrate the level of demand during the market period and readjust their production on this basis. Such adjustments were considered to be at work but would have consequences only on the next market period. Second, Clower stuck to partial equilibrium approaches. As a result, he ignored the consequences of the non-realization of optimization programs on other markets, what Patinkin (1956) called "spill-over" effects. And third, every study was led as if the dynamic properties of the models were a secondary issue. Clower set dynamic systems but mainly discuss the properties of their equilibria. In that respect, it is striking that he always insisted on market-clearing. Of course, this was partly due to the complexity of the dynamic systems. But beyond that, a deeper reason, consubstantial with his project, justified this approach. The goal was to demonstrate that a single price determination process, with a common criterion (supply/demand balance), characterized all forms of competition:

> Therefore, market equilibrium (in monopoly) is defined by the intersection of the supply curve *s* with the demand curve *d*— a result which is remarquably similar to that which defines market equilibrium price in an isolated competitive market! […] Here, precisely as in the case of the monopoly, market equilibrium is defined by the intersection of the market supply and demand curves *s* and *d* (1957: p. 189).

Because of this orientation, Clower was really more interested in full market clearing situations.

1.2.3 The compatibility with the "traditional general equilibrium theory"

Now, let's focus on the synthesis perspective. In his first manuscript, Clower claimed that his "general theory of price determination" was the result of an extension of the "traditional" general equilibrium theory:

> *The* [general] *theory follows immediately from generally accepted postulate of traditional analysis in conjunction with one simple, almost obvious, further assumption which, while already at hand in elementary dynamical considerations underlying established analysis, is here utilized for the first time* (1954i: p.2 underlined by Clower).

The extension concerned the dynamic procedure of estimation of equilibrium prices as suggested by the tâtonnement hypothesis. To stress the existence of a "general theory of price determination", Clower proposed to couple this procedure with the assumption that the Walrasian broker did not want to hold unwanted stocks.[13]

During the development of his project, Clower wondered whether or not simple extensions of Walrasian microeconomics were sufficient to account for the kind of behaviors addressed in his "general" theory. In 1959, he mentioned the possibility of a break with the "traditional price theory". But he claimed that it was preferable to remain in this framework:

> The inadequacies of traditional price theory as an instrument for describing observed market behavior have become increasingly apparent in recent years. It is still an open question, however, whether these shortcomings can be removed by appropriate generalizations of existing theories or whether modifications of a more fundamental kind will be required. […] It seems to me that both points of view entail interesting programs of research and that neither can be said to involve anything more than this at the present time.[…] Meanwhile, it is interesting to speculate about the possible fruitfulness of an approach which lies somewhere between the two extremes. […] The purpose of the present paper is to elaborate upon this theme by sketching a simplified "learning model" of oligopoly which is broadly consistent with traditional doctrine yet sufficiently general to include both established monopoly theory and the accepted theory of pure competition as special cases (1959i: p. 2).

Therefore, the compatibility between the "general theory of price determination" and Walrasian general equilibrium theory was claimed all along the way.

[13] See 1.2.2 for an explanation of Clower's rationale.

To conclude, from 1949 to 1959, Clower developed two theoretical projects in which i) he was never interested by involuntary unemployment and more generally by individual disequilibrium its consequences; ii) he always considered that extensions of "established" general equilibrium theory were sufficient to build his theoretical models. So, what happened to him? How to explain that in little more than three years, at the Royaumont conference (1962), he proposed a disequilibrium interpretation of the Keynesian theory whilst defending the need to break with Walrasian microeconomics?

2. Clower's *about-face*: Phase II (1960-1962)

In the early sixties, Clower reopened investigations on Keynesian macroeconomics. In an attempt to shed new lights on the Keynes-Classics debate, he radically broke with the equilibrium and synthesis perspectives that prevailed until now. That is why these reflections are considered as part of another research phase (Phase II). Clower's *about-face* took place in two steps. Its origins are mysterious. But they are clarified by the intellectual context and the invariants of Clower's works. Clower probably considered that the disequilibrium interpretation of the *General Theory* fostered by Patinkin opened a fruitful avenue of research to address the two very issues on which he was working on since his PhD dissertation: the microfoundations of Keynesian macroeconomics and the dynamics of market economies. His focus on unstable dynamics led him to realize, in reaction to Patinkin's own contradictions and to the developments in non-tâtonnement economics, that a break with the Walrasian framework was imperative. Clower's rejection of Walras' law makes sense when one realizes that this law was violated in the dynamical analysis proposed by Patinkin (1956) in chapter XIII, and that Hahn and Negishi (1962) demonstrated that the stability of non-tâtonnement processes was partly due to its validity.

2.1 A two-step reorientation

One unpublished manuscript and two papers will be studied to examine Clower's *about-face*: "Keynes and the Classics: A Reinterpretation" (KCR);[14] "Keynes and the Classics: A Dynamical Perspective" (1960) and "The Keynesian Counter-Revolution: A Theoretical Appraisal" (1965). The debate over Keynes and the Classics was the point of entry in these new investigations. In the first two works, Clower displayed a disequilibrium interpretation of the *General Theory* whilst maintaining a synthesis perspective. Clower realized the incompatibility between the two theories shortly before presenting the "Counter-Revolution" paper, at the Royaumont Conference.

2.1.1 Disequilibrium and synthesis

In KCR, Clower proposed a disequilibrium interpretation of the *General Theory*. The main ingredients of disequilibrium economics were mobilized. First, involuntary unemployment was the focal point. This concept was viewed as the dividing lines between Keynes and the "Classics", in statics and in dynamics. In the former case, Clower proposed to tread on Keynes' footsteps to show that the "Classical point of full employment equilibrium" was an "*upper limit* to possible equilibrium level of employment in the Keynesian model" (KCR, p.7). Yet, according to Clower "the relative merits of Keynesian and Classical [theories] cannot be discussed profitably on a static level of analysis (KCR: p. 8). That was why he proposed to stress a dynamic interpretation of the Keynes-Classics debate. The matter was instability of the full employment equilibrium in Keynes's theory versus stability in the "classical" theory. Second, involuntary unemployment was presented as a disequilibrium situation. When Clower sought to account for the "unlimited number of equilibrium states" in Keynes' *General Theory*, his ambition was to explain that entrepreneurs could set the volume

[14] Robert W. Clower Papers, Box 4, Rubenstein Rare Book and Manuscript Library.

of employment whilst leaving the labor market in excess supply (KCR, p. 6-7). Third, Clower considered involuntary unemployment as a dynamic phenomenon. The demonstration of its persistence through the analysis of market adjustment processes was the aim of his "dynamical interpretation" of the Keynes-Classics debate (KCR, p. 2). Fourth and finally, Clower intended to account for the consequences of disequilibrium transactions. That was what he suggested when he distinguished two scenarios in his dynamic analysis: "*Case I:* it is assumed that all market transactions at output prices other than those which 'clear the market' are strictly provisional (i.e., if the output market operates according to Walrasian or Edgeworthian principles). […] Case II is rather different, for it rests upon Keynes' version of Say's law; i.e., it depends on the proposition which asserts that "supply creates its own demand" in the strictest possible sense" (KCR, p. 9). Here, what Clower called Say's law in the sense of Keynes meant that the model took into account the income constraints imposed on workers' consumption when they failed to sell the quantity of labor planned. By assumption, workers would express a demand for goods determined by the level of employment imposed by firms.

It is striking that whilst developing this disequilibrium interpretation of the *General Theory*, Clower kept maintaining that there was no fundamental difference between Keynes and the "Classics". In KCR, Clower contended that the "Classical equilibrium problem parallels that given by Keynes in chapter 2 of the General Theory; in particular, it is consistent with his treatment in every respect." And in 1960, he claimed that "the essential formal difference between Keynes and the classics is more one of subject matter than of underlying postulates" (1960: p. 25). Keynes would have been interested in addressing "depression states" while the "Classics" would have been interested in addressing equilibrium situations. Accordingly, there would be no problem to synthesize the two theories!

2.1.2 Disequilibrium and break with Walrasian microeconomics

This position radically changed shortly before the Royaumont conference (held from 03/08/1962 to 04/07/1962). A letter sent to Patinkin on March 1962 is often quoted to show Clower's break with Walrasian microeconomics (Backhouse and Boianovsky, 2013: p. 50; Rubin, 2005: p.18). Here, Clower's radical reorientation is emphasized drawing from a letter sent to G. Delehanty (Massachusetts Institute of Technology):

> The heart of the problem seems to be that Keynes, unlike the specialists in tâtonnement economics, assumes that market excess demands depend in part on the level of current transactions (that is to say, income flows). Dependence upon income as an independent variable is obviously inconsistent with traditional preference analysis since, if income is taken as given it is not possible to define factor supply functions. Why this difficulty has not been noticed before I cannot say, but I can tell you that it is more difficult to get over than one might suspect at first sight. My own proposal is a kind of dual decision theory of the consumer, which makes sense in a dynamic context, and happens to include traditional preference analysis as a special case – valid under full employment conditions (Letter from Clower to Delehanty, 02/19/1962).[15]

The argument mentioned was the heart of the 1965 piece. Clower realized that Keynesian relations such as the consumption function could not be derived from Walrasian microeconomics. The reason was that realized income was considered as an independent variable in Keynes' theory, while it was not in the Walrasian theory. In the later, individuals were supposed to chose their income by defining their selling and purchasing plans at the same moment. Income was endogenous. No adjustment of consumption was possible, unless prices varied. As a result, realized income could not act as a constraint in the Walrasian demand for consumption goods (labeled "notional", in opposition to the "effective" demands of the Keynesian theory). For that to be possible, Clower contended that an alternative theory of the consumer was required. His idea was to drop the assumption of a systematic

[15] R. W Clower Papers, Box 2, Rubenstein Rare Book and Manuscript Library.

synchronization between the decisions to buy and sell, in a context were individuals could trade out of the equilibrium. This de-synchronization characterized the so-called "dual-decision" hypothesis.

2.2 Why such an *about-face*?

On two occasions, Clower suddenly reoriented his interpretation of Keynesian economics. The circumstances of these reorientations remain mysterious. Yet, the intellectual context with and the invariants of Clower's analytical approaches shed some light on this *about-face*.

2.2.1 Patinkin's influence on Clower's break with the equilibrium perspective

There is a coincidence in time between the emergence of Clower's disequilibrium interpretation of the *General Theory* and the beginning of his interactions with Patinkin. At the end of the fifties, Clower and Patinkin started a correspondence. Initially, Clower reacted to "Liquidity Preference and Loanable Funds: Stocks and Flow Analysis" (1958), a paper in which Patinkin questioned the validity of Walras' law in situations of involuntary unemployment. Then, the two authors started a new correspondence on monetary theory in reaction to the publication of G.C Archibald and R.G Lipsey (1958)'s paper "Monetary and Value Theory: A Critique of Lange and Patinkin". In this context, Clower repeatedly expressed his admiration and his interest for the reasoning developed in *Money, Interest and Prices*:[16]

> Re-reading your book, I am more than ever impressed by the consistency of the analysis – given the assumptions—and with the absence of anything but minor slips (Letter from Clower to Patinkin, 03/10/1959, Don Patinkin Papers, Box 25).

Although Patinkin's unemployment theory was not discussed in these correspondences, there are strong grounds for believing that it was not a simple fact of timing

[16] See Rubin (2005: pp.17-18) for other quotations.

if Clower wrote KCR at the same moment. First, like Clower, Patinkin sought to provide microfoundations to Keynesian macroeconomics. And like him too, Patinkin insisted on the need to understand the dynamics of market economies. To be more specific, Patinkin proposed to explain involuntary unemployment as a dynamic phenomenon. Workers' inability to realize their Walrasian optimizing plans induced pressures on wages which, in turn, provoked market adjustments. These were the two points of entry in Clower's reconsideration of Keynes' *General Theory*. In KCR, behind the label "Keynes-Classics debate", Clower really addressed the compatibility between Walrasian and Keynesian theories and the stability of the market economy (see 2.1).

Second, the theoretical proximity between the two authors is undeniable. In KCR, Clower nearly paraphrased Patinkin (1956) to criticize Keynes (1936) for having defined involuntary unemployment as an equilibrium situation:

> Perhaps the most curious aspect of the matter is the fact that *if* w and p just happen to fall at the same rate of time then, starting from an initial position of Keynesian equilibrium (with excess supply in the labor market), the economy will remain 'in equilibrium' indefinitely although prices and wages are constantly falling over time! Under these circumstances, it is perhaps natural to speak of the difference N^s - N^d as 'involuntary unemployment'; but it is a curious of language to refer to the situation as a whole as one of equilibrium (KCR, p. 13 underlined by Clower).

> All, then that Keynes means by the statement that the system may settle down to a position of 'unemployment equilibrium' is that the automatic workings of the system will not restore the system to a position of full employment equilibrium. He does not mean 'equilibrium' in the usual sense of the term that nothing tends to change in the system. All that is strictly in equilibrium is the level—or, possibly, only the fact—of unemployment; but there is no equilibrium of the money wage rate (1956: p. 471).

Likewise, he nearly paraphrased Patinkin to emphasize the need to use dynamics to capture Keynes' theory of involuntary unemployment:

> Although Keynes himself never made a complete transition from statical to dynamical modes of thought, his work prompted many of his contemporaries to do precisely this, and so wrought a fundamental change in intellectual perspective in the space of few years […] The fruits of the Keynesian Revolution have been, and are being, gathered primarily by a new generation of economists, a generation that has finally accustomed itself to thinking in terms of points and planes instead of curves and crosses (1960: p. 323).

> Indeed, it is the very departure from these curves, and the resulting striving of individuals to return to the optimal behavior which they represent, which provides the motive power of the dynamic process itself. Thus our task in studying involuntary unemployment is to free ourselves of the mental habit – long ingrained by the methods of static analysis – of seeing only the points <u>on</u> the demand or supply curve (1956: p. 220 underlined by Patinkin).

Lastly, Clower resorted to the logic of the "spill-over effect" in the disequilibrium model put forward in KCR. The same mechanism underlined his application of "Keynes' version of Say's law". Patinkin described the behavior of entrepreneurs that failed to sell the quantity of goods they had planned. They would integrate the level of demand as an additional constraint and would redefine their labor demand. Clower described the income constraints imposed on workers' consumption when they failed to sell the quantity of works they had planned, which was simply the symmetric effect.

Whilst taking up central ideas shaped by Patinkin (1956; 1958), Clower finally considered that the Walrasian and Keynesian theories were fundamentally incompatible, a position diametrically opposed to those held in *Money, Interest and Prices*. How does one explain that?

2.2.2 Clower's break with the Walrasian framework

Rubin (2005) considered that the roots of Clower's break with the Walrasian framework lie in Patinkin's own contradictions. Whilst studying their respective positions on

the validity of Walras' law, he showed that Patinkin (1956; 1958) preferred contradicting himself rather than rejecting the Walrasian framework. Clower (1965) would have identified the gaps and would have drawn the consequences that the invalidation of Walras' law was the *sine qua non* of the Keynesian theory:

> Either Walras' law is incompatible with Keynesian economics, or Keynes had nothing fundamentally new to add to orthodox economic theory (1965: p.41).

Rubin's viewpoint is here reinforced by putting Patinkin's contradictions in perspective with the contemporaneous development in "non-tâtonnement" economics and with Clower's ambition to account for the instability of market economies, in his disequilibrium theory.

The dynamics of market economies and, more specifically, the possibility of a continuous depression was core to Clower's disequilibrium interpretation of the *General Theory*:

> On the other hand, any point which lies on the demand curve but above the supply curve refers to a state of *involuntary unemployment* in the sense of Keynes. […] Under the latter circumstances, the marginal utility of the real wage exceeds the marginal disutility of labor, whereas the marginal product of labor is equal to real wage; hence *households alone* have an incentive to expand employment. By analogy with situations of a similar sort experienced in practice, it is natural to regard these as 'depression' states of the model. The interesting thing about 'depression' states is that it is not directly plausible to say that they cannot persist indefinitely. No doubt it can be asserted, with good reasons that any particular 'depression' state tends to be followed by another 'depression' state, and so on, *indefinitely*. This is clearly a dynamical stability question (1960: p. 23 underlined by Clower).

A disequilibrium model would have to account for i) the rationing suffered by workers on the market for labor; ii) the pressures on wages resulting from their incentive to change the employment situation; and iii) the dynamic of the whole economy, given that entrepreneurs

have no interest to modify the employment situation. In this context, Clower insisted on the possibility that the economy might stick to a depression state – another issue on which he was working on since his PhD dissertation. That was a scenario considered by Keynes (1936) and that Clower wanted to account within his disequilibrium theory of unemployment.

In view of this, the contributions of Patinkin (1956; 1958) on one side, and of Hahn and Negishi (1962) on the other side, may explain why the rejection of Walras' law became a focal point. In chapter XIII, section II of *Money, Interest and Prices*, Patinkin broke with Walras' law when he explained the dynamic of his disequilibrium model. In situation of involuntary unemployment, the excess demands for goods and labor were based on notional supplies and effective demands so that their sum (weighted by market prices) would be less than zero. Then, in 1958, Patinkin questioned the validity of this law in Keynesian macroeconomics. He realized that the formulation of involuntary unemployment as a rationing in the labor market questioned its validity. By virtue of this law, it would not be possible to have an excess-supply in the labor market without having an excess-demand elsewhere in the economic system:

> Walras' law relates to an economy in which all markets are in equilibrium. In the case of involuntary unemployment, on the other hand, there exists a state of excess supply –and hence of continued disequilibrium – in the market for labor. At first sight then, there would seem to be no place for the operation of Walras' law (1958: p. 314).

In spite of these contradictions with his disequilibrium interpretation of the *General Theory*, Patinkin sought to maintain the validity of Walras' law. To do so, he assumed that workers adjusted passively their labor supply to the demand for labor:

> One way out of this difficulty (there may well be others) is to assume it away by attributing to workers a completely passive behavior pattern according to which they adjust the amount of labor they plan to supply to the amount employers demand at the going wage rate (1958: p. 314).

This way, "equilibrium always exists in the labor market" (1958: p. 314) and so, Walras' law was respected. Patinkin realized that this solution "dodges the real difficulties" (1958: p. 315). But the problem really was that the very existence of his disequilibrium analysis was in question. If the labor market was in "equilibrium", the dynamic pressure supposed to act on wages in situation of involuntary unemployment did no longer exist. Accordingly, involuntary unemployment stopped being a dynamic phenomenon and so, Keynesian macroeconomics lost its status of disequilibrium theory. In a different way, the contemporaneous development in non-tâtonnement economics also emphasized the dynamic consequences of keeping Walras' law valid. Hahn and Negishi (1962) demonstrated that a general equilibrium system with disequilibrium transactions but in which Walras' law held good was stable. Clower may have heard about this article before the Royaumont conference since he was in touch with Negishi at least since 1961.[17] And of course, as a careful reader of Patinkin's works, he surely noted his contradictions. In view of this, Clower may have considered that to discard Walras' law was a precondition to account for the unstable dynamics of market economies, in a disequilibrium model.

In fact, that was the theoretical message underlying the 1965 piece. Clower maintained that a break with the Walrasian framework was the key to vindicate the Keynesian heterodoxy. That was suggested in section II of the "Counter-Revolution" paper when he established a link between three "Keynesian indictments": the instability of the full employment equilibrium, the reject of Walras' law and the breaching of the "second postulate":

> The first item in his [Keynes] bill of particulars is embedded in a lengthy discussion of wage bargains between entrepreneurs and workers. Outwardly, this item represents little more than a vigorous attack on orthodox preconceptions about the stability of a market economy. For the burden of his argument

[17] As a matter of proof, see "Monopolistic Competition and General Equilibrium" (1961: p. 196).

> seems to be that if labor is ever forced to move 'off its supply curve' it may be unable to get back on again. If this is an accurate interpretation, we may say immediately that Keynes' criticism is not of fundamental theoretical significance, for there is no reason to suppose that Keynes was more expert on stability analysis than his orthodox predecessor. However, the same argument might also be interpreted as a direct attack on the orthodox theory of household behavior. This would certainly put labor off its supply curve and would also explain Keynes' categorical rejection of postulate II. But if this is what Keynes intended, i.e., to deny the validity of the orthodox theory of household behavior, one can only say that he was singularly unsuccessful in providing a rationale for his attack (1965: p. 40).

Thanks to the formulation of the "dual-decision" hypothesis, Clower thought he had found the way to link these indictments and so, the key to understand the Keynesian heterodoxy. Walras' law would be the piece hinged, thus explaining why Clower insisted so much on his rejection. The core of the "Counter-Revolution" paper was devoted to the relation between the "dual-decision" hypothesis and Walras' law. Clower demonstrated that the substitution of the "constrained demand" to the notional one turned Walras' equality into an inequality in case of involuntary unemployment (1965: p. 53). Thus, the model would admit situations in which there could have an excess supply in the labor market without necessarily an excess demand in the market for goods. This is the best known part of his argumentation, which is not the case of the relation between Walras' law and the instability of the full employment equilibrium. Clower contended that its validity entailed the existence of symmetric pressures on wage and price so that the return to the full employment equilibrium was ensured (1965: p. 52). But what would be the dynamic path of the economy if it was rejected? To answer this question, Clower considered a "typical" Keynesian situation in which the labor market was in excess supply and the market for goods cleared. Workers would consume the quantity of goods sold by employers (1965: p. 54). Although he did not express his position clearly, he seemed to have the idea that the economy might not return to a situation of full employment equilibrium:

> The point of the example is merely to illustrate that, when income appears as an independent variable in the market excess-demand functions – more generally, when transactions quantities enter into the definition of these functions – traditional price theory ceases to shed any light on the dynamic stability of a market economy (1965: p. 55).

Since the disequilibrium theory sketched in the 1965 piece could integrate consistently the three main "Keynesian indictments", Clower firmly believed that he was taking the right direction to ground Keynes' economics. During the Royaumont conference, Clower ended the discussion of his paper by claiming that he was able to provide a faithful microfounded general equilibrium account of the *General Theory*:

> In conclusion of his discussion, Clower described the purpose and message of his paper. He thought that people, including himself had failed to understand that there was a general equilibrium interpretation of Keynes, namely the one he had developed, which made all of the more familiar interpretation in terms of equational inconsistencies, rigid wages, liquidity traps, etc., unnecessary (1965a: p.309).[18]

This craze also explained why Clower did not hesitate to proclaim his heterodoxy and to violently reject Walrasian microeconomics.

Conclusion

My paper aimed at explaining the genesis of the "Counter-Revolution" paper. This was a difficult task since it entailed solving the mystery which, very often, surrounded Clower's contributions. He was an economist who had ambitions, asked important questions to understand the functioning of market economies, and always provided promising intuitions to answer. But he rarely succeeded in formalizing the models that fully supported his views. So, intuitions were often put in the back burner. This made difficult to capture his thought.

[18] This quotation is from the record of the discussions held at the Royaumont conference, published by Hahn and Brechling in 1965.

Because of that, an archival work was necessary. It helped to reveal the intuitions, the intellectual influences and the aims contemplated.

Backhouse and Boianovsky (2013) proposed a first important study, notably because they initiated the use of Clower's archives. They maintained that the "Counter-Revolution" paper resulted from an independent research program rooted in the works of Clower during the 1950s. Independency and linearity therefore characterized their account of Clower's intellectual path. Instead, my paper has showed that the two salient features of this path were the dependency (to an intellectual context mainly composed of Hicks and Patinkin) and the rupture (with equilibrium and synthesis perspectives). This is summed up in the following table:

	Phase I		**Phase II**
	The "General Theory of the Trade Cycle" (1949-1957)	The "General Theory of Price Determination" (1954-1959)	The "General Theory of Income Determination" (1960-1962)
Main intellectual background	i) The post-Keynesian theories of the trade cycle (Harrod, 1939; Hicks, 1950); ii) Microfoundations of macroeconomics (Hicks, 1939)	The debates on the realism of perfect competition (Chamberlin, 1933; Triffin, 1940)	i) Disequilibrium microfoundations of Keynesian macroeconomics (Patinkin, 1956, 1958)
Were individual disequilibrium and its consequences the focal points?	No	No	Yes
Was a break with standard Walrasian theory considered to be necessary?	No	No	Yes

Here, the 1965 piece is presented as the result of an *about-face*, mainly prompted by Patinkin (1956; 1958)'s disequilibrium interpretation of the *General Theory*. Clower (1965)'s advocacy of a disequilibrium theory and of a break with Walrasian microeconomics were two ideas which were opposed to those defended until the 1960s. In the first two theoretical project developed in the 1950s, Clower did not intend to leave room for involuntary unemployment, and more generally, for individual disequilibrium and its consequences. Moreover, he considered that simple extensions of the Walrasian general equilibrium theory (often called "traditional" price theory) were sufficient to undertake the construction of his models. That is why a theoretical *about-face* really underlined the "Counter-Revolution" paper. In view of the interactions between Patinkin and Clower at that time, there are strong grounds for believing that the author of *Money, Interest and Prices* played a crucial role in this sudden reorientation. This is surprising to say the least since in the 1965 piece, Clower violently Patinkin (1956)'s program of microfoundation, judging it as "counter-revolutionary". This attitude may explain why the two authors failed to see the deep proximity of their analyses when they met at the Royaumont Conference.

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