Don Patinkin's *Money, Interest and Prices* as the Climax of IS-LM Macroeconomics

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1. Introduction

This paper is not concerned with IS-LM as a pedagogical device or as a framework that could illustrate some results of current macroeconomics but as an instrument for scientific investigations in macroeconomics. In other words it deals with a story that begins in 1936 with the publication of the *General Theory* and ends in the seventies with the decline of fixed-price models and the rise of New Classical economics. The aim of this paper is to show that *Money, Interest and Prices* (1956, 1965), Patinkin's main work, might be considered as the climax of these IS-LM macroeconomics.

To measure the scope of Patinkin's contribution, a preliminary distinction must be introduced. The IS-LM model was the basis of a research program developing along two different lines. One could be said "extensive", the other "intensive".

The "extensive" line of research refers to all efforts theoretical and applied which aimed at extending the scope of IS-LM. For example, it includes the integration of the Philips curve (Samuelson and Solow, 1960) and the balance of payments (Mundel, 1960, Fleming, 1962). It also includes all the contributions to enrich the understanding of the components of the model, like the work of Modigliani (1954) and Friedman (1957) on the consumption function or the work of Tobin (1958) on the demand for money.

The "intensive" line of research refers to all efforts oriented towards strengthening the internal consistency of the model. This particular line was developed on the basis of a specific assumption, namely that the IS-LM model could be derived from the Walrasian general equilibrium model. The relevance of this assumption is not the subject of this paper[1]. It should only be noted that Hicks (1937, 1939), Lange (1938), Klein (1947), Modigliani (1944) and Patinkin (1949, 1956), the economists who framed the model, all took it for granted[2]. The "intensive" line of research gave rise to the model of Barro and Grossman (1971) and fixed-price models of the 1970's in general.

Patinkin mostly contributed to the second strand of the research program. Nonetheless, the soundness of the extended versions of IS-LM is logically dependent on the internal consistency of the basic version of the model. Therefore, the importance of Patinkin's contribution to the internal line of research is also the importance of his contribution for IS-LM macroeconomics at large.

The first part of my paper shows that the first edition of *Money, Interest and Prices* offers the most accomplished version of IS-LM "strictly speaking". The second part deals with the evolution from IS-LM à la Hicks and Modigliani to the fixed-price models à la Barro and Grossman. It is argued that Patinkin plays a crucial role in the transition. The third and final part of the paper explains in what sense *Money, Interest and Prices* can be considered as the climax of IS-LM macroeconomics.

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[1] On this point, De Vroey's clear cut distinction between the Marshallian and the Walrasian approaches is illuminating (see De Vroey, 1999, in particular). IS-LM is a general equilibrium model directly inspired by Keynes' *General Theory*. In other words, IS-LM comes out of the Marshallian school. Genealogically speaking, it has nothing to do with Walrasian economics. Hence, the idea that IS-LM actually derives from the Walrasian model is wrong. Yet, the detailed representation of general equilibrium offered by the Walrasian model has no Marshallian or Keynesian counter-part. Given this fact, one easily understand how the idea that the Walrasian model could help provide microeconomic foundations for the Keynesian model can have made sense for a whole generation of economists.

[2] This conception of IS-LM is illustrated by this famous statement of Patinkin: "Thus a basic contribution of the *General Theory* is that it is in effect the first practical application of the Walrasian theory of general equilibrium: 'practical', not in the sense of empirical (though the *General Theory* did provide a major impetus to empirical work), but in the sense of reducing Walras' formal model to n simultaneous equations in n unknowns to a manageable model from which implications for the real world could be drawn" (1991, p. 27).

2. *Money, Interest and Prices* as the climax of the first synthesis

The claim that *Money, Interest and Prices* offers the most accomplished version of IS-LM is not novel. For instance, Lucas writes that Patinkin's book was "perhaps the most refined and influential version of what I mean by the term 'neo-classical' synthesis" (1981, p. 278). A somewhat similar position is adopted by Weintraub (1979) and d'Autume (2000). Nonetheless, the signification of this statement remains to be clarified.

The papers of Hicks (1937) and Modigliani (1944) are usually considered to be the most important contributions to the elaboration of IS-LM (De Vroey, 2000). In order to define Patinkin's own contribution I will thus compare his full employment model to the model of Modigliani. Three novelties will be examined: the use of a measure in real terms to write the model, the introduction of real balances in the behavior functions and the addition of an explicit equation for the bonds market. Finally, to show that Patinkin's framework was not outmatched, I will compare it to its chief rival: Modigliani's "mid-50's model" (1963).

Real and monetary incomes

To my knowledge, the first IS-LM model whose behavior functions depend on real income instead of money income is presented by Pigou in his famous 1943 paper. But Patinkin is the first among the major authors of the "neoclassical synthesis", Hicks, Klein, Lange, Modigliani and Tobin, to adopt this modification. As a matter of fact, this is already done in his Ph.D. thesis "On the Consistency of Economic Models: a Theory of Involuntary Unemployment", submitted in 1947 at Chicago University. In this work, the IS and LM equations are replaced by the following two equations:

$$X_{fe} = G(X_{fe}, r) \quad (1)$$

$$M(r, P, X_{fe}) = 0 \quad (2)$$

Where X_{fe} is the full employment level of real income, G( ) is the aggregate demand function, M( ) is the excess demand function for money, r the rate of interest and P the price level. This modification also appears in Patinkin's "Involuntary Unemployment and the Keynesian supply function" (1949, p. 379) and, indeed, in *Money, Interest and Prices* (1956).

In the models of Hicks (1937) and Modigliani (1944), the monetary values of investment, savings and money demand, I, S and L respectively, where supposed to be dependent on the money income Y. The equilibrium conditions of their models can thus be written as follows:

$$I(Y, r) = S(Y, r) \quad (3)$$

$$M = L(Y, r) \quad (4)$$

This version of IS-LM suffers from a serious defect: a generalized monetary illusion. The consequence of using money instead of real income appears clearly if one considers the liquidity trap case. This case is very important according to Hicks since it is the only case in which the Keynesian theory is "completely out of touch from the classical world" (1937, p. 136). This statement is taken up by Modigliani:

> There is one case in which the Keynesian theory of liquidity preference is sufficient by itself to explain the existence of underemployment equilibrium without starting out with the assumption of rigid money wages. (…). Whenever this situation materializes, the very mechanism that tends to bring about full-employment equilibrium in a system with flexible wages breaks down, since there is no possible level of the money wage

rate and price level that can established full-employment equilibrium (Modigliani, 1944, p. 74).

According to Modigliani, the liquidity trap is an important aspect of the Keynesian model because in this case, even if wages and prices are flexible, the market mechanism does not restore full-employment. In other words, the model is deprived of any full-employment solution.

Actually, this result cannot be obtained in the model of Hicks and Modigliani. Equations (3) and (4) form an independent subset determining r and Y. Because of this recursive structure, the model features a rectangular hyperbolic aggregate demand function (cf. equation (5) and (6)):

$$Y = PX \tag{5}$$

$$X^D = \frac{Y}{P} \tag{6}$$

If prices and wages are flexible, the aggregate supply function (equation 10) is derived from the equilibrium condition on the labor market (equation 7), the demand function for labor (equation 8) and the production function (equation 9):

$$N^S(W/P) = X'^{-1}(W/P) \tag{7}$$

$$W/P=X'(N) \tag{8}$$

$$X = X(N) \tag{9}$$

$$X^S = X[X'^{-1}(w^*)] = X_{fe} \tag{10}$$

The aggregate supply is thus a constant (w^* being the market-clearing real wage).

In this framework, if the LM curve is horizontal on the left and the IS curve intersects the LM curve on this portion, monetary policy can increase neither Y, nor X and N. But this policy inefficiency has nothing to do with a system flaw. Actually, due to the form of the aggregate demand function, the system always possesses a full employment solution. Hence, Modigliani's comments are inconsistent with his theoretical framework. Figure 1 illustrates this issue:

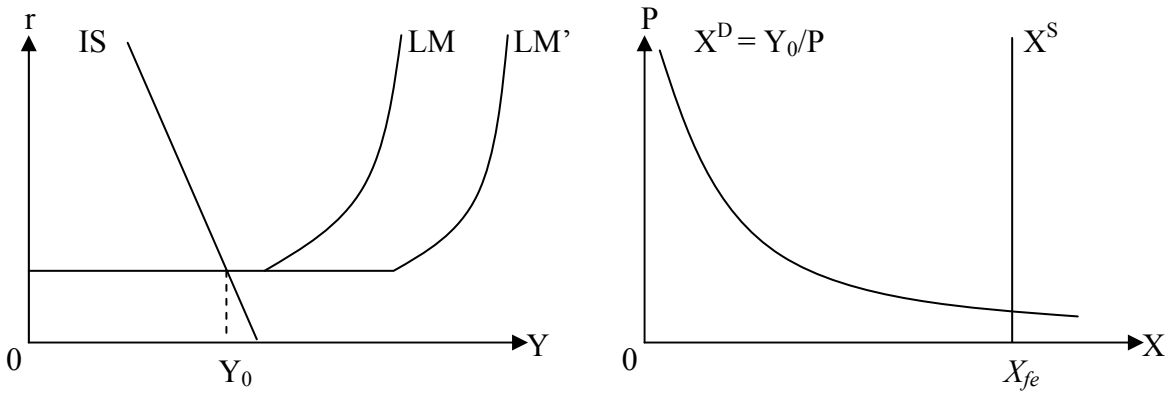

Figure 1 "Liquidity trap" with full-employment equilibrium in the Hicks-Modigliani model

In Patinkin's version of the IS-LM model the inconsistency between the definition of the liquidity trap and the outcome of the model is resolved. If the IS curve intersects the LM

curve on its horizontal portion the aggregate demand curve is vertical. Therefore, if wages and prices are flexible, the system has no equilibrium solution[3].

Real balances and the consistency of the classical model

In trying to clarify the foundations of the Keynesian model, Patinkin addresses a second issue. In his 1944 paper, Modigliani asserts that the demand functions composing the IS-LM model should be homogeneous of zero degree with respect to the price level: "(…) since we are proceeding under 'static' assumptions, all the supply and demand functions [except the ones for money] must be homogeneous of zero degree, if people behave rationally" (1944, p. 46). Modigliani maintains this assumption in spite of Lange's demonstration that it leads to an inconsistency (Lange, 1942). Patinkin (1947, 1949) reformulates Lange's criticism and shows its relevance. Suppose that the price level is modified. If all excess demands, save the excess demand for money, are homogeneous of zero degree with respect to P, its modification does not affect them. Therefore, the price level appears to be indeterminate. According to Modigliani, the solution is offered by the traditional monetary equation: M = kPX. Yet, given Walras Law, if excess demands are homogeneous of zero degree on all markets but one, the last one must also be homogeneous of zero degree. The Cambridge equation thus contradicts Modigliani's assumption concerning the homogeneity of the demand functions.

To remove this inconsistency, Patinkin incorporates real balances in the aggregate demand functions. In a monetary economy, agents hold money balances. Hence, insofar as they act in accordance with their budget restraints, any variation of the price level must affect their expenses. A price increase reduces the real value of money balance. Therefore, the demands for goods, bonds and money must decrease. This real balance effect still exists in the aggregate if money is a net wealth for the economic system as a whole or if the value of money balances is not canceled by the value of some private debts (Patinkin, 1948, p. 550). A rigorous expression of the IS-LM model is then (1956, p. 152):

$$N^S\left(\frac{w}{p}\right) = N^D\left(\frac{w}{p}\right) \qquad (11)$$

$$X_{fe} = F\textbf{Error!} \qquad (12)$$

$$M = P.l^D\textbf{Error!} \qquad (13)$$

Where F( ) is the aggregate demand function and l^D is the real money demand function. Real demand functions are now homogeneous of zero degree with respect to P and M. Therefore the inconsistency affecting Modigliani's classical model disappears. The classical dichotomy between a real sector and a monetary sector vanishes, but the neutrality of money can still be demonstrated. And, in the context of a system with price and wage flexibility and no distribution effects, this result, Patinkin shows, only depends on the absence of monetary illusion (Patinkin, 1954, 1956).

The bonds market and the general equilibrium method

A remarkable aspect of Patinkin's approach is his rigorous use of the general equilibrium method. In this respect, his basic idea is that in an authentic general equilibrium perspective "the equilibrium values of relative prices, the rate of interest, and the absolute price level are simultaneously determined by all markets of the economy" (1956, p. 268). For

[3] Lange (1938) and Klein (1947) propose another reformulation of the model, savings, investment, the money demand and income being measured in wage-units. But this presentation is still ambiguous.

this reason, the four markets of the IS-LM model must be explicitly presented before studying the interrelationships among them. Hence, the introduction of the bonds market equation in Patinkin's model, an equation still implicit in the preceding works of Hicks and Modigliani:

$$rp.B^{S}\textbf{Error!} = rp.B^{D}\textbf{Error!} \qquad (14)$$

Patinkin's introduction of the bonds market brings about many clarifications. This is particularly true as concerns the many-sided and complex debate over the determination of the interest rate. For Modigliani, the question was whether the rate of interest was determined by IS or by LM. According to him, the former was true in the Classical model with flexible wages. Patinkin suggests that the rate of interest is primarily related to the bonds market since it is the reciprocal of bonds price. Nonetheless, like all prices, this variable is generally determined simultaneously by all the equations of the model. Hence, Patinkin shows, the determination of the rate of interest by IS is necessarily due to some special assumptions implicitly made by Modigliani: namely, the absence of real balance effect on the goods market.

Another important clarification introduced by Patinkin concerns the use of Walras Law. This property was commonly invoked to justify the exclusion of the bonds market from IS-LM analysis. If this procedure is perfectly correct in the case of a full-employment model, it becomes problematic when it is applied to unemployment equilibrium. Patinkin is the first to raise this issue in a 1958 paper entitled "Liquidity Preference and Loanable Funds: Stock and Flow analysis". Unemployment equilibrium means that the labor market is in excess supply whereas the markets for goods, bonds and money are in equilibrium. Therefore, Walras Law is violated and cannot be used to justify the analysis of the interaction between two markets only. Patinkin shows that the solution consists in using a form of Walras Law restricted to three markets only, the labor market being excluded. This relation is a consequence of the fact that, in a situation of unemployment, workers' spendings are a function of the labor demand instead of the labor supply.

Finally, the introduction of the bonds market leads Patinkin to clarify the conditions of the liquidity trap. According to Hicks and Modigliani, the liquidity trap is the consequence of an infinite money demand. But an infinite money demand would imply an infinite bonds supply. This means that agents do not respect their intertemporal budget constraints. Therefore, a liquidity trap cannot appear in this way. Patinkin then shows that this phenomenon can still appear as a market experiment and as a consequence of the form of the demand for bonds. Suppose that the demand for bonds becomes nil when the rate of interest reaches a low value. In this case, if this low value is already reached, an increase of money supply will have no effect on the rate of interest. If, in addition, there is no real balance effect on the goods market, then the only effect of this increase will be an increase in money demand. In these conditions, an infinite increase in money supply will finance an infinite increase of money demand (Patinkin, 1956, p. 245-9). The validity of this analysis is confirmed by the work of Grandmont and Laroque (1976).

A comparison of Modigliani (1963) and Patinkin (1956)

To my knowledge, only one model competes with the macroeconomic model of *Money, Interest and Prices*. This is Modigliani's "Mid-50's model" presented in "The Monetary Mechanism and its Interaction with real phenomena" (1963). I will thus compare the two models to see if Modigliani does better than Patinkin.

The comparison is made easy by Modigliani since he defines himself the main differences between his 1944 model and his 1963 or "Mid-50's" model. This shows that his model contains no significant improvement. Modigliani defines five modifications. The first three already characterize Patinkin's model. It is obvious for the "explicit reliance on a

general equilibrium formulation" (1963, p. 80), a novelty whose definition paraphrases the introduction of chapter 9 of *Money, Interest and Prices* (1956, p. 125). It is also obvious, indeed, for the "correction of the faulty formulation of the homogeneity properties of the consumption, investment, and demand for money functions" (1963, p. 82). Also characteristic of Patinkin's approach is the "explicit treatment of the bond market" (1963, p. 81).

Another modification of the 1944 model is the "use of a more convenient and effective device for expressing the hypothesis of wage rigidity" (1963, p. 82). Although this amendment is not directly inspired by Patinkin, it might be an indirect consequence of his criticisms. In 1944, Modigliani associates wage rigidity and the assumption of a horizontal supply curve of labor. But this approach of wage rigidity cannot offer a satisfying representation of involuntary unemployment, says Patinkin (1947, 1949), because workers are always "on their supply curve of labor". This criticism is repeated in a letter addressed to Modigliani (7 April 1948)[4]. Thus, Modigliani would have tried to escape Patinkin's criticism by abandoning the whole idea of a "horizontal supply curve of labor". This explains his insistence on the fact that "the difference between this level of employment [determined by N^D] and the potential supply at W_0 is then 'involuntary unemployment' in the Keynesian sense'" (1963, p. 82).

Two modifications mentioned by Modigliani are not to be found in the works of Patinkin from 1947 to 1956. The first one is the introduction of a private banking sector in the model. The second one consists in "improvements in the consumption and investment function and in particular more adequate recognition of the role of stocks" (1963, p. 81). Actually, these modifications are quite secondary. The latter "improvements" are the introduction of labor income NW/P in addition to real income X in the consumption function and the introduction of the stock of capital K_0 in the investment function. Yet, both variables are actually neglected in the analysis that follows. The introduction of a banking sector does not modify the basic structure of the model. It is a very useful refinement but not really new in 1963 after Gurley and Shaw (1960) and Patinkin (1961)[5].

Modigliani's 1963 paper illustrates the referential position of *Money, Interest and Prices*. As a matter of fact, it is primarily conceived as an answer to Patinkin[6]. Modigliani intends to promote his own definition of the dichotomy and to show that Patinkin's conclusion concerning the neutrality of money is erroneous:

> We proceed first to a summary of some implications of the model within the classical framework of price and wage flexibility. Its main justification is the hope of disposing for good of a controversy, connected with the names of Pigou and Patinkin, which has

[4] An analysis of Patinkin's position on this point and of the problems raised by the "horizontal supply curve of labor" is presented in Rubin (2002).

[5] In the first edition of *Money, Interest and Prices,* Patinkin explicitly excludes the banking sector from his analysis assuming that money is only composed of government money (cf. 1956, page 145 and note 17 page 206).

[6] At this point it is useful to quote the letter that Modigliani sent to Patinkin in August 1947, the first letter of a correspondence which was particularly intense in 1948: "I have read with the greatest of interest your manuscript on, 'The Consistency of Economic Models' [Patinkin's Ph.D.], which was sent to me by the Cowles Commission. I have found the whole treatment so valuable, that I spent some ten days over the month. I fully agree with your criticism of my paper; as a matter of fact, I had already found out for myself that there was some inconsistency in the homogeneity assumption made by myself, Lange, as well as by practically all writers. There are a considerable number of points which I would like to raise in connection with your manuscript ranging from minor typographical errors to rather substantial points. This is partly due to the fact that I had worked on the subject for sometimes and have a half completed manuscript dealing with partly overlapping topics. For this reason I hesitate to attempt to discuss the whole matter via mail, and I wonder whether you expect to be in New York or in this neighborhood in the near future so that the matter might be discussed in person" (Modigliani to Patinkin, 8 August 1947).

plagued the profession, draining the resources into what strikes me as a largely barren endeavor (1963, p. 83).

In terms of these definitions, Patinkin's basic contention can be summarized as follows: in an economy with relying on a token money as a medium of exchange, the dichotomy does not hold, but under certain conditions money will be neutral. (…). It is found that Patinkin's contention is basically unwarranted, although no attempt at rigorous proof is possible here (ibidem, p. 84).

To found his contention, Modigliani analyzes three cases. The first is a model with pure bank money or internal money, the second is a model with government money and no public debt and the third is a model with public debt. Since in the first case the classical dichotomy is valid and since in the third money is not neutral, Patinkin would be wrong. This critical analysis is not very convincing since it actually boils down to a synthesis of different results that can be derived from Patinkin's model. That money is not neutral when public debt is introduced is explicitly recognized in *Money, Interest and Prices* (1956, p. 207). The case of a system with pure bank money is not analyzed in the first edition of *Money, Interest and Prices*. In this case, money is not a net wealth for the economy as a whole. If distribution effects are absent, the model contains no wealth effect. As a consequence, "the equilibrium value of the real variables of the system is independent of both the supply and the demand for money" (1963, p. 84), Modigliani's definition of the dichotomy is valid. Besides, the model can contain a liquidity trap. But like Patinkin and most authors of the neoclassical synthesis, Modigliani still considers that money supplied by the government, or by a central bank, and government bonds are net wealth[7]. This implies that the pure bank money case, on which Modigliani insists so much, has very little empirical content; for such an economy must have no central bank and not public debt.

In trying to evade Patinkin's conclusions Modigliani only illustrates the rigor and the scope of his macroeconomics.

3. From Hicks and Modigliani to Barro and Grossman: the decisive impulse of Patinkin

So, in 1956, the basic framework of IS-LM is completed. The aggregate relations defining the model are fully and consistently specified. Nevertheless, this is not the end of the "intensive" line of the research program associated with IS-LM. A major characteristic of this model is that its microeconomic foundations are not perfectly explicit. According to its builders, these micro-foundations can be found in the Walrasian theory. Hence, logically, the next step of the research program is the attempt at deriving IS-LM from Walrasian microeconomics. This reconstruction is accomplished by the theoreticians of fixed-price equilibria. But its starting point is the works of Patinkin.

IS-LM was devised by Hicks to compare the Keynesian theory and the Classical theory. Involuntary unemployment being an essential part of the Keynesian theory, it is also a necessary ingredient of the IS-LM model. But the introduction of this phenomenon questions the supposed walrasian micro-foundations of the model. Patinkin is the first to perceive this difficulty. For this reason, he plays a decisive role in the transition from IS-LM à la Hicks and Modigliani to the work of Barro and Grossman.

[7] Indeed Modigliani (1987) is very critical about Barro's Ricardian equivalence theorem (Barro, 1974). Yet, ironically, this theorem is the strongest argument to support the idea that there is nothing else but "inside money".

The problem defined

As a theory of involuntary unemployment, IS-LM describes an economy in which goods and services are produced and exchanged out of general equilibrium. As shown by Clower (1965), in this context, one must distinguish between planed transactions, based uniquely on prices, and realized or effective transactions. In other words, Walrasian microeconomics is not appropriate foundations for a fully developed IS-LM model. To obtain suitable foundations, Walrasian microeconomics must be modified. More precisely, agents' budget constraints must reflect the quantity constraints resulting from disequilibrium exchanges. Suppose that households suffer from involuntary unemployment. In this situation, their planed or Walrasian labor supply is superior to their effective level of employment. As a consequence, when defining the allocation of their resources, households take into account the additional restraint: $N^S \leq N^D$. The results of their calculus are the Keynesian effective demands in which income, just like prices, appears as an independent variable. This is Clower's famous dual decision hypothesis, the starting point of all the work done by authors such as Barro and Grossman (1971, 1976), Bénassy (1975) or Drèze (1975).

This issue was hardly understood by the first authors of the neoclassical synthesis. When dealing with the micro-foundations of IS-LM, economists such as Klein, Lange or Modigliani mainly insist on the problem of aggregation. Apart from this problem, the only modifications they consider necessary to transform a Walrasian model into an IS-LM model are the introduction of a rigid wage and the specification of the slopes of the demand curves. None of these authors perceives the incompatibility between the Keynesian analysis and Walrasian microeconomics.

Klein's *Keynesian Revolution* (1947) is particularly representative of this issue. For Klein, the way IS-LM can be derived from microeconomic relations must be clarified:

> The theories of individual behavior provide a complete set of inter-relationships within the economy; e.g., they give us the demand-and-supply relationships of every commodity in the system. This is the famous Walrasian system of general equilibrium (Klein, 1947, p. 57).

> A problem which has never been adequately considered by Keynesians is the derivation of a theory in terms of communities of individuals and groups from a basic theory in terms of individuals and single commodities. In modern economic terminology this is the problem of passing from micro to macro economics, i.e., aggregation (ibidem, p. 56).

As shown by this last quotation, the problem is seen mostly as a problem of aggregation. Yet, once stated, the problem is actually dodged by Klein: "It is a very technical mathematical solution to show how the difficulties of aggregation may be overcome" (ibidem, p. 57). Furthermore, when he treats the question in his technical appendix, Klein does not distinguish the foundations of the Keynesian model from the foundations of the Classical model. The differentiation is done only at the macro level. The Keynesian model features an inelastic investment function, a very elastic money demand function and rigid wages. The Classical model features an elastic investment function, an inelastic money demand function and flexible money wages.

The "spill over" effect and microeconomics of "involuntary action"

Within the group of economists who framed IS-LM, Patinkin is an exception. He is the only one who sees the issue raised by the micro-foundations of IS-LM. In chapter 13 of *Money, Interest and Prices* (1956), Patinkin enlarges his macroeconomic model to account for

involuntary unemployment. At this point, he notes that the behavior of firms in an economy with involuntary unemployment is inconsistent with the behavior assumption of the Walrasian theory. To cope with this problem, he defines the "spill over effect".

The starting point of the market experiment analyzed in chapter 13 is a decrease in aggregate demand. As a consequence, firms accumulate inventories until they decide to "bring current output –and consequently current input –into line with current sales" (1956, p. 216). Excess supply on the goods market then "spills over" on the labor market and involuntary unemployment is created.

The important thing is that this "spill over effect" does not square with the standard theory of the firm. Here, Patinkin clearly understands that the Keynesian scenario requires specific micro-foundations:

> Furthermore, it must be emphasized that this absence of an express dependence on the volume of output is not a property peculiar to our function, but one that holds for any labor demand function derived in the standard way from the principle of profit maximization. (…).
>
> In particular, our demand function for labor describes the behavior of firms maximizing profits within a framework of perfect competition. This means that the planned labor input it specifies for any given real wage rate reflects the firm's assumption that they will be able to sell all of their resulting output at the prevailing market price. Hence any development in the commodity market which invalidates this crucial assumption must also invalidate these plans. In particular, the continued forced accumulation of unsold outputs described above must eventually make firms drop both their assumption of an unlimited market and, consequently, their plans for labor inputs as described by the demand curve in Figure 34 (Patinkin, 1956, p. 216).

Not only does Patinkin stress the inappropriateness of the standard labor demand function, he also sketches an alternative theory. The quantity constraint experienced by firms on the goods market cause them to express a "new" labor demand distinct from their planed demand for labor. This effective labor demand is derived by taking into account the additional constraint: $Y^S \leq Y^D$. Yet, firms still express their planed or "notional" supply on the goods market (ibidem, p. 218). This behavior assumption offers an underpinning for the analysis of the quantity adjustments typical of IS-LM.

Now, it is necessary to stress that Patinkin's insights are not an accident. Actually, they are the outcome of a thought process which begins in 1946 when Patinkin writes the first drafts of his Ph.D. thesis, submitted during the summer 1947 at the University of Chicago[8].

In this work, Patinkin attempts to elaborate the microeconomics of 'involuntary action'. This project results from his thinking about the concept of involuntary unemployment. Patinkin's starting point is the idea that: "In order to be acting involuntarily, they [workers] must be off their supply curves" (Final Report to the Social Science Research Council, June 1947). This means that unemployed workers do not realize their Walrasian plans. But this does not mean that they have no plan at all. They still act in conformity with the principle of

[8] Patinkin himself insisted on the importance of chapter 13. For instance, in a letter to Leijonhufvud, who, in a paper published in 1974, had spoken about the "tortured, obscure, and ad hoc" analysis of chapter 13 of *Money, Interest and Prices*, Patinkin wrote: "From this description the reader would hardly guess how basic this chapter is to my thinking; (…). There is one sense in which chapter 13 is indeed an 'interlude'; for in contrast with the other parts of my book, I did not succeed in achieving in it (and this I admitted in that footnote on p. 323) an integration of my economic intuition with my formal economic analysis. But surely an astute observer of life among the econ should have recognized this for what it was: the insistence of a semi-deviant member of the tribe to express something he considered to be of great importance –something basic to his own thinking –even if he thereby violated the strict taboo against saying anything that was not rigorously and systematically incorporated in a model" (Patinkin to Leijonhufvud, 12 february 1974).

utility maximization but their effective plans incorporate "additional restraints". Their situation, Patinkin notes, is "involuntary" "in a relative sense only" (Patinkin, 1947, p. 79). It is still the consequence of a choice, but the options are inferior to the options opened in the "normal" context arbitrarily defined by the Walrasian theory. On this basis, Patinkin envisions a general theory of involuntary action whose general formula is presented as follows:

> For example, consider a consumer maximizing his utility from n goods:
> (62.1) $u(Z_1,\ldots, Z_n)$
> subject to the budget restraint
> (62.2) $\sum_{i=1}^{n} p_i Z_i = y$
> (where the p_i = prices and the y = income are considered as given) and some additional restrictions (say, some sort of rationing control)
> (62.3) $\theta(X_1, X_2,\ldots, X_n) = 0$.
> Then he maximizes
> (62.4) $u(Z_1,\ldots, Z_n) - \lambda_1\left(\sum_{i=1}^{n} p_i Z_i - y\right) - \lambda_2\theta(Z_1, Z_2,\ldots, Z_n)$
> To yield the n equations
> (62.5) $u_i - \lambda_1 p_i - \lambda_2\theta_i = 0$ $(i = 1,\ldots, n)$.
> Thus we have n + 2 equations (62.2), (62.3) and (62.5) in n + 2 variables: the Z_i, λ_1, and λ_2. Solving in terms of the p_i and λ we have
> (62.6) $\lambda_j = f_j(p_1,\ldots, p_{n-1}, y)$ $(j = 1,2)$
> (62.7) $z_i = g_i(p_1,\ldots, p_{n-1}, y)$ $(r = 1,\ldots,n)$ (Patinkin, 1947, p. 117).

This maximization program must illustrate the fact that agents in a disequilibrium situation will express new behavior functions, the g_i functions, reflecting rationing imposed on them. These g_i functions are nothing but Clower's "effective demands" distinct from the notional or Walrasian demands noted h_i by Patinkin.

This planned microeconomics of disequilibrium implied quite explicitly the idea that Walrasian microeconomics cannot account for "involuntary action" and "involuntary unemployment". But Patinkin did not succeed to materialize his insights in 1947. The major problem consisted in defining the "additional restraints" imposed on each agent in an economically meaningful way. This is exactly what Patinkin did in chapter 13 of *Money, Interest and Prices* concerning the situation of firms. In contrast, and strangely enough, he did not see how his analysis could be applied in the case of households[9]. This was left to Clower.

Patinkin's influence on Clower

The complementarity of Clower's "dual decision hypothesis" and Patinkin's analysis of the "spill over effect" has been duly noted by Barro and Grossman (1971)[10]. But the two authors' contributions are not only complementary. Clower's analysis is actually a consequence of Patinkin's work and an attempt at deepening his disequilibrium theory of unemployment.

[9] Patinkin's inability to apply the "spill over effect" to households seems to be a consequence of his approach of their maximization program. As a matter of fact, he always considers separately (in his Ph.D thesis and in *Money, Interest and Prices*) the decision concerning labor supply on one side, and the decision concerning spendings and savings on the other side.

10 "[Clower's] approach to explaining household behavior is obviously similar to Patinkin's analysis of the firm" (Barro and Grossman, 1971, p. 83).

This claim might appear surprising for someone who only knows Clower's 1965 paper. As a matter of fact, Clower presents Patinkin as the leading figure of the "Keynesian Counter-Revolution" and accuses him to betray the economics of Keynes. Yet, it can be shown that Clower's assertions concerning his attempt to break with Patinkin's macroeconomics should not be taken too seriously.

Before all, it should be noted that elements of the "dual decision hypothesis" can be found in Patinkin's works. The first one is the idea that unemployed have to take account of an "additional constraint" apart from prices and their budget constraint (1947, p. 79; 1956, p. 212). The second one is the modified budget constraint used by Clower in 1965, a relation defined by Patinkin in a 1958 article entitled "Liquidity Preference and Loanable Funds: Stock and Flow Analysis". In this paper, one can read: "The right-hand side of the household account reflects our assumption that wage earners passively expect to receive whatever employers plan to pay; hence the term N^D appears there as well as on the left-hand side of the business account" (1958, p. 315). To obtain de dual decision hypothesis, Clower only had to show that the consumption function resulting from Patinkin's modified budget constraint was the Keynesian one with income as an independent variable. Besides, he may have been helped by Patinkin's remark in chapter 13 of *Money, Interest and Prices* about "the involuntariness with which firms, no less that workers, must act during periods of unemployment" (1956, p. 219). Indeed, this remark suggests that if the positions of firms and workers are symmetric, a "spill over effect" must exist in the case of households too.

Now, that Clower's contribution could be the result of a careful reading of Patinkin is not a mere conjecture. It is actually confirmed by the correspondence between the two economists from 1958 to 1962.

This correspondence first demonstrates that Clower and Patinkin interacted actively during the period preceding the first presentation of Clower's "Keynesian Counter-Revolution" at the Royaumont Conference in 1962. Both economists meet a first time during the summer 1959. In 1960 Patinkin accepts an invitation from Clower to stay for a month a Northwestern University as a visiting Professor. In their letters, they discuss a number of theoretical issues and in particular the criticism of Archibald and Lipsey's against Patinkin's monetary theory. Finally, Patinkin submits to Clower some corrections for the second edition of *Money, Interest and Prices* (1965). At one point, he even asks him to present his article for the Royaumont Conference in absentia (Letter to Clower, 19 march 1962).

The correspondence also proves that Clower was a close and grateful reader of Patinkin. It begins by a letter about Patinkin's 1958 article in which one can read:

> While I am at it, I should like to thank you for many pleasant and profitable hours, the result of you having written *Money, Interest and Prices*. It is a remarkable book in more respects than it is possible to mention, and should do much to make our science a better field in which to work (Clower to Patinkin, 6 December 1958).

Finally, the correspondence contains the evidence that Clower wrote "The Keynesian Counter-Revolution" in an attempt to deepen Patinkin's insights concerning the theory of involuntary unemployment. In a letter written in March 1962, Clower announces that he has obtained some interesting results in the field of disequilibrium economics. But he does this by pointing at the weaknesses of Patinkin study of "disequilibrium systems". Actually, he seems to be disappointed by the fact that Patinkin prefers to work on his monetary theory, his "hobby horse", instead of trying to develop the work began in chapter 13 of *Money, Interest and Prices*:

> I think we probably have methodological differences, for I am unconvinced of the importance of this detailed discussion of the utility theory foundations of monetary theory. We all have our hobby horses, to be sure, but this one does not really fit too well

with some of your other ideas, particularly the ideas adumbrated in the second half of your book on disequilibrium systems. That is still the weakest part of your entire structure, and the weakness arise from undue concentration on the equilibrium properties of households models in part I. I will say no more on that here, since your concentration on consumer equilibrium saves me all kinds of time to concentrate on consumer disequilibrium, an area in which I am currently specializing with what I think are interesting results (Clower to Patinkin, 3 March 1962).

This letter shows that Clower does not break with Patinkin's macroeconomics and that his contribution results from an internal criticism of *Money, Interest and Prices*. Actually, Clower continues Patinkin's contribution.

4. Patinkin and the limits of IS-LM

How could *Money, Interest and Prices* be the culmination of IS-LM if the sophisticated works of Barro and Grossman, Bénassy, Drèze or Malinvaud are taken into account? My answer is that, for all the progress realized in the formalization and in the analysis of the Keynesian model, these authors did not advance beyond Patinkin's conclusions concerning the limits of IS-LM. First, I will present Patinkin's analysis and, second, I will show how his conclusions were re-discovered by the theoreticians of fixed-price analysis.

Patinkin's reasoning

According to Patinkin, the study of involuntary unemployment within the IS-LM framework cannot be restricted to the analysis of fixed-wage or fixed-price equilibrium. IS-LM must allow the analysis of the adjustment process induced by involuntary unemployment in an economic system with flexible wages and flexible prices. In other words, IS-LM should be the model of a theory of "disequilibrium unemployment"[11].

The reason behind this position is that the association of price rigidities and unemployment limits the scope of the Keynesian theory and contradicts Keynes's project. According to Patinkin, if Keynes' message is that price rigidities cause unemployment it is trivial[12]. For him, the Keynesian theory, hence IS-LM, must demonstrate that a perfectly competitive system with price and wage flexibility can suffer from chronic unemployment, a result that Patinkin pretends to obtain in chapter 13: "First we see that involuntary unemployment can exist even in a system of perfect competition and wage and price flexibility" (1956, p. 220).

Given the influence of New-Classical economics on current economic theory, this statement seems very odd indeed. One cannot understand Patinkin if one assimilates price flexibility and market-clearing. The theory sketched in chapter 13 of *Money, Interest and Prices* should be seen as a non-tâtonnement theory. In this setting, the economic system goes through a sequence of equilibria based on parametric prices and quantity adjustment. Price flexibility then refers to the progressive adjustment of prices from one equilibrium to the

[11] "The argument of this chapter can now be summarized in the following terms: Equilibrium means full employment, or, equivalently, unemployment means disequilibrium. Hence our study of the corrective market forces automatically generated by the presence of involuntary unemployment is a study of the dynamic workings of an economy in disequilibrium" (Patinkin, 1956, p. 224).

[12] "I must also emphasize that were the *General Theory* to depend on the assumption of wage rigidity, there would be no novelty to its message: for the fact that such rigidity can generate unemployment was a commonplace of classical economics" (Patinkin, 1991, p. 28). This argument is already used by Patinkin in a letter to Modigliani in 1948 (cf. Rubin, 2002a, p. 208).

other. Micro-economic foundations (adapted from Walrasian microeconomics) define the market excess demands or the "market forces" that move prices[13].

Once this criticism of unemployment equilibrium is accepted a question must be answered: what is the destination of the adjustment process? Is there a fixed point to which the system would converge? Although his justification is dated, Patinkin's position on this point is conventional. For him, a model is satisfying and general enough only if it contains a steady state. This position appears very clearly in the drafts of Patinkin's thesis and in the thesis itself: "The inconsistency of these macrosystems means that they cannot describe the real world; for the real world, by its very existence, must be consistent" (1947b, p. 24a)[14]. According to Patinkin, a model with no solution describes an economy that is breaking down, thus a very exceptional case. The same argument applies for stability[15]. Now, unless some price is supposed to be rigid, the only general equilibrium concept available is the Walrasian one. Hence, Patinkin concludes that just like the tâtonnement process, the non-tâtonnement adjustment must lead the system to general equilibrium:

> And the assumption made until now, that, granted flexibility, these forces will restore the economy to a state of full employment, is an assumption that the economy is consistent and stable; that, in other words, an equilibrium position always exists an that the economy will always converge to it (1956, p. 224).

Patinkin's conclusion raises an important difficulty. It blurs the content of the Keynesian message. If the economic system always converges towards full employment, involuntary unemployment is a transitory phenomenon and the market mechanism is efficient. The model does not justify State intervention.

A letter to Robertson shows that Patinkin was very much aware of this problem:

> I have been trying for the Past ten years to find out just what is the nature of Keynesian economics, and how does it differ from previous economics. I am not sure that I understand the difference today; I am not even sure that such a difference exists.
>
> (Patinkin to Roberston, 15 August 1951)[16]

A basic function of IS-LM is to define what distinguishes the Keynesian position from the Classical one. Therefore, some element must be introduced in Patinkin's disequilibrium theory to help define market inefficiency and market efficiency. This necessary element is the notion of "duration of the adjustment process". As stated by Patinkin in chapter 14 of *Money, Interest and Prices* (1956, p. 235):

> Thus Keynesian economics is the economics of unemployment disequilibrium. It argues that as a result of interest-inelasticity, on the one hand, and distribution and expectations effects, on the other, the dynamic process of chapter 13.3 –even when aided by monetary policy –is unlikely to converge either smoothly or rapidly to the full-employment equilibrium position.

[13] A detailed argumentation of this interpretation is presented in Rubin (2002b). Indeed Patinkin does not refer to non-tâtonnement in *Money, Interest and Prices*. But in 1956 this word did not exist. Nevertheless, a paragraph of the first part of the book (1956, p. 37), in which Patinkin defines what he calls a "less dramatic" form of tâtonnement, clearly refers to non-tâtonnement.

[14] The word inconsistent refers to an absence of equilibrium solution.

[15] In *Money, Interest and Prices*, Patinkin writes about a model with no solution: "the inconsistency which it proposes is operationally equivalent to the instability of a consistent system: in neither case do the dynamic forces of the economy succeed in bringing it to an equilibrium position;" (1956, p. 236).

[16] Quoted by Backhouse (2002).

This quotation deserves some complementary explanations. The "slowness" of the adjustment process in the Keynesian case is not a consequence of price stickiness. According to Patinkin, the Keynesian position states that given some "normal" speeds of adjustment for prices on the different markets of the system, the adjustment process following a negative aggregate demand shock will take a long time. During this "long time" the economy suffers from involuntary unemployment so that State intervention is justified. This problem is primarily caused by the characteristics of the aggregate demand function, namely weak prices and interest elasticities. Conversely, the Classical position states that the same "normal" prices speeds of adjustment guaranty a "rapid" adjustment towards full-employment. If ever unemployment persists, this means that State intervention or the behaviour of trade unions add some price rigidities to the system[17].

To conclude this analysis of Patinkin's reasoning, it should be noted that the economist says nothing of the way the "length of the adjustment process" could be accounted for in the Keynesian model. As a matter fact, that something like "different lengths of time" for the adjustment towards general equilibrium could be introduced into a non-tâtonnement framework is subject to doubts (De Vroey, 2002).

The disciples' and dynamic disequilibrium

Patinkin's heirs worked mostly on the elaboration of various forms of fixed-price models. Nonetheless, these authors never lost sight of the necessity to go beyond the fixed-price assumption and analyze the price-dynamics of their models. This preoccupation is apparent in Grossman (1971) and Barro and Grossman (1971). The latter refer to Grossman's paper in a footnote:

> Grossman develops a more general model of multi-market disequilibrium based on Clower's choice theoretic paradigm, and focuses in detail on the implications of this model for the disequilibrium behavior of prices and interest. (Barro and Grossman, 1971, footnote 8, p. 85).

Bénassy's (1975) rigorous generalization of Clower's dual decision hypothesis is supposed to define the effective excess demands pressing on prices. Besides, this economist states explicitly that each equilibrium with quantity rationing is only one stage in a sequence of such equilibria (1976, p. 766). Grandmont (1977) in his survey of the literature on temporary equilibrium for *Economica* refers several times to the necessary study of the price-dynamics of "fixed-price" models. Finally, Laroque (1981) writes:

> The study of the movement of prices from one period to the next should be an important feature of the fixed price method. While, in recent years, a large number of works are devoted to the description and the properties of the allocation of resources in a given period, very little success has been achieved yet as far as the dynamics of prices is concerned. (Laroque, 1981, p. 355)

The reasons for this emphasis on dynamics are those given by Patinkin. The idea that each equilibrium with quantity rationing pertains to a sequence of equilibrium with changing prices is supposed to mean that the whole theory is not based on price rigidities. This argument is explicit in d'Autume (1985, p. 244):

[17] This definition of the Classical position, explicitly stated by Patinkin in "Price Flexibility and Full Employment" (1948, p. 557), is conform to Pigou's approach of unemployment (cf *Employment and Equilibrium*, 1941, p. 85-98).

> Il faut d'ailleurs rappeler que l'expression « d'équilibre à prix fixes » que l'on rencontre parfois ne doit pas induire en erreur. Mieux vaut parler de prix imparfaitement flexibles : l'étude de l'équilibre temporaire n'est qu'un des moments de l'analyse et celle-ci doit logiquement être complétée par l'étude de la dynamique engendrée par l'ajustement progressif des prix.

Besides, in the rare studies dedicated to this issue the adjustment process always leads to a Walrasian general equilibrium (Grossman, 1971; Veendorp, 1975; Laroque, 1981). Indeed, as was understood by Patinkin, this result is inescapable for an economist trying to build a Keynesian model from the starting point of Walrasian economics. At this stage, Patinkin's heirs are at a loss. Gale puts it quite bluntly:

> The different "equilibria" described above are not really equilibria; they merely describe the trade offers that would be made in disequilibrium during a non-Walrasian adjustment process. Now this interpretation seems to be returning in the direction of the neoclassical caricature of Keynesian economics, according to which Keynes had merely emphasized the frictions and market imperfections which slowed the economy's eventual return to full employment equilibrium. For if the theory does not provide a concept of non-Walrasian equilibrium or it does not provide a theory of effective demand to explain how prices adjust, the whole question of whether the economy returns to full employment of own accords is left up in the air. There is no more reason to expect a Keynesian conclusion from this sort of theory than from the Walrasian *tâtonnement*. (Gale, 1983, p. 27)

Although his reference to the "neoclassical caricature of Keynesian economics" shows a bad understanding of Patinkin's subtle interpretation of the Keynesian theory, Gale points the right issue: what is a Keynesian conclusion if the economic system returns to full employment? In front of this problem, d'Autume (1985) offers a familiar answer:

> A ce problème d'identification [des déséquilibres] s'ajoute la nécessité d'entreprendre une analyse dynamique. Dans un cadre non-walrassien encore plus que dans un cadre walrassien, il convient de se garder de passer insensiblement d'un résultat de statique comparative à un résultat de dynamique. **Les cheminements prennent du temps et sont ici l'essentiel.** L'analyse de l'équilibre à prix fixés n'est que le premier temps de l'étude et celle-ci doit notamment se poursuivre par l'analyse des effets d'un ajustement progressif des salaires et des prix. (d'Autume, 1985, p. 155, my emphasis)

D'Autume's book, *Monnaie, croissance et déséquilibre*, is especially representative of the literature on fixed-price model since it is probably one of the last works published on the subject in the mid-eighties and, for this reason, an illustration of the state of the art. Now, like Patinkin, d'Autume considers that the elaboration of a non-tâtonnement theory is a necessary development of fixed-price models. And, like Patinkin again, he adds a notion of "duration of the adjustment process" to give a content to the Keynesian position. But, this key element of the theory remains fuzzy[18]. D'Autume does not tell us own "the length of time" necessary for the return to full employment fits in the theory. In this sense, economists of the fixed-price school did not outstrip Patinkin. They went extremely far beyond Patinkin on the question of micro-foundations of parametric prices equilibria. But as far as an authentic disequilibrium theory is concerned they only rediscovered his conclusions.

[18] This issue is highlighted by De Vroey (2001, 2002).

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