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ON THE EARLY CONTRIBUTIONS
OF CLOWER AND LEIJONHUFVUD**

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ABSTRACT

The paper presents a unified and critical discussion of the early contributions of Clower and Leijonhufvud (1960s and early 1970s). Its central argument is that the main message of Clower's initial project, which has to do with what will be called the "wandering system" dynamics, has been neglected in favor of the static message underlying the income-constrained (or multiplier) process. The following contentions are made:

- i) In his static model, Clower derives coordination failures which are not intrinsically specific to a pure money economy.
- ii) Clower's discussion of dynamics leads to a crucial conjecture about the possibility of permanent Keynesian unemployment (due essentially to the inability of the system to alleviate the coordination failure over time), but this conjecture has been neglected by those who have concentrated on (static) fix-price equilibria.
- iii) Leijonhufvud's analysis of "dynamics" in fact replicates static fix-price results, and is inappropriate for dealing with Clower's conjecture.

INTRODUCTION

The work of Robert Clower and Axel Leijonhufvud in the field of Keynesian economics clearly stands as one of the major advances of "non-Walrasian" theory of the past three decades. The aim of this paper is to emphasize that the main point of their approach has been missed. While Clower's initial project contained a static and a dynamic part, recent developments in the "fix-price" tradition have retained exclusively the static framework relating to the "dual-decision hypothesis." The ironic twist in the matter is that the common misinterpretation of Clower and Leijonhufvud springs from the fact that, as will be shown, the authors themselves did not succeed in stating clearly the implications of their models for the dynamic part of their analysis. In particular, Leijonhufvud's discussion of the dynamic issues in Clower's approach turns out to be a dead end because it merely re-states, in more general terms, the conclusions of the static part of the argument.

The paper is designed to provide a unified and critical account of the early contributions of Clower and Leijonhufvud. This means that only their articles of the 1960s and early 1970s will be reviewed in detail. References to subsequent articles will be made in footnotes whenever necessary. Section 1 briefly situates Clower's and Leijonhufvud's work in the well-known debate around the "Neoclassical Synthesis." Section 2 discusses the foundations of Clower's analysis; it questions the "monetary" nature of the coordination failures modeled by Clower, and then argues that his approach contains a second, dynamic part which has been completely overlooked by subsequent fix-price theorists. Section 3 is devoted to Leijonhufvud's extensions of the Clower model; it is critical of Leijonhufvud's discussion of "dynamics" and defends the idea that it is in fact of little use in understanding permanent Keynesian unemployment. Finally, section 4 gives concluding comments, pertaining mainly to the possible openings offered by a reinstatement of the dynamic part of the Clower-Leijonhufvud approach.

1. FROM STATICS AND EQUILIBRIUM TO DYNAMICS AND DISEQUILIBRIUM

In traditional Hicksian IS-LM models, a two-market equilibrium is considered (commodity and bonds or commodity and money); standard formulations (see, e.g., Allen [1965]) assume a fixed money wage and allow for labor market disequilibrium in the case of a labor supply curve which becomes inelastic above the full employment level of real wages. In that case, the model predicts that lowering the money wage w and/or increasing the nominal money stock M to push the price level up (both of which lead to a lower real wage) will do away with unemployment. We basically have a "maladjustment" between M and w . Classroom Keynesianism takes Keynes literally in his dislike of wage deflation, and asserts that ultimately authorities must increase the money stock in terms of wage units by increasing M . It is true that bits to justify this remedy may be found in the General Theory.

However, as Leijonhufvud [1968, 1969] emphasizes, this has led to a vision of Keynesian economics which

- i) relies in an ad hoc manner on money-wage fixity and possibly also on real-wage fixity, wages and prices being assumed to move together in the same proportion (e.g., through some "mark-up on labor costs" argument).
- ii) is at variance with the liquidity preference theory presented in the General Theory, in which velocity is variable rather than fixed as in a Quantity Theory framework.
- iii) is compatible with the assertion of Neoclassical theorists such as Patinkin who contend that through wage deflation (leading to a lower price level by point i) or through injection of outside money, a real balance effect will set in and boost demand in the short run until full employment is restored.

This is the essence of the "Neoclassical Synthesis" which originated in Hicks' IS-LM model and was developed by Patinkin among others. This synthesis is based on what Leijonhufvud [1969] calls the Keynesian "basic case": unemployment due to too high money wages. The issue of whether the General Theory contains this argument is difficult to tackle; the consequence, however, is clear: as Patinkin [1956] states, Keynes appears to have added nothing theoretically new to macroeconomics. His only novelty lies in the insistence on short-term stabilization policies to speed up the economy's return to full employment.

Patinkin's argument as presented in point [iii] must, to say the least, be put to serious question. His vision of how the economy fares over time is dubious: while he recognizes the existence of a time lag due to sluggish adjustment, he relies on a comparative-static argument which is firmly grounded in the vision of a self-equilibrating economic system. To shed doubt on this assertion was the main purpose of Clower's and Leijonhufvud's (henceforth CL) attack on orthodox Keynesianism in the 1960s. Essentially, they have argued that to make sense of Keynes' vision of the economy one must move from a "statics and equilibrium" to a "dynamics and disequilibrium" viewpoint. The basic ideas originated in Clower's writings¹ and were developed subsequently (though, as we will see, only in a partial way) by Leijonhufvud. Reading their main papers of the 1960s and early 1970s one sees clearly that, at that time, while they were influential

¹ As evidenced by the subsequent efforts of Barro and Grossman and of Malinvaud to synthesize Clower and Patinkin, some of the substance was already contained in Patinkin [1956], essentially chapter XIII. Yet there seems to be a consensus in the profession that the way for "non-Malrasian" analysis was really opened by Clower. One is convinced of this after reviewing the references cited in the introductions to various papers on fix-price equilibria.

on disequilibrium, their treatment of dynamics was essentially in-existent because they did not go beyond the threshold of fix-price equilibria.²

2. CLOWERIAN FOUNDATIONS

I

In the CL approach the reference point is full Walrasian equilibrium. "Disequilibrium" is defined in comparison with a state in which all desired transactions are compatible. While this is obvious, it has potentially far-reaching consequences: since Walrasian models function with quantities being optimally determined via price changes, the CL approach embodies a "disturbance" of this causality, namely, an inability of price changes to coordinate trading activities. Thus, to put it bluntly and to rephrase certain passages of Clower's afterword in Walker [1984], the CL reading of Keynes does away with the implicit presence of a Walrasian tatonnement in prices. At best, other rules of price motion or, better, joint rules of price and quantity motion are required to move away from the Neoclassical Synthesis and back to Keynes. Both authors have, in later papers which I will not discuss here, carried this intuition to some length, introducing, e.g., inventory holdings.³ In the 1960s Clower's main intuition was the fallacy of orthodox (tatonnement) pricing rules which imply instantaneous equilibrium. In the "Dynamical Perspective" paper of 1960, he concentrates on a representation of real wage adjustment in the labor market, with standard demand and supply curves; in the case of involuntary unemployment in the Keynesian sense (off the supply curve but on the demand curve), he argues that no direct argument allows for the assertion that the level of real wages has to fall. Such states he calls "depression states" because only households, not firms, have an incentive to increase employment. His argument is that Keynes had the distribution of possible states of the economy skewed toward depression states (clearly disequilibria in the Walrasian sense), while the Classics view the time path as a sort of Brownian motion around the equilibrium state. The tendency for depression states to persist, e.g., because of rising rather than falling real wages, he explains by expectational phenomena of the type emphasized by Keynes.

² This judgement would (though certainly not entirely) have to be relaxed upon reviewing in detail some of the later papers of the authors. See in particular Leijonhufvud [1987], Clower [1987]. My concluding section adds some perspectives.

³ See Clower and Leijonhufvud [1975], Clower [1975], and Clower and Friedman [1984]. These papers, however, contain various dynamic elements which make them quite distant from the ones I review here.

All this has to do with some unorthodox price and wage adjustment rules, but the paper remains intriguing because of the absence of any explicit dynamic price and wage equations, and also because of its exclusive reliance (in keeping, admittedly, with chapter 2 of the General Theory) on partial equilibrium analysis of the labor market. The step towards general equilibrium is taken in the "Keynesian Counterrevolution" paper of 1965. Clower's aim in that paper is to give choice-theoretic foundations to Keynes' consumption function which makes total consumption spending dependent upon current realized income. Ultimately, his objective is clearly to state the case for the fundamental role of the consumption function in the dynamics of output and employment through a critique of Say's Law and of traditional consumer optimization theory — which serves as the starting point of a reconsideration of the usefulness of Walrasian general equilibrium theory for understanding Keynes.

II

Clower starts from a full employment equilibrium. He assumes that realized income falls short of desired income, because of a fall in some individuals' sales of labor services to firms. This amounts, of course, to initially postulating the emergence of a state of unemployment. The latter is thus not explained within the model. Keynes then, in Clower's mind, was preoccupied more with the analysis of the consequences of unemployment than with its genesis. All incomes are measured in some commodity used as a unit of account. The fall in realized income must, by the budget constraint (called Say's Principle), lead to a lower demand for some or all commodities: effective demand falls short of notional demand for the market as a whole. But we should be careful to note that the fall in income starting from equilibrium could only come from the price vector suddenly becoming "false," i.e., from prices no longer all being at market-clearing levels. This is stated quite clearly: the problem which Keynes analyzes arises from households reacting to a situation in which they are unable to sell the quantity of labor they desire, at prevailing market prices. Keynes' central problem really originates, according to Clower, in a distortion of the relative price structure compared to the Walrasian equilibrium vector. Ensuing quantity constraints, which at given prices can be translated into income constraints in terms of numeraire, serve as the foundation of the formulation of consumption strictly as a function of realized income. The basic mechanism is provided by the "dual decision hypothesis," according to which the representative household revises its commodity demands downwards once it has perceived a constraint on its desired sales of labor.⁴

⁴ Actually, Clower takes into account the possibility that in fact such a downward revision will only occur once the household has exhausted its other (non-wage) financial resources, e.g., its previously accumulated savings. This possibility is contained, but in insufficiently explicit form, in the following passage:

Since he is not dealing with a micro-to-macro model with aggregation, Clower at no time in the paper alludes to any type of rationing scheme, and so the question of how information about perceived constraints is disseminated is left up in the air. This point (i.e., the fact that Clower's set-up really needs some type of *tatonnement* in the quantity constraints) was later raised by Leijonhufvud.⁵ I will not come back to it here, but I stress that it is of significant conceptual importance. One point which I will return to when discussing Leijonhufvud in the next section is the general equilibrium framework, and particularly the role of money. While Keynes attributed a central role to money in his economic system — mainly, as argued by Hicks [1967], because of the need of agents to hedge against unforeseeable expenditures — Clower's 1965 model does not appear to be specific to a money economy in Keynes' sense. As Hicks [1967] has emphasized, a commodity money is only a "partial money" unless it serves other purposes than simply that of a means of transaction, i.e., unless it is also held for precautionary and/or speculative purposes. Thus, in Clower's model, the problem of not being able to demand more goods because one is short of numeraire income is not intrinsically linked to a pure money economy: Hahn [1977] has argued that even in a barter transaction structure the spillover effect of sales rationing can occur, and has hinted that it might even be more disruptive than in a numeraire economy. Let me expand on this point.

III

Still staying within the framework cast by the "Counterrevolution" paper, I will make a quick incursion into Clower's "Reconsideration of the Microfoundations of Monetary Theory" [1967], in which he essentially attempts to restate more convincingly the idea of a "dual" budget constraint in a money economy. The basic intuition is that in a system where all exchanges involve a single medium of exchange

Specifically, imagine that we have a strong wish to satisfy our champagne appetites but that the demand for our services as economic consultants does not in fact allow us to gratify this desire without doing serious damage to our household finances. [My emphasis; 1965:48]

⁵ In Leijonhufvud [1968], chapter 2, pages 74-75, one reads:

Thus, Clower's explanation of the income-constraint bases the financing of purchases on currently realized sales of labor services rather than on expected sales. In effect, therefore, households are assumed to be informed about the quantities they will be allowed to sell before making their decisions on purchases. (...) This implies an information process which, like the Walrasian *tatonnement*, functions apart from the trading process itself, but relates to quantities, not to prices. Households are informed of their real income "before any trade takes place." There are no "false purchases" of consumption goods.

("money" as a means of transaction exclusively), any purchase of a good must be preceded by a sale of at least equal value of some other good: to spend money one first has to acquire it. There is an "income demand" for money, equal to the total value of net sales of nonmoney commodities, which essentially mimicks Hicks' [1967] transactions demand; and there is a (somewhat mysterious) "reservation demand" for money, equal to initial balances minus the total value of net purchases of nonmoney commodities, which might be seen as a nominal saving function not derived from an explicit intertemporal uncertainty model. These demands for money correspond, respectively, to an income constraint and to an expenditure constraint; the reason these constraints have to be separated is, according to Clower, that no other commodity but the unique means of exchange can be used to enter in an actual transaction, i.e., to make demand effective. In short, the usual "all-combinations-admitted" budget constraint of Neoclassical barter models must be rejected.

This idea is certainly valid and it will have important consequences for the analysis of the multiplier. But, again following Hahn [1977], I would strongly doubt that the problems linked to Clower's dual constraint would be alleviated in a pure barter system (as is claimed, e.g., by Leijonhufvud [1973]). Indeed, much more than a problem of transaction structure, the problem is one of coordination failure (as Leijonhufvud [1968, 1969, 1973] puts it) — one that can arise in any system in which information about inexhausted mutually satisfactory transaction possibilities is not transmitted. It is difficult to see why in a barter economy such information should be a priori better transmitted than in a Clowerian money economy. It is precisely the lack of mutual coincidence of wants which is at the root of non-Pareto-optimal states in a barter economy, and such states may perdure in the absence of a central information-disseminating device, if the number of traders is large. "Ineffective" demand is a result of inexistent communication networks rather than any particular transaction structure.

Thus, Clower's dual budget constraint, which rests on the assumption of a unique means of exchange, does not seem to be a necessary feature of an economy in which coordination failures may arise. The necessary feature, as I have already stated, is the absence of a pure tatonnement in prices, so that the foundation of Clowerian Keynesianism really appears as the "No-Walrasian-Tatonnement" assumption. Since this feature is present in Clower's monetary economy there is nothing fundamentally wrong with analyzing such an economy (see Hahn [1977]); but it should be emphasized before we move on that such an economy may not be a very correct reflection of Keynes' vision of a monetary economy, and that its properties are not necessary for deriving coordination failures.

Let us now return to the "dynamics and disequilibrium" part of Clowerian theory. As is clear from his afterword in Walker [1984], Clower's main objective in the papers under review was to stress the dynamic features of Keynes' theory. As becomes equally clear upon reading the papers in some depth, the dynamic arguments are sibylline; most of the time they are hidden behind a very static-looking formalization.

Taking the "Counterrevolution" paper at face value, one simply cannot get around the impression of a fix-price model, as formalized later by Barro and Grossman [1971], Benassy [1975, 1982] and Malinvaud [1977], among others. But while these models have not until recently (see, e.g., Malinvaud [1980]) gone beyond the static method (essentially, fix-price equilibria and what Benassy calls "p-efficiency"), Clower views his 1965 model as one step in a type of non-tatonnement process. Trades are brought into mutual compatibility at a given disequilibrium price vector, and for this the Benassy-type framework (essentially, continuous nonmanipulatable rationing schemes) is adequate; but then the system somehow moves on and the crucial question is this: what market "tensions" are relevant to the subsequent dynamic motion of the system? In standard language, it is a question about market signals. This is hinted at times in the course of the paper,⁶ but not nearly strongly enough, which certainly accounts for the widespread notion that Clower is the father of fix-price equilibrium.

Let us dwell a moment on Clower's restatement of Walras' Law (WL) in a disequilibrium situation. In notional terms, WL holds even in such a situation, since it is just the sum of the consumers' tight budget constraints. In a good-cum-labor economy (where "n" denotes notional magnitudes and "e" effective ones):

$$(1) \quad p \left[ndg - nsg \right] + w \left[ndl - nsl \right] = 0$$

Clower's argument is that rationing in the labor market curtails goods demand: $p \cdot edg < p \cdot ndg$, so that

$$(2) \quad p \left[edg - nsg \right] + w \left[ndl - nsl \right] < 0$$

One particularly relevant situation is the one where the goods market "clears" given the (general disequilibrium) price vector (p, w) , so that $p \cdot [edg - nsg] = 0$. In that case, Clower's version of WL implies that the perceived equilibrium for goods (in the sense that the firm is not

⁶ Most notably, section VII of the "Counterrevolution" paper contains fairly explicit allusions to dynamic adjustment issues which are distinct from the fix-price equilibrium argument.

aware of the notional excess supply) coexists with a notional disequilibrium in labor. Of course, this is only part of the story since in the labor market the actual level of transactions is equal to the firm's notional demand, if the supply of labor imposes no constraint. We thus get $w \cdot [nd1 - t1] = 0$, where "t1" stands for the level of actual transactions on the labor market. We then get a fix-price equilibrium at (p, w) , just as in Clower's graphical representation at the end of his paper, in which

$$(3) \quad p \left[edg - nsq \right] + w \left[nd1 - t1 \right] = 0, \text{ both terms zero}$$

Note that t1 is not necessarily equal to the effective supply of labor. Labor is now off its supply curve, but this does not imply that it has revised its labor supply plans downwards. For t1 to be equal to es1, one would have to explain why rationing in the goods market leads workers to supply less labor. Clower is silent on this, and this appears as an important loose end in his formulation. His presentation nevertheless leads to interesting consequences for the dynamics of the system.

Indeed, in terms of dynamics, formulations (2) and (3) do not say quite the same thing. At the fix-price equilibrium of (3), there is no longer any "observable" disequilibrium: both markets "look" as if they clear, and in the absence of a device for disseminating information about any remaining notional disequilibria prices and wages may not move, so that the essential point seems to be the following: under the "No-Walrasian-Tatonnement" assumption, price fixity may very well become an endogenous property of the model, over time rather than just at one point in time. Clower's message can then be seen as interpreting "effective demand is deficient" as "edg is too low so that there is no perceived disequilibrium putting pressure on prices." In equation (2), it is true that p may not move because the representative firm perceives no incentive to change it (notice that we are here in a price-setting framework). However, the same may not be as plausible for w to the extent that, contrary to the goods market, notional labor market disequilibrium is in some way "observable" and thus provides a relevant market signal. This accounts for Clower's choosing (2) instead of (3) as a description of the system at one point on its time path. Note that, of course, neither (2) nor (3) could really stand as satisfactory accounts of the motion of a more realistic system, since they suffer from the "one household, one firm" limitation to which I have already alluded. In particular, if we allow for several firms, price adjustment may depend on the distribution of rationing over the firms, and there may be no price fixity even with an aggregate equation such as (3).

The "Counterrevolution" paper thus appears as a prologue setting the stage for dynamic analysis of a system which is not in a Walrasian equilibrium — the static apparatus, as it were, needed for a dynamical reinterpretation of the General Theory. In the paper Clower remains very vague (just as he did in the "Dynamical Perspective"

paper) as to precisely which dynamic specification should be used; this is true also for the "Microfoundations" paper where he states that with the excess demand functions derived from the dual budget constraint

the response of transactors to changes in prices or in initial endowments of goods or money will differ qualitatively from findings associated with established doctrines [1967:89]

The crucial point of the "Counterrevolution" paper, namely that once it has settled into a fix-price equilibrium, the economy could remain on an underemployment time path because price and wage changes do not go the "right" way, is stated as a conjecture rather than derived from formal considerations. This is disturbing because, as will become apparent also in the discussion of Leijonhufvud's subsequent work, Keynes' crucial issue of persistent unemployment (as opposed to a transitory divergence from a full employment time path) is left up in the air.

3. LEIJONHUFVUD'S EXTENSIONS

I

The discussion of the preceding section suggests that we characterize Clowerian Keynesianism by a twofold dynamics:

(CK1) The "instant multiplier" dynamics: some initial deflationary shock creates a fall in labor demand, starting from full employment; Clower's dual-decision mechanism curtails demand and entails further reductions in employment, until the system settles down at some lower level of employment.

(CK2) The "wandering system" dynamics: starting from this state of non-Walrasian equilibrium, the various prices in the economy may or may not move in the "right" direction (i.e., back towards a full employment path).

As should be clear by now, (CK1) is in fact a static concept which can be assimilated to dynamics via some type of "correspondence principle" argument.⁷ (CK2), on the other hand, deals with adjustment over time. It is concerned with time paths rather than instantaneous adjustment at one point in time.

⁷ The notion that the multiplier should be seen as a truly sequential process has been raised by Shackle [1967] and Hicks [1974], among others. This sequentialism is not envisaged in the CL approach.

Leijonhufvud has attempted to clarify the dynamic issues underlying Clower's reading of Keynes. It will be argued that he did not succeed, and that he left open the question of persistent unemployment. One of his main arguments is that an underemployment state as in point (CK1) may arise even if, contrary to what was stated at the beginning of section 1, there is no initial "maladjustment" between M and W. This is essentially because, in the face of the initial shock, the traders' liquidity preference will interfere with the interest rate mechanism (the so-called "coordination of intertemporal decisions") in the commodity market.

The idea is essentially the following: Suppose there is a deflationary shock in the form of a loss in confidence. This may happen (A) through a fall in investment demand (a downward shift of the marginal efficiency of capital schedule) or (B) through a fall in consumption demand to the benefit of higher saving. As we will see, this way of describing things brings money into the picture, though not quite for the same reasons as in Clower.

Case (A): Start from equilibrium. Suppose firms finance their investments by issuing bonds. The downward shift in the marginal efficiency of capital schedule causes a fall in investment demand and in bond supply at the initial equilibrium interest rate. The bond market is a Hicksian flex-price market, so that the yield instantly adjusts downward, raising supply and lowering demand until bonds are back in equilibrium. At the same time investment demand rises; the crucial point, however, is that its rise is not sufficient to wipe out the excess supply of goods because transactors will partly substitute money for bonds, so that the rise in speculative money demand prevents the rise in investment demand from being "strong enough." The rest of the excess supply of goods is wiped out by a reduction of output which yields a fall in national income until

a) the goods market clears;

b) the money market clears through a fall in transactions demand.

The consequence of (a) is that, assuming profit maximization, labor demand now falls short of labor supply: the initial (p,w) vector is now "false" and corresponds to an underemployment equilibrium. Neither p nor w have had to change for this state to emerge.

Case (B): Start from equilibrium. At the initial level of income, the increase in saving causes producers to perceive a contemporaneous fall in demand. Since they do not realize that this corresponds to a higher demand in future periods, they do not switch resources from the production of consumption goods to that of investment goods, whereby they would keep employment constant. In short, Say's Law is not valid in an intertemporal framework. This is essentially because savers prefer to hold money or some liquid asset instead of purchasing contingent claims to specific commodities at specific future dates: liquidity preference in the broad sense used by Hicks [1967]. Hence employment must fall. Of course, concomitantly, higher saving may

mean a higher demand for bonds as a liquid asset, but the implied fall in the interest rate would not be large enough to stimulate investment demand sufficiently — again because of liquidity preference, though operating this time in the narrower, "speculative" sense of case (A). Overall then, we are again in an underemployment equilibrium relative to (p, W) , which have not changed at all during the contraction.

Cases (A) and (B) are two alternative formulations of the "instant multiplier" — or, as Leijonhufvud terms it, "income-constrained process" — dynamics. Here we looked at a multiplier with no price changes at all. We will see shortly that Leijonhufvud also has a version in which prices change, but in which these changes are destabilizing because of "temporary" rigidities. Both cases (A) and (B) represent basically a comparative-static argument underpinned by a process which is taken to be instantaneous. Only here, contrary to Walrasian tatonnement, adjustment is pure quantity adjustment rather than pure price adjustment, and it is "deviation-amplifying" rather than "deviation-counteracting." What we have here is Leijonhufvud's (later relinquished) idea that Keynes inverted the relative adjustment speeds of prices and quantities with respect to Marshallian market-period theory. In substance, the first part of the CL approach (that dealing with the "instant multiplier") relies on imperfectly flexible prices.

II

In his 1968 book (chapter 2), Leijonhufvud gives one hint of why prices and money wages might be inflexible. This is new compared to Clower, and it seems to be one of the major extensions necessary to understand non-market-clearing approaches to unemployment (this is still true for more recent theories). Leijonhufvud's framework is the Stigler-Alchian search model which tries to account for price and wage stickiness by an imperfect information argument: agents are price-setters and set themselves reservation prices while they are screening the markets for better trading opportunities. This will account for some rigidity in the supply price of labor and of some commodities, and such rigidities may arise even in atomistic (non-oligopolistic) markets. Such an imperfect information framework allows for a model in which cases (A) and/or (B), rather than instant return to full employment through perfect Walrasian adjustment, are the relevant scenarios for the economy following, e.g., an expectational shock. One strong criticism, of course, is that unemployment thus resulting from too high reservation wages is not "involuntary" in the sense that Keynes might have understood it. We may rather be dealing here with voluntary (search) unemployment.

In these scenarios, it is clear that money plays a significant role, namely via the liquidity preference mechanism which prevents interest rate adjustments from leading the system back to full employment. It is equally clear, if one accepts the criticism I mentioned earlier about Clower's insistence on money as a unique means of exchange, that in Leijonhufvud the essential characteristic of

money is its "store of value" function. Making the link with Hicks' [1967] "Keynesian Triad," we can say that in case (A) the speculative motive is important, while in case (B) the precautionary motive appears as central. The reason for this shift away from Clower's insistence on the transactions motive is that Leijonhufvud reads Keynes as having dealt essentially with intertemporal coordination failures. In such a case, money is held also for reasons other than the transactions motive, and thus Leijonhufvud's framework is much more consistent with a non-transactions demand for money: as I pointed out earlier, Clower's rationale for introducing a "reservation demand" for money in his "Microfoundations" paper was unclear precisely because of his lack of an explicit intertemporal framework.

Thus, starting from Clower's crucial recognition that goods demand falls in the presence of current income constraints resulting from "false price trading," Leijonhufvud constructs a multiplier mechanism in which Keynes' central transmission mechanism, the rate of interest, plays a dominant role. He is able to do so by stressing non-transaction motives for holding money, thus taking into account intertemporal as well as within-period coordination failures. Three arguments appear as central in Leijonhufvud's extension of the Clower model:

- i) The "No-Walrasian-Tatonnement" assumption implies imperfect information problems and consequently some degree of price rigidity.
- ii) Quantities adjust faster than prices.
- iii) Markets for contingent claims on commodities are incomplete because of liquidity preference, so that increased saving today is not perceived as an increase in future consumption.

(i) and (ii) may be said to have been already present in Clower; (iii) is Leijonhufvud's original contribution, and it provides the link with Keynes' insistence on uncertainty as a major feature for explaining malfunctions in the system. Still, it remains static in nature, since it accounts for the genesis of the income-constrained process.

III

Indeed, so far, nothing has been said about the crucial point (CK2) concerning the "wandering system" dynamics. Recall that the problem here is to give some foundation to Clower's conjecture that the economy could remain on a prolonged-unemployment path because prices might not move in the "right" direction, if they move at all, starting from an underemployment fix-price equilibrium.

In fact, Leijonhufvud adds little to the argument because he uses the idea of "wrong" price movements as part of the income-constrained process leading to the underemployment equilibrium, in a version of that process somewhat different from the fix-price versions of cases

(A) and (B) above. His basic idea, which fits into point (CK1) but not into point (CK2), is that once current income constraints have started to drive demand below its notional level, prices and wages may not stay fixed, but may not move in a Walrasian manner:

Once the deviation-amplifying feedbacks characteristic of this system have taken hold, the deviation-counteracting price adjustments become less effective. (...) In the early stages of contraction, prices may then fail to keep pace with the fall in hypothetical market-clearing prices, with the gap between the actual and the short-run full employment price-level widening instead of narrowing, even though the ongoing reduction be drastic (...). In this phase, the contraction of real income would continue. [1968:56-58]

In short, in terms of the three points just mentioned, (iii) causes the multiplier process to be triggered, while (i) and (ii) imply that actual prices will not move fast enough to prevent quantity adjustments from creating underemployment. In the "Keynes and the Classics" lectures [1969], a stronger statement may be found:

If the multiplier-process takes hold, however, some prices that "ought" to be rising may be falling, and some industries that "ought" to be expanding will then be induced to contract. [1969:66]

Thus, wrong movements in relative prices may induce misallocations in a multimarket system, essentially because effective excess demands may have the opposite sign of notional excess demands.⁸

Exactly how this whole argument about "wrong" price movements is to be understood from a formal point of view is unclear. Some hints may be found in chapter 2 of Leijonhufvud's 1968 book. Essentially, the initial shock creates current income constraints and thus curtails demands; but in various markets the elasticity of demand to current income is very different, so that the new relative demands may not yield the excess supplies appropriate for prices to shift in the "right" direction. (In this "No-Walrasian-Tatonnement" world, price changes supposedly occur via individual price decisions). The end result is an underemployment equilibrium at "false" prices, which only differs from Clower's and from the ones of cases (A) and (B) in that the "false" price vector is not the pre-disturbance equilibrium vector. But the idea that prices move in "wrong" directions during the income-constrained process is only of limited interest in the sense that

⁸ See also Leijonhufvud [1987]. This sign reversal property has never been, to the best of my knowledge, derived formally. Thus it just stands as a conjecture.

- i) It is not a necessary condition for the system to drop to an underemployment equilibrium.
- ii) The multiplier process is seen as essentially instantaneous, so that we know nothing more about the subsequent time path of the system.

What point (ii) suggests is that Leijonhufvud's idea of "wrong" price movements is of little help in understanding feature (CK2), and Clower's conjecture remains theoretically untested. While the force of the intuition is there (in essence: Keynes was thinking in terms of an unemployment path which does not converge back to the full employment path), there is nothing to tell us that a Patinkin-type argument might not do the trick after all. Both the fix-price process of cases (A) and (B) and the flex-price process just described pertain to (CK1); they lead to an underemployment equilibrium which is quite likely to be transient, despite Leijonhufvud's portrayal of it as more or less "permanent." Once the distinction between (CK1) and (CK2) is introduced, this discrepancy becomes blatant.

IV

The same notion that the "wandering system" dynamics was never really tackled arises when one looks at Leijonhufvud's further extensions of the model in the "Effective Demand Failures" paper [1973]. In that paper, Leijonhufvud takes up an argument which was already present at the end of his "Keynes and the Classics" lectures, namely: Clower's income constraints as presented in the "Counterrevolution" paper are too tight, because they operate in a pure flow model in which holdings of stocks of liquid assets are neglected.⁹ Leijonhufvud presents his own "cosmology" which he explicitly views as an attempt to synthesize Keynes and the Classics: effective demand failures such as the ones derived from Clower's model will arise only if the system as a whole has a low degree of liquidity, because either

- i) borrowing conditions have become too costly so that all types of collateral have themselves de facto become illiquid
- ii) or existing stocks of liquid assets have already been exhausted, or are insufficient to cope with the initial falls in employment and demand.

⁹ We saw that in fact Clower allowed for the holding of liquid stocks in the "Counterrevolution" paper, but that he failed to express this in a sufficiently explicit manner (see footnote 4). Actually, the "Microfoundations" paper also contains the idea of preexistent money holdings, but Clower does not make any multiperiod analysis in that paper.

In other words, as long as households and firms have enough liquid assets at their disposal, a "small enough" shock will have no effect on demand because lost labor income can be replaced by income from the sale of assets or by drawing on cash balances (for whose existence a rationale is provided in Leijonhufvud's system). Hence the multiplier effect will not "bite."

Thus the first possible interpretation of the "multiplier" part of the CL approach is that Keynes was only dealing with very large and unanticipated "displacements" (of the nature of cases (A) and (B)), for which the system as a whole is unable to provide a sufficient amount of liquidity. A second possibility is that Keynes had in mind a system which initially lives on its stocks but is progressively "squeezed dry" so as to finally collapse into an income-constrained process. It is formally and conceptually close to the first interpretation. A third interpretation, related to the two preceding ones but to me more appealing, could be the following: after the initial shock, some households find that their labor is suddenly an illiquid asset and start drawing on their precautionary cash balances while engaging in search, while others start from an expectation of unemployment and withhold from spending as much of their current labor income as before, so as to build up their precautionary balances. Thus demand is likely to be curtailed all the same. This scenario would be consistent with both a broad notion of liquidity preference and a collapse of the system — as in case (B). But still it is less radical than Clower's initial framework, in the sense that it is only one possible outcome of the initial shock (while, as Leijonhufvud emphasizes, in Clower the shock necessarily and unambiguously triggers the deviation-amplifying mechanisms because all unemployed become liquidity constrained at the same time).

Apart from this "Keynesian" regime, Leijonhufvud's 1973 model also exhibits a "Classical" regime, which he terms the "corridor," in which liquidity is sufficient and/or borrowing conditions are good enough (as in permanent income theories) so as to keep quantity adjustments from setting in. The system may stay within the corridor even with a non-Walrasian price system, of course; yet if there are no forces to bring it back to general equilibrium values, my suggestion would be that the system is bound to get "squeezed dry" (unless we allow for unlimited injections of outside money, with potentially explosive consequences) and to drop into the Keynesian regime. If there are forces working to push prices back in the "right" direction, the 1973 paper does not provide any insight into them — just as previous papers provided no clear insight into "wrong" price movements. Moreover, I should emphasize again that despite the use which I make in this section of some "dynamic" vocabulary, we are still within the realm of the atemporal multiplier, since Leijonhufvud's paper discusses the income-constrained process.

The stock-flow model is clearly the appropriate framework for analyzing the Keynesian message, since Keynes used asset-holding phenomena as a central ingredient in his system. Leijonhufvud's 1973 amendment to the CL approach to Keynes conveys two insights:

1. In non-credit economies, or in economies where liquidity is endemically low, shocks which affect employment may well entail strong Clower-type income-constrained processes.
2. In what Hicks has called "overdraft economies," or in economies where saving and asset-holding behavior is sufficiently cautious, the income-constrained process may be kept at bay for a while.

However, we do not know, for case 2, whether prices can move in such a way that the income-constrained process is held back altogether. And since we are still dealing with (CK1)-type processes, the behavior of the system over time, which corresponds to Clower's crucial conjecture of a persistent-unemployment path, cannot be inferred from this type of model.

4. CONCLUDING REMARKS

While the static "front end" of the Clower-Leijonhufvud approach provides a very stimulating analytical apparatus (mainly, the instantaneous income-constrained process, the associated role of liquidity preference and of the rate of interest, and the possibility of a two-regime model in the stock-flow case), the true dynamics of the system — that answering the question: Will the price system move back to full employment values or not, once the system has settled into an underemployment equilibrium? — is still largely absent in the papers of the 1960s and early 1970s which have been reviewed here.

This suggests that the two authors have been "over-credited" for an analytical approach, that of fix-price equilibria, which they themselves saw only as a step in a broader theoretical effort. A corollary of this is, of course, that the fix-price school which took off after Barro and Grossman's reinterpretation of Clower in the 1970s has been steering a dubious course.¹⁰ The Clower-Leijonhufvud approach is not simply static, and to a large extent price fixity is just a gimmick used in the absence of satisfactory price and quantity dynamics. Recall that we saw this type of dynamics to be already the main preoccupation in Clower [1960]. In Leijonhufvud [1968] it is quite aptly recognized that "macroeconomic adjustment processes

¹⁰ This has been changing a bit lately, with some price and wage endogenization being introduced into macroeconomic rationing models. See, e.g., Sneessens and Dreze [1986], Sneessens [1987], Nickell [1989]. But these formalizations are recognized by their authors as being largely ad hoc, and they remain static in nature. More dynamic studies have been conducted by, e.g., Boehm [1978], Honkapohja [1979], Malinvaud [1980], Fourgeaud and Michel [1981], but the specification of the laws of motion is not very satisfactory as they refer essentially to Walrasian-type price adjustments.

involving both price and income effects simultaneously in all markets are extremely complicated," and that "in constructing short-run macromodels, the economist therefore has to choose. At one extreme of the spectrum of possibilities are the traditional full employment models where the whole brunt of adjustments is borne by prices; at the other extreme are the 'pure Keynesian' models where prices are essentially given and incomes move."

Of course, this means that the core of what I have termed Clowerian Keynesianism has yet to be clearly formulated. If it is not the income-constrained process (which boosted fix-price analysis), it must be a more general principle, relating not to polar adjustment processes in a given framework of "atomistic" markets, but rather to composite processes making use of more than one type of market organization. The distinction between "thick" and "thin" markets, which is just now making its way into the literature,¹¹ naturally comes to mind. But that field of research is only just opening up. Since Clower's "wandering system" conjecture is based on the essentially negative notion that in the absence of a theory of price-quantity adjustment "anything may happen," one major task is to set up the analytical apparatus needed to tackle the interaction between "thick" market and "thin" market processes. One may then (or not) find that indeed Brownian motion and concepts of bounded but nonconverging cyclicity are relevant to the dynamic motion of the economy. These ideas are actually quite close to what is being done currently in some strands of institutional economics. For instance, Day [1984] refers to the need to account for the existence of market mechanisms which ensure the "viability" (rather than dynamic convergence) of systems which are driven by recurring and endogenous disequilibrating tendencies (i.e., are globally unstable).

That such intuitions should flow from an approach traditionally believed to have dealt with instantaneous fix-price equilibria may seem surprising. The aim of this paper has been to show that this "missing dynamics" could have been detected earlier.

¹¹ See Clower [1987].

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