Oskar Lange's Conversion to Keynesian Economics

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Outline :

In the first half of the 1940s, Oskar Lange's view of capitalism evolved markedly. In 1934 he was persuaded that capitalism was doomed and that the capitalist State could not save it. Because of imperfect competition, prices and wages could not adjust as they should. In "Say's law: a restatement and criticism" (1942) and in a Cowles Commission monograph entitled *Price Flexibility and Employment* (1945), Lange developed a totally different view. He adopted the claim developed in John Maynard Keynes' chapter 19 according to which downward wage adjustment could not restore full employment. This led him to revise his conception of the State and defend the possibility of a mixed economy. His new vision was grounded by a general equilibrium approach borrowed to John R. Hicks. Our paper tries to document Lange's evolution from 1934 to 1945. We also discuss the influence and the significance of *Price, Flexibility and Employment*. This book was instrumental in imposing the idea that the foundations of Keynes' claims should be sought in the general equilibrium theory. It may be seen as a bifurcation with respect to the approach of microfoundations suggested by Hicks in *Value and Capital*.

Keywords: History of macroeconomics, Microfoundations, Oskar Lange, John Hicks, Neoclassical Synthesis, Walrasian Macroeconomics.

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1. Introduction

Potted histories of macroeconomics often present the current state of the field as the result of a care for microfoundations that would have been totally lacking before the works of Lucas and his disciples during the seventies. Recent works by Backhouse and Boianovsky (2013), Duarte and Lima (2012), Hoover (2012) or Rubin (2012) have challenged this vision. Worries about the relation between macroeconomics and choice theory and even general equilibrium theory are certainly as old as the discipline. As shown by Boianovsky (2014a and 2014b), even before the publication of the *General Theory*, Wicksell or Pareto had made forays into the relation between general equilibrium theory and the explanation of business cycles.

This paper concentrates on the figure of Oskar Lange and on the way he related Keynes' *General Theory* and The Walrasian general equilibrium theory during is American period from 1936 to 1944. After the publication of the *General Theory*, Lange was instrumental in imposing the idea that the foundations of Keynes' claims should be sought in the general equilibrium theory. In "Say's law: a restatement and criticism" (1942) and in a Cowles Commission monograph entitled *Price Flexibility and Employment* (1945), Lange developed an alternative to the nascent Keynesian mainstream founded on the IS-LM framework. Our paper traces the genesis of this approach and shows why it should be understood as one among various ways of developing macroeconomics available by the end of the 1940s.

A striking feature of Lange's contributions is his defence of the main claim of *General Theory*'s chapter 19. In 1934, Lange was persuaded that capitalism was doomed and that the capitalist State could not save it. Because of imperfect competition, prices and wages could not adjust as they should. In the first half of the 1940s, Lange developed a totally different view. He adopted the claim developed by John Maynard Keynes according to which downward wage adjustment could not restore full employment. This led him to revise his conception of the State and defend the possibility of a mixed economy. His new vision was grounded by a general equilibrium approach borrowed to John R. Hicks. Our paper tries to document Lange's evolution from 1934 to 1945. We also discuss the influence and the significance of *Price, Flexibility and Employment.*

A major problem when studying the evolution of Lange's thought during his American period is the lack of archival sources. Lange published intensively during this period but the subject of his papers are particularly varied and he never paused to clarify his underlying research project. Michael Assous and Roberto Lamp (2014) have argued that his works should be seen as an attempt to develop a "theory of the evolution of capitalism" mixing ingredients taken from Marx, Schumpeter, Kaldor and Kalecki.[1] Lange would have been engaged in a question for a theory of the business cycle. The problem with this reconstruction of Lange's research agenda is that it becomes difficult to understand why the latter based his analysis of economic crisis on the general equilibrium theory in his 1942 and 1945 works. This approach seems only loosely connected to the business cycle models of Kaldor and Kalecki. Furthermore, the notes taken by Don Patinkin during his courses at the University of Chicago in 1944 and 1945 seem to attest that business cycle models were not high on the agenda of Lange. In the course titled "Business Cycle theory", during the summer 1945, in particular, Lange dedicated very little space to the business cycle models proper (10 pages on 126). The part of the course on "Dynamic Keynesian Models" presented the model of Kaldor and Kalecki but it began with a warning. Lange remarked that there was too many business cycle models and no way to discriminate between them.[2] This empirical issue might explain why, in the context of the Cowles Commission, that settled at Chicago in 1939, Lange considered that developing general equilibrium systems was necessary. As evidenced by the latter work of Lawrence Klein, the economists of the institution believed that disaggregated models would perform better empirically. All this shows suggest that Assous and Lampa have only scratched the surface of the issue. In this paper, we will not investigate the problem raised by the econometrics of business cycle model. We will only try to show that even though Lange's works were underlined by a consistent questioning, the tools he used changed and the answer he proposed evolved.

To understand what Lange tried to do in 1945 and the specificities of his works, section 2 of the paper clarifies the role attributed to the Walrasian approach in his contributions prior to 1938 (section 2). In 1938, Lange published "The rate of interest and the optimum propensity to consume". In this paper he presented an *IS-LM* type interpretation of the *General Theory* and maintained that Keynes' theory was a simplified version of Walras' theory (section 3).

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[1] See also Assous (2016), Lampa (2011) and Kowalik (1987).

[2] "Diff. of bus. Cycle is not that can't construct theory of bus. Cycle, but can construct too many. Which shall we choose? On what basis? Only way is to confront with empirical data and see if can eliminate all but one. But haven't yet succeeded in doing this – partially because of inadequate & inaccurate data, also each cycle subject to unique events. Won't discuss all theories." ("Economics 332, Business Cycle Theory, Summer 1945", Don Patinkin's Paper, Duke University Special Collections: 86)

Yet, Lange did not pursue this line of thought in the following years. In "Say's law, a restatement and criticism" (1942) and in *Price Flexibility and Employment* (1945), he developed a way of wedding Keynes' contribution and the general equilibrium theory inspired mainly by Hicks' *Value and Capital* (1939) but also secondarily by Samuelson (1941). Section 4 explains why the reading of *Value and Capital* was probably decisive in Lange's shift. Hicks inaugurated the interpretation of chapter 19 of the *General Theory* in terms of instability that would be developed by Lange. Section 5 presents the content of Lange's 1942 and 1945 pieces and shows how it modified Hicks's interpretation of instability. Section 6 explains why Lange's approach can be called a Walrasian macroeconomics. Its influence is examined in section 7.

2. The place of Walrasian theory in Lange's fight for socialism (1932-1937)

In studying Lange's contribution to the birth of macroeconomics one cannot abstract from his political stance and from the questions motivating his works in the period preceding the establishment of a communist regime in Poland. Starting from Lange's commitment to socialism, we will clarify the role he attributed to Walrasian theory in his theoretical contributions prior to 1938.

2.1. Vision and Utopia

Lange's vision of capitalism was made clear in a text co-authored by Marek Breit and published in polish in 1934 and in Lange (1935). Capitalism was based on technical progress. The latter was necessary to maintain the "reserve army of unemployed" and preserve low wages and high profits (1935: 198). But technical progress led to the concentration of industry. Imperfect competition in turn introduced "rigidities and inelasticities" destroying the adjustment mechanisms prevailing under perfect competition. Whereas crises were transitory during the 19th century, capitalism was now prone to protracted crises as evidenced by the events of the 1930s:

> Capitalist crises are becoming more severe and protracted, and the way out of the crisis is increasingly difficult using the means appropriate to the capitalist economy. In this way, in monopoly capitalism, capitalist crisis are turning into a crisis of capitalism, an inability of capitalism to function anymore. (1934: 52)

What is clear in Breit and Lange (1934) is that, around 1935, Lange firmly believed in the "automatic mechanism of the capitalist economy" (1934: 53) based on competition and flexible prices. This belief led Breit and Lange to criticize the reformists who thought that it was possible to impose higher wages through Unions and political pressure. The only result when the boom faltered was mass unemployment:

> But in the same way that cartels and trusts frustrate the automatic equilibrium of the capitalist economy in the domain of production, social reforms thwart that equilibrium in the labor market. (1934: 55)

Consistently enough, Breit and Lange clearly rejected the possibility that State intervention could save the capitalist system. Interventions, guided by the interest of cartels and trusts, only made matters worse:

> Since the beginnings of its existence, the capitalist economy has not witnessed such great and far-reaching state intervention in economic affairs. These interventions are utterly destroying the automatic mechanism of the capitalist economy. (1934: 53)

In "Marxian economics and economic theory" (1935) Lange claimed that the Marxian analysis of the long run tendencies in the development of the capitalist system was a clear element of superiority with regards to modern (marginalist) economics. In the list of tendencies put forward by Lange, "the increase of economic instability in the capitalist system, which by destroying the economic and social security of the population of capitalist countries, causes them to rebel against the existing economic system, whatever the ideology and program underlying this rebellion (Socialism or Fascism)" (1935: 190) seems the most relevant.

Lange's commitment to the establishment of a socialist organization of the economy illustrated by his participation to the socialist calculation debates is famous. This was his utopia. In one of his last American papers, Lange defined the socialist economy as "an economic organization where production is done by public services operated for the satisfaction of the wants of the community" (1945-6: 28). In a capitalist system, the pursuit of money profits dominates the satisfaction of collective wants. For this reason, a socialist system should enhance the welfare of the masses: "Can socialist therefore increase the economic welfare of the masses? Yes it can." (Breit and Lange, 1934:66)[3]

At the scientific level, Lange's vision and utopia led to two different issues. The first issue was the explanation of the malfunctioning of a capitalist system in order to justify its abandonment. How could one account for the increasing "economic instability" of the capitalist system? The second issue was the economic organization of a socialist system. These are the unifying threads of his works during his American period.

[3] See Assous (2016) and Neuberger (1973)

2.2. *From Marx to marginalism*

In order to deal with his main issues, Lange had to choose his scientific tools. At this stage, Lange departed from his Marxian standpoint. According to him, the best tools were offered by "modern economics". This claim was the subject of "Marxian Economics and Modern Economic Theory".

The paper was an answer to Shibata, a Japanese Marxist. Shibata contended that Walrasian general equilibrium theory failed on two accounts. First, it could not "make clear" the present organization of capitalism. Second, it could not explain the laws of its development. Lange conceded the validity of the second criticism. Because bourgeois economics did not specify the institutional data of his economic systems, it could not grasp the tendencies deriving from the specific institutions of capitalism. Yet, Lange rejected firmly Shibata's first criticism. Actually, it was Marxian economics and not "bourgeois" economics which could not "grasp the phenomena of the every-day life of a capitalist economy". And even worse, it could not be used to conceive the organization of a socialist system:

> What can Marxian economics say about monopoly prices? What has it to say on the fundamental problems of monetary and credit theory? What apparatus has it to offer for analyzing the incidence of a tax, or the effect of a certain technical innovation on wages? And (irony of Fate!) what can Marxian economics contribute to the problem of the optimum distribution of productive resources in a socialist economy? (…). On the other hand, 'bourgeois' economics is able to grasp the phenomena of the everyday life of a capitalist economy in a manner far superior to anything the Marxists can produce. (1935: 191)

Lange's position seems to stem from his appreciation of Marx' theory of value. Like marginalist price theories, the labour theory of value was a "static theory of general economic equilibrium". But, unlike more modern theories, it was only valid when applied to a perfectly competitive economy of independent producers or Smith's "primitive state". Once capital and profits entered the scene, the theory stumbled on the transformation issue: "In fact, the adherence to an antiquated form of the theory of economic equilibrium is the cause of the inferiority of Marxian economics in many fields" (1935: 195-6). Besides, efforts to explain the difficulties involved in the accumulation of capital developed by Marxian economists using Marx' reproduction schemes had not "reached any definite conclusions" (Lange, 1937, note 2: 130).[4]

[4] On the limits of the theories to which Lange referred see Tutin (2000).

2.3. *An eclectic marginalist*

Lange was an eclectic marginalist. "Modern economic theory" was not tantamount to the Lausanne School in his view. In 1935 he referred to "the Austrian School, Pareto and Marshall" or "Wieser, Boehm-Bawerk, Pareto or even Marshall". Yet, Lange drew mainly on the contribution of the Marshallian and the Walrasian Schools. As stated by Lendgel (2001), Lange saw the tools provided by these schools as complementary. Until 1937, he used Walrasian theory chiefly to discuss the plausibility of a socialist economy. In order to account for the "economic instability" of the contemporary capitalist system, he referred to the more applied works of Marshallian economists.

In his famous pair of papers "On the Economic Theory of Socialism" (1936-1937), Lange played with the opposition between the ideal and the actual capitalist systems. In the first part of his essay, he had shown, using the Walrasian theory of tâtonnement, how "free competition tends to enforce rules of behavior similar to those in an ideal planned economy" (1937, p. 123). In other words, in principle, socialism and capitalism offered the same results. But then, asked Lange, "what is the use of bothering about socialism?" (ibidem). Lange developed the first part of his answer on the basis of the Walrasian representation of a perfectly competitive economy. At this level of analysis, there were two differences explaining why a pure socialist system was superior to a pure capitalist system. Firstly, in a capitalist system, the distribution of wealth was arbitrary and this prevented the attainment of maximum social welfare. Secondly, a planned economy would cope more efficiently with externalities. But Lange considered these arguments as inconclusive. In the second part of his discussion, he put forward the gap between the actual economic system and a pure capitalist system. The first source of this gap was the imperfection of competition analyzed by Robinson and Chamberlin. And this, according to Lange, added a "much more powerful argument to the economist's case for socialism" (1938, p. 126). It is also in this context that Lange referred to the works of Robertson (1926) and Keynes (1936) showing that the "actual rate of saving in capitalist society" could prove inadequate. What all this shows is that, in 1937, in order to prove the superiority of socialism, Lange thought that he had to insist on the distance between the actual economy and a perfectly competitive system. And to do discuss the features of the actual economy, he had recourse to the works of Marshallians.

Considering the papers published by Lange until 1937, one can see that he referred to the Walrasian theory only insofar as stable systems and the organization of a socialist economy were at stake. In other words, the Walrasian framework was essentially relevant to discuss the properties of well-functionning or stable systems. To discuss the observable flaws of capitalist economies one had to rely on the tools of the Cambridge School. What we call today macroeconomics was left to Robertson and Keynes in 1937. As shown by Assous and Lampa (2014) and Patinkin's notebook, at this stage macroeconomics was also the theory of the business cycle illustrated by the works of Schumpeter and Kalecki.

3. The Walrasian interpretation of *IS-LM*

Yet, one can imagine that Lange would have liked to show that the flaws affecting the capitalist system were inherent to its inner logic. In other words, a more powerful critique required to account for those malfunctioning in the realm of pure theory. This can explain the way Lange interpreted the *General Theory* in "The Rate of Interest and the Optimum Propensity to Consume" (1938).[5]

In this article, Lange pointed out the hidden connection between Keynes' theory and the theories of Pareto and Walras: "It is a feature of great historical interest that the essentials of this general theory are contained already in the work of Walras." (Lange 1938, p. 20) Unwittingly, Keynes had devised was we would call today a Walrasian macroeconomics. Lange presented Keynes' model under the guise of an *IS-LM* framework and argued that this framework was actually a simplified version of the models of Pareto and Walras. Analytically, this surprising statement was allowed by Lange's reading of chapter 2 of the *General Theory* and his interpretation of involuntary unemployment as the result of a horizontal supply curve of labor. This meant that Keynesian unemployment was compatible with labor market clearing. As a result, Keynesian equilibria were only a subclass of Walrasian equilibria.[6]

Presenting *IS-LM* as a Walrasian model was not meant to downplay the merits of Keynes. According to Lange, "Mr Keynes [had] provided us with an analytical apparatus of great power to attack problems which hitherto [had] successfully resisted the intrusion of the economic theorist." (1938: 12). The *IS-LM* model showed the possibility of chronic unemployment together with the possibility of over savings or the possibility that a lack of consumption resulted in a lack of investment. Since *IS-LM* was a simplified version of the Walrasian model, it represented a perfectly competitive economy. In other words, at this stage, Lange presented the economic problems pointed out by Keynes as inherent to a pure

[5] For a full discussion of the points in this section see (Rubin, 2016).

[6] As I showed elsewhere, Lange position was marred by a number of inconsistencies. In particular, the mathematics of his model did not reflect his assumption concerning the labor supply curve.

capitalist system and not the consequences of added imperfections. Keynes showed the possibility of second best solutions in a Walrasian setting, equilibria that were not optimal in the sense that investment and employment were not at their maxima.[7]

Lange's 1938 reading of the *General Theory* could have oriented his subsequent works. At stake in his article was the problem of the microfoundations of Keynesian macroeconomics. Beyond his will to clarify the scope of Keynes' results, Lange wanted to make clear the nature of the aggregates and of the mechanisms at play in the *IS-LM* framework. To do so, one had to specify the relation between *IS-LM* and a disaggregated general equilibrium model. Ironically enough, Lange was so sure that the bridge was easy to build that he did not develop this line of research. But the idea that a relation existed between Keynesian macroeconomics and the Walrasian theory would prove quite influential, being taken up by founders of the Neoclassical Synthesis like Lawrence Klein, Franco Modigliani or Don Patinkin.

4. The *Value and Capital* hypothesis

In 1942 and 1945, Lange chose to develop a different approach. His 1938 paper "explored the internal logic"[8] of Keynes' model and used it to answer a question raised by Malthus. In "Say's law: a restatement and criticism" and in *Price Flexibility and Employment*, he would use a Walrasian approach to tackle questions raised by Keynes. This new step in Lange's thinking can be attributed to his discovery of Hicks' *Value and Capital* and of Samuelson's approach of dynamics (1941). Our conjecture is that the reading of *Value and Capital* came as a shock to Lange. After a brief presentation of the book, we will try to substantiate this claim.

It has not been sufficiently recognized that *Value and Capital* and "Mr Keynes and the Classics" belong to two very distinct lines of research (Rubin, 2016). As Hicks himself repeated several times, in his 1937 article, he attempted to capture the mathematical model contained in the *General Theory*. As a matter of fact, the equations of *IS-LM* were scattered in Keynes' book (Barens, 1999). In *Value and Capital*, Hicks proposed his own way of approaching what he called "dynamics". In other words, he attempted to develop and modify the theories of Pareto and Walras to explain fluctuations and crisis. This project, visible in papers from the first half of the 1930s (Hicks, 1933, 1935a and 1935b), preceded the publication of the *General Theory*. In "A Suggestion for Simplifying the Theory of Money"

[7] See Assous and Lampa (2014: 15) who quote a letter from Lange to Samuelson clarifying the definition of the « optimum propensity to consume ».

[8] Kowalik (1987).

(1935a), Hicks related the instability of the economic system, the crisis, with the instability of a general equilibrium system considering the possibility that « wage-changes will avail nothing to stop either an inflation or a deflation» (1935: 17). This line was pursued and radicalized in the last chapters of *Value and Capital* (Rubin, 2011). Hicks asserted that even if a general equilibrium always existed, the economic system might be unable to reach it. To him, this theoretical possibility meant that fluctuations threatened to kill the capitalist system.

Those claims were developed on the basis of the temporary equilibrium theory. Hicks considered a general equilibrium system with money and bonds but no future markets. This market incompleteness gave a prominent role to price expectations. As is well-know time was decomposed in weeks. Prices coordinating current supplies and demands were assumed to be determined each Monday, the rest of the week being dedicated to production, trade and consumption. Hicks studied the stability of the temporary equilibrium. In other words, he analyzed the conditions under which equilibrium prices would be found on a particular Monday. This issue of point in time stability must be clearly distinguished from the issue of the stability of a stationary state. On this question Hicks remained agnostic. The sequence of temporary equilibria might not lead to situation in which expectations would be realized. His analysis of point in time stability fell in two parts. He first assumed that the rate of interest was constant and considered the implications of an excess demand for goods. Hicks argued that if expected prices varied proportionally or more than proportionally with respect to current prices, the system would be unstable. In a second stage, Hicks considered the consequences of interest rates adjustments. A variation of the price level would affect the demand for money hence the rate of interest and, finally, supplies and demand for goods. Normally, this was stabilizing. But due the nature of interest rate expectations and the existence of a zero lower bound, in case of deflation, this mechanism could also prove insufficient.

The way Hicks interpreted the conclusion of his reasoning is crucial to appreciate Lange's contribution. Hicks claimed that his theoretical results shed light on the instability affecting real-life capitalism. But at the same time, he was deeply uneasy concerning the place that instability could find in a general representation of the capitalist system. Hicks interpreted temporary equilibrium instability as the "break-down" or the "death" of the economy. As a result, he judged this scenario too extreme to be realistic. To preserve realism (and consistency) without abandoning the "most important proposition of economic dynamics" (1939: 255) he sketched a business cycle theory that would allow for point in time instability in certain circumstances. In normal times, the form of expectations would preserve stability but, if a positive shock failed to intervene to restart the economy (1939: 298), expectations could be destabilized to the point that the system would break-down.

Even though the last chapters of *Value and Capital* developed a line of inquiry that antedated the publication of the *General Theory*, Keynes was at the center of Hicks's attention. Hicks interpreted his contentions concerning the possible instability of the temporary equilibrium both as a clarification and as a generalization of chapter 19 of the *General Theory*:

> One naturally associate [our proposition], however, with the names of Mr. Keynes, as well as with that of Wicksell. In *The General Theory of Employment* the proposition is turned the right way round; but the proof of it which Mr Keynes gives is more limited than ours. (1939: 256)

He also criticized the way Keynes integrated the danger of instability in his theory. Keynes used wage rigidity as the "corner stone" of his system together with unit elasticity of price expectations. For various reasons, Hicks considered instead inelastic price expectations as the ultimate stabilizer of the economy. According to him, inelastic expectations led to wage rigidity. Since the latter was associated with a notion of fair wage, one may argue that Hicks considered that institutions were essential for the stabilization of the capitalist economy. Note that wage rigidity was endogenous to the working of the economy and not the result of State intervention.

It is not difficult to see why Lange must have been seduced by Hicks' approach. Lange wanted to prove the inherent instability of the capitalist system in other words an instability affecting its purest form as described by general equilibrium theory. But that was precisely what Hicks claimed to do in chapters 20 and 21 of *Value and Capital*. As a matter of fact, the book contained more than a verbal discussion of stability conditions. It also provided a tentative mathematical demonstration of the stability of a static system. This was the promise that a truly rigorous analysis of tâtonnement was possible. This hope was enhanced by Samuelson's article on "The Stability of Equilibrium: Comparative Statics and Dynamics" (1941). In his autobiography, Patinkin (1995) explains that the appendix of Value and Capital together with Samuelson's 1941 paper were the basis of the course on mathematical economics taught by Lange at the University of Chicago in 1944. A point confirmed by Patinkin's notebook titled "Mathematical Economics, Economics 402 Autumn 1944".[9]

[9] Don Patinkin Papers, Duke University.

5. Lange as an unfaithful disciple of Hicks

Lange developed his own interpretation of the economic crisis in two pieces of work (Lange 1942 and 1945). The method was clearly inspired by Hicks: to use a disaggregated (temporary) general equilibrium system to discuss issues raised by Keynes. We will see how he developed these discussions but also how his way of interpreting cases of instability secludes him from Hicks.

5.1. "Say's Law a Restatement and Criticism" (1942)

The title of the 1942 essay obviously echoed Keynes rebuttal of Say's law. Yet, if, by the forties, the theme had become Keynesian, the link with the approach followed in the *General Theory* was tenuous. The main aim of the paper was to establish the dismissal of Say's law. Lange used Walras' law to define a universal glut as a situation in which a general excess supply of commodities (products and factors alike) was associated with an excess demand for money. Say's law, stating that "the total demand for commodities (exclusive of money) is identically equal to their total supply", eliminated this possibility. But this proposition, Lange showed, also implied that money prices were indeterminate. Moreover, the quantity theory of money offered no escape since its equation and Say's law were contradictory. The conclusion was straightforward:

> We have seen that Say's law precludes any monetary theory. The theory of money must, therefore, start with a rejection of Say's law. (1942, 66)

The main objective of the theory of money, as defined by Lange, was to study the "stability of the monetary equilibrium" or the conditions under which a general oversupply would be eliminated by a fall of the price level.

In the paper, Lange referred explicitly to Keynes only two times. The first time he pointed out the correspondence between one of his concepts and the concept of "user cost". The second time, he clarified the difference between his definition of unemployment and Keynes' concept of involuntary unemployment. For him, unemployment meant "an excess supply of primary factors and direct services" whereas he still interpreted Keynes involuntary unemployment as "an equilibrium position obtained by intersection of a demand and of a supply curve" (Lange, 1942: 61). This meant that general equilibrium was tantamount to full employment from his own perspective: "[Unemployment] requires, as we have seen, absence of monetary equilibrium" (ibidem). But, following Hicks (1939), Lange bypassed the existence issue. For him a theory of chronic unemployment was about the stability of general equilibrium, a serious breach with Keynes unemployment equilibrium approach:

> The objective of the theory of money is then to study the conditions under which equilibrium of total demand and of total supply of commodities (or, instead, equilibrium of total demand for cash balances and the quantity of money available) obtains and the processes by which such equilibrium is attained. (Lange 1942: 66)

Lange stressed implicitly the difference between his definition of Say's law (quoted above) and Keynes' definition when he wrote:

> Say's law, however, does not imply that the total demand and the total supply of products are identically equal. Neither does it imply an identity of the total demand and the total supply of primary factors and direct services. (…). Under Say's law an excess supply of primary factors and direct services always implies an excess demand of equal amount for products, and vice versa. This tends directly to restore equilibrium. (1942: 57-8)

Remind that Keynes defined Say's law as the identity between the aggregate supply for goods and the aggregate demand. Lange did not discuss explicitly Keynes' attack on Say's law but referred instead to the debates between Malthus and Say. His inspiration came in part from his knowledge of the early 19th century Classics.[10]

5.2. Price Flexibility and Employment (1945)

In the 1942 paper, the dismissal of Say's law was meant to open the way for a theory of chronic unemployment interpreted as a stability issue. This was the subject of the 1945 monograph but Lange presented it explicitly as a problem stated by Keynes:

> This monograph presents a systematic investigation of the effect of price flexibility, particularly flexibility of prices of factors of production, upon employment and economic stability. According to traditional economic doctrine, unemployment is entirely due to rigidity of factor prices. Hence flexibility of these prices is regarded as desirable and is advocated as a norm of an economic policy which aims at full employment and proper allocation of resources. This view has been subject to serious criticism. Lord Keynes maintains that, under certain conditions, changes in money wage rates have no effect upon employment but influences only the level of product prices. (1945: 1)

In chapter 19 of the *General Theory*, Keynes used the model developed in previous chapters to practise a comparative static experiment. If the exogenous wage is lowered, will the new equilibrium feature more or less unemployment? The adjustment of wage rates was then

[10] Jonsson (1999) has pointed out the hidden connexions between Lange's 1942 contribution and his Marxian background, Neisser (1934) and Taylor's *Principles of Economics* (1909).

represented as a sequence of unemployment equilibria with the money wage level gradually decreasing but no diminution of unemployment. Inspired by chapter 20 of *Value and Capital*, Lange's experiment started with a system in a state of general equilibrium where all markets were cleared and all factors were fully employed. Then he introduced a rise in the supply of one factor and asked whether the adjustment of prices would restore general equilibrium.

Lange centred his analysis on the "monetary effect". This was defined as the effect of price level variation on the excess demand for money. Along the lines of his 1942 article, Lange used Walras' law to state that the value of the excess demand of money was equal to the value of the excess supply of goods.[11] A variation of the excess demand of money implied an inverse variation of the excess supply of goods. If a reduction of the price level reduced the excess demand of money it would decrease the excess supply of goods. In this case Lange called the monetary effect "positive". The monetary effect was "negative" if the excess demand for money increased; the effect was "neutral" if the excess demand for money remained the same. The monetary effect described the substitution between goods and money resulting from a change in the price of money in terms of goods. A positive effect occurred when a rise in the price of money caused agents to increase their excess demand for goods and to decrease their excess demand for money. Lange claimed that his emphasis on substitution between money and goods had been inspired by Keynes:

> The interest in the problem and the recognition of the crucial importance of substitution between money and goods were inspired by Lord Keynes. (1945: vii)

But he immediately added that "for the tools of analysis" he was heavily indebted to Hicks. Again, Keynesian issues were treated with un-Keynesian methods. Lange neither used Keynes' toolbox, nor the *IS-LM* framework directly inspired by the *General Theory*.

In the first stage of the inquiry, Lange showed that stability depended on the sign of the monetary effect. He supposed that one factor was in excess supply so that its price diminished. This triggered a substitution of other factors for this factor and an increase of output of all products using this factor, the expansion effect. If all goods were substitutable "enough" all prices were led to decrease. Equilibrium, said Lange, could be restored only if some prices diminished in smaller proportion than the price of the unemployed factor. Then the substitution and the expansion effects would increase the demand for the unemployed factor. This was the case if the reduction of the price level triggered a substitution of goods

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[11] Lange defined goods as the sum of commodities (products and factors) and securities (stock and bonds).

for money. The demand for certain goods would increase so that their price would rise relative to the price of others.

After that, Lange turned his attention to the parameters determining the sign of the monetary effect and to its transmission to the goods market. According to him, the real demand for money was independent of the price level as long as the elasticity of expectations was equal to one. But if the elasticity was greater than one it could increase when the price level decreased due to intertemporal substitution effects. So, if the money supply was constant, and if there was no intertemporal substitution (inelasticity of price expectations), the monetary effect was positive. According to Lange this was the position of the "traditional theory of equilibrium". But the supply of money could decrease with prices and expectations could be elastic. Lange argued that even when the monetary effect was positive it may not affect the goods markets. An unequal distribution of cash balances could lead to a pure substitution between money and bonds. If uncertainty was high, Lange showed that a reduction of the short rate of interest would not affect the long rate hence investment would not increase. Then Lange enlarged his analysis to account for international trade, imperfect competition and innovations.

Lange's conclusions were very similar to the conclusions of Keynes' chapter 19 but with a socialist flavour added. Like Keynes, Lange concluded that, in the Post-World War I context, flexibility of money wages would not "result in the automatic maintenance or restoration of equilibrium of demand and supply of factors of production" (1945: 83), the "capitalist economy" had become unstable. The Marxian tonality of Lange's historical analysis lies in his emphasis on the results of the rise of oligopolies. Oligopolies were a major source of instability. They were also responsible for the fact that innovation now resulted in technological unemployment. He also insisted on the problem raised by the "exhaustion of investment opportunities" associated with a decline of the marginal productivity of investment goods. For all these reasons, Lange proposed a policy of fixing the price of labor or of some other "important commodity". But he also advocated the creation of "public agencies" designed to regulate oligopolistic firms or even the "socialization of the respective industries" with due reference to his essay *On the Economic Theory of Socialism* (1938). He also defended a strict control of the money supply and public interventions to increase the demand for commodities (subsidies to consumers and public investment). The book ended with a mathematical appendix using the tools put forward by Samuelson (1941) to demonstrate that fixing certain prices could restore the stability of an otherwise unstable system.

5.3. Lange versus Hicks

Lange's analysis was more general than Hicks' analysis thanks to his monetary effect. This concept showed that in a general equilibrium system there could be, in principle, a direct effect of price level variations on the state of the goods market. Following Keynes' method, Hicks assumed instead that inflation of deflation could affect goods market only if they modified the rates of interest. But this was a special case deriving from assumptions that were not clarified in *Value and Capital*. The weakness of Lange's discussion lied in his failure to uncover the microeconomic basis of his monetary effect.

The most important difference between the two economists concerned their interpretation of instability. Whereas Hicks was very cautious in his use of this scenario, Lange was not afraid to use it as a description of the *Great Depression*. This implied a serious distortion of the framework provided by Hicks. In *Value and Capital*, Hicks developed an instantaneous conception of equilibrium (Donzelli, 2012). Since equilibrium had to be established by the end of each Monday, time did not matter in its establishment. In this context, talking of a process of adjustment process lasting ten years or more made no sense. Either equilibrium was stable and the economy could function or it was unstable and the economy broke down. For this reason, Hicks thought that actual economies were characterized by stabilizers explaining why, most of the time, they went on functioning even in the midst of the worse recession. To say that capitalism had become unstable during the interwar, as Lange said in the last chapter of his book, implied that the economy could remain in a perpetual state of tâtonnement. This was not consistent with the Hicksian week but also with the no trade assumption implicitly at work behind the scene. Lange's socialism may explain why he sidestepped Hicks reservations concerning the realism of the instability scenario.

6. *Price Flexibility and Employment* as an alternative to IS-LM macroeconomics

To what extent may we characterize Lange's 1945 approach as an alternative to the IS-LM macroeconomics that developed out of Hicks' "Mr Keynes and the Classics and out of his own contribution of 1938? The use of De Vroey's definition of macroeconomics will help us to discuss this matter.

6.1. A Walrasian approach

Lendjel (2001) has shown that Lange's classic papers "On the Economics Theory of Socialism" (1936-7) developed a conception of the formation of equilibrium that drew more on Marshall than on Walras. Lendjel notes that, in an early work (Lange, 1932), Lange stressed the sterility of the method of the Lausanne school for the analysis of concrete problems and considered that Marshall's method of "isolation" was superior in this respect. For each problem one had to identify the best method or even try a synthesis. In brief, Lange was not a purely Walrasian economists but an eclectic marginalist with a Marxian background.[12]

Notwithstanding, in the first pages of *Price Flexibility and Employment* Lange explained that in order to disentangle the controversies surrounding the effect of wage flexibility upon employment, a general framework was required. And the name of Hicks who had "provided the most up-to-date formulation of the theory of general economic equilibrium" was put forward. The main reference was no longer Walras, like in 1938, since he had been outdated by Hicks' *Value and Capital*. Lange must have considered that the issues raised by Keynes were general and abstract enough to justify the use of the Lausanne school method. Yet this does not tell us what made his approach Walrasian.

Lange's analysis of the formation of equilibrium is what betrays the Walrasian nature of his 1945 approach. In book V of the *Principles of Economics*, Marshall theorized the formation of the "temporary equilibrium of demand and supply" assuming that "everyone will try to guess the state of the market and govern his action accordingly" (1920, 277). Sellers and buyers anticipate the supply and the demand curves and, as a result, the equilibrium price of the current period. If expectations are perfect no-one trades until this price is established.[13] This contrasts with the Walrasian approach in which buyers and sellers are price takers. They cannot anticipate current prices since they have no information concerning the supply and demand curves of others. In Lange, expectations only concerned future prices and not current prices and agents were price takers. The hands of the auctioneer appeared in the working of the law of supply and demand.[14]

Even if he did not use the word in 1945 (he did in 1938), Lange treated the issue of chapter 19 as a tâtonnement issue. The question of the formation of a general equilibrium pertained to the core of Walras' agenda. As a result, economists with a Walrasian training displayed a

[12] This fact appears also in Lange's methodological writings. See Lange 1935 and 1945-6.

[13] "The price of 36s. has thus some claim to be claimed to be called the true equilibrium price […] because every dealer who has a perfect knowledge of the circumstances of the market expects that price to be established" (Marshall, 1920: 278).

[14] A more exhaustive test can be done using De Vroey's distinctions (De Vroey, 1999, 2006) between the Walrasian and the Marshallian schools.

mastery of such questions far superior to the mastery of Marshallian or Keynesian economists. I think that Lange's 1945 little book illustrates this. His treatment is far more systematic and clear than the one that can be found in contemporary attempt to deal with stability analysis in the context of *IS-LM* (see Modigliani (1944) for instance). Lange did analyzed a whole economy directly. The second chapter of his monograph was entitled "partial-equilibrium theory". But it was meant to show that "the range of partial-equilibrium theory is, however, very limited" (1945: 3). Lange did not begin by a separate study of the labour, the goods and the money markets as Keynes did in the *General Theory*. In chapter 3, entitled "general-equilibrium theory", he jumped to the analysis of the effect of factor price decline on the economy in its entirety. The hallmark of his approach, already present in 1942, is that all markets are explicitly taken into account in the analysis. By contrast, the IS-LM approach was characterised by the possible omission of the labour and (or) the bonds markets as in Hicks (1937) and Modigliani (1944). Lange's method went hand in hand with the use of Walras' law that clarified the relation between the values of excess demands on all the markets of the economy. The law was the main tool used in 1942 and played a pivotal role in the 1944 monograph where it was introduced on page 5 to define the relation between the excess supply for goods (factors, products and securities) and the excess demand for money.

6.2. Macroeconomics

According to De Vroey (2004) (1) macroeconomics belongs to general equilibrium theory but (2) it is concerned with simplified general equilibrium models; (3) it consists of mathematical models and (4) it is concerned with providing practical policy advice; (5) its models are geared towards a confrontation with the data.

For Lange, the general theory of a monetary economy defined a number of adjustment scenarios possible in unemployment states. Given its parameters a system could be stable or not. Confrontation with the data would show whether the actual economic system was stable and point the sources of instability. Once the latter were identified, the economist had to define policies geared toward modifying the parameters or designed to compensate their effects in order to stabilize the economy. Lange's macroeconomics were a sub-field of the stability analysis of general equilibrium models with money.

One difference between Lange's 1945 approach and macroeconomics is his insistence on the need to analyze complex systems and not simplified ones like *IS-LM* in order to settle the controversies raised by Keynes. But the macro-dimension of Lange's work appeared in his attempt to organize the analysis thanks to the monetary effect concept and the division of goods in three categories (factors, products and bonds). In the end, Lange's model came close to the classical version of *IS-LM* that is to say a four market model. One could cast a lot of his analysis into the language of *IS-LM* and obtain a clearer understanding of the model. This would be shown by Patinkin in *Money, Interest and Prices* (1956). The most important feature of his work in this respect was Lange's treatment of the money market and of its relations with goods markets (factors, products and securities). Keynes' theory appeared as a special case of Lange's model in which the monetary effect was restricted to the bonds market so that a disequilibrium on the money market resulted in a variation of the rate of interest only. But his analysis also put forward factors of instability related to the heterogeneity of goods and agents. For instance, Lange insisted on the possible lack of substitutability between factors. A positive monetary effect could increase the demand for engineers. But the fact that their wages were higher would not lower the unemployment of unskilled workers.

Probably related to the emphasis on complex systems was the lack of a mathematical model supporting Lange's analysis. The model in the appendix had no room for elasticities of price expectations, uncertainty and the time horizon of agents, the rate or rates of interest or money. Lange did not model his temporary equilibrium system. He did not clarify agents' decision programs and actually made errors on this ground.[15] This was probably the main weakness of his approach compared to *IS-LM* macroeconomics.

7. Influence of *Price Flexibility and Employment*

7.1. The uncertain reception of Lange's contributions

Lange's reading of Keynes' *General Theory* resulted in the definition of two research programs. The first one was dormant in the 1938 paper and proposed to clarify the relation between the *IS-LM* apparatus and an underpinning Walrasian model. The 1942-1945 research program, in turn, offered to develop Walrasian macroeconomics defined as the analysis of the causes and remedies to the instability of a temporary general equilibrium.

The influence of the latter program was probably limited. The fact is documented by Solow:

"'Price Flexibility and Employment' was an important book for my generation of graduate students. It did not count as much as *Value and Capital* or *The Foundations of Economic Analysis* even then; and it has not worn nearly as well. But at the time it seemed more important than its later eclipse would suggest. It held out the

[15] See Patinkin's criticisms below.

promise of using the Hicksian version of general equilibrium theory and the dynamics of Samuelson to say things of absolutely central importance to macroeconomics. (…).
The effect wore off quickly, however, perhaps largely as a result of Milton Friedman's adverse review." (Solow, 1982)

As a matter of fact, Friedman (1946) wrote a disparaging review of *Price Flexibility and Employment* for the *American Economic Review*. Friedman called Lange's approach "taxonomic". Beginning with very general assumptions he sought to "enumerate all possible economic systems to which these functions could give rise". The result was a set of imaginary worlds of which stable systems appeared as special cases. But the fact that stable systems were special cases within the bound of theory did not mean that they were special cases in reality. Harrod (1946) wrote another adverse review for *The Economic Journal*. He was actually quite sympathetic to Lange's policy conclusions and to his endorsement of Keynes' views concerning the effects of wage flexibility but he heavily criticised Lange's basic framework. The monetary effect was conceptually and theoretically flawed so Harrod proposed to revert to "Lord Keynes or some other theory" as far as monetary analysis was concerned. He also rejected Lange's dynamics.

Friedman and Harrod were both Marshallians.[16] Their negative reviews do not explain why young economists like Solow, who were trained with *Value and Capital,* did not try to develop Lange's approach. The review by Timlin (1946), for the *Canadian Journal of Economics and Political Sciences* offers some indications. Timlin praised Lange's general framework and completely endorsed his research program:

> Further redefinition and exploration of Dr. Lange's models to allow for distribution changes and their effects might cast light on some very important problems. Manipulation of the models under varying assumptions regarding interventions could be used to form hypotheses about the relative desirability of financing public works, subsidies, or other anti-deflationary projects by various methods, and also the relative merits of various methods of inflation control. More fundamentally, such manipulation could be used to form hypotheses respecting the relative desirability of monetary systems based on varying proportions of credit money and primary money and the relation of various states of expectations to stability of prices and employment in these systems. (Timlin, 1946: 212)

Yet, she stressed the need to develop the framework and to look carefully to the data before formulating policy proposal. Like Friedman she was sceptical with regard to the way Lange

[16] Consider Harrod's review of Jaffé's edition of Walras : ' Almost all those general qualities that made Marshall's Principles a great classic, despite the fact that its original contributions to pure theory are admittedly limited, are lacking in Walras." (Harrod, 1956: 311-2)

jumped from theory to policy prescription. But his method of exploring theoretical scenarios could be fruitful. However, developing the kind of theory sketched by Lange was not an easy task. *IS-LM* was available and an easier way to macroeconomic analysis.

The belief in an organic link between *IS-LM* and the Walrasian model put forward in the 1938 essay had more success with the founders of the neoclassical synthesis. The idea that *IS-LM* was a simplified version of the Walrasian general equilibrium model can be found in Modigliani (1944: 46) and in Klein (1947: 56-7). But, like Lange, neither Klein nor Modigliani tried to clarify the relation between *IS-LM* and the Walrasian model. Only Patinkin, the "true heir" of Lange according to Solow (1982), really drew on the Polish economist's legacy.

7.2. Lange influence on Patinkin's doctoral dissertation

During his training at the University of Chicago, from 1941 to 1943, Don Patinkin discovered mathematical economics in Lange's classes, a fact he stressed in an autobiographical paper:

> "In a sequence of systematic courses, Lange brought us to what were then the frontiers of micro- and macroeconomic theory." (Patinkin, 1995: 371)

The supervisors of Patinkin's Ph.D. thesis were Marschak and Lewis, but the main influence was Lange. The whole work can be read as an internal criticism of Lange's 1945 book.[17]

In the first part of the thesis, Patinkin attempted to clarify the issue raised by Lange in "Say's law a restatement and criticism" and found that *Price Flexibility and Employment* was flawed in at least two respects. Firstly, Lange assumed that the real demand for money was homogeneous of degree zero with respect to money prices (1945: 13) and extended this assumption to all excess demand functions (1945: 10). Ironically, this assumption implied that the price level was indeterminate in Lange's framework. Secondly, like Walras and Pareto, Lange failed to put money into the utility function. In order to justify the homogeneity of degree one of the bonds demand with respect to money prices, he wrote a maximization program in which money did not appear at all.

At this stage Lange's research program was undermined but not condemned. Patinkin considered several solutions in order to escape the indeterminacy of the price level. One was the solution of incorporating "the real value of assets" A/P in excess demand functions. This implied that "a proportionate change in all prices causes a substitution between money and

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[17] For a detailed presentation of Patinkin's dissertation see Rubin (2012).

goods” (1947: 48). Here he referred to Lange. It was possible to develop the analysis undertaken in *Price Flexibility and Employment* on a sounder basis. But this approach was inconsistent with the Keynesian views developed in the second part of the thesis. The wealth effect would have undermined Patinkin’s explanation of unemployment. This solution was not acceptable at this stage.[18]

The aim of Patinkin, in the second part of his thesis, was to build a theory of involuntary unemployment. For him this amounted to clarify the relation between the *IS-LM* model and an underlying Walrasian model. In other words, Patinkin took up the research program implicit in Lange’s 1938 paper:

“Our attention will be concentrated on the microsystem lying behind this [macrosystem].” (1947: 88)

To begin with, he would write down a disaggregated model with a number of goods, of sectors, of firms within this sectors and a number of households. Then, he would write down the maximizing plans of firms and households from which demand and supply functions were derived in full employment states as in involuntary unemployment equilibrium states. Patinkin did not go very far along this road, to say the least, but his intention was clear.

But why did he adopt a research program that Lange would have deemed irrelevant? The reason was that he rejected Lange’s conception of the relation between IS-LM and the Walrasian model. Involuntary unemployment could not be defined as a labor market clearing phenomenon. Hence, a Keynesian equilibrium and a Walrasian equilibrium were not one and the same thing.

In order to clarify the foundations of the “Keynesian macro-models”, one had to modify the Walrasian system to account for the possibility of trade in un-cleared markets. For involuntary unemployment implied a disequilibrium on the labor market. This led to the elaboration of a theory of choice with “additional constraints” and a “theory of compromise” showing how the volume of trade was determined whenever desired supplies and demands did not coincide. One should add that Patinkin assumed flexible prices and wages all the way. Since Keynes wanted to show that unemployment was not a consequence of wage rigidity it was better to dispense with the assumption. On this point he fallowed Lange’s interpretation of Keynes and Lange’s 1945 approach.

[18] In his doctoral dissertation, Patinkin presented unemployment as the result of a situation in which the full employment rate of interest was negative and could not be reached. This approach neglected the Pigou effect considered to be empirically insignificant.

By rejecting a basic component of Lange's interpretation of the Keynesian theory Patinkin undermined his conception of the relation between *IS-LM* and Walras' model and activated the research program still dormant in the 1938 paper. Doing so, he anticipated the work developed in the 60's and 70's by fixed-price equilibrium theorists. Yet, Patinkin's results were disappointing. He did not find how to use his additional constraint concept and his Keynesian general equilibrium concept was heavily criticized by the members of the Cowles Commission.

After the completion of his PhD thesis, Patinkin began to work on the manuscript of *Money, Interest and Prices*. To some extent, it represented a return to the inspiration of *Price Flexibility and Employment* with its emphasis on stability issues analyzed from the perspective of the substitution between goods and money. The book appeared in 1956 and became a landmark of the neoclassical synthesis. Patinkin developed the vision of the economic system at work in Lange's 1942 and 1945 texts to analyze an *IS-LM* framework.[19] A core message of the book was that Keynesian economics, or the theory of unemployment, was about disequilibrium states. This meant that its subject were the processes of adjustment leading (or not) to the Walrasian equilibrium. This was exactly the perspective of Lange in 1945. But, for Patinkin, unemployment still implied trading and producing out of equilibrium. His analysis of this issue in terms of spill over effect would inspire Clower (1965) and Barro and Grossman (1971). Besides, Patinkin never accepted to transform macroeconomics into instability analysis. Instability was a possible yet an extreme scenario. It could not account for the normal functioning of the economy. Furthermore, Lange's demonstration of instability gave a very important role to expectations. For Patinkin very little could be said on this subject and, conversely, any result could be obtained once expectations entered the scene:

"Once the Pandora box of expectations and interest and price uncertainty is opened upon the real world of economic analysis, anything can happen." (1956: 180)

8. Conclusion

The works of Lange during his American period contained two ways of relating Walrasian general equilibrium theory and macroeconomics. His 1938 article defined macroeconomics as the use of a simplified version of the Walrasian model, for this was how Lange considered *IS-LM*. In 1942 and 1945, he developed a different approach. The integration of money in a

[19] See Rubin (2004).

disaggregate or complex Walrasian model should allow to tackle basic issues of Keynesian macroeconomics (the validity of Say's law and of the quantity theory of money, the effect of wage variations on employment) and to diagnose the sources and the remedies of macroeconomic malfunctioning (unemployment, inflation). If the kind of Walrasian macroeconomics defended in *Price Flexibility and Employment* did not attract followers, Lange did influence the evolution of macroeconomics. This influence ran mainly through the contribution of Patinkin, his student at Chicago University. Our study of the relation between their works clarifies the reasons why Lange's alternative to *IS-LM* was not taken up, it shows its weaknesses, but it also reveals the insights that made their way up to the 1970's. The defects of Lange's second approach were numerous and Patinkin was highly aware of them. First of all, Lange did not provide a mathematical model as tractable and operational as *IS-LM*. The general framework used in *Price Flexibility and Employment* was to complex to be formalized???. As a result, young Keynesians all opted for the *IS-LM* model. Lange's framework also suffered from a defective integration of money. The last weakness highlighted by Patinkin was the definition of macroeconomics as the study of instability. Like Patinkin, many economists would be reluctant to picture the normal functioning of a market economy as an instable system in the Walrasian meaning, either for political reasons or, more basically, because, like Hicks, they would find that "not realistic". Besides, Lange's demonstration of instability relied on factors that receded to the back of the theoretical scene during the era of the Neoclassical Synthesis like the Hicksian theory of expectations and imperfect competition. Nonetheless, Lange did participate to the formation of modern macroeconomics. A major contribution was his idea of wedding *IS-LM* to a Walrasian model. Retrospectively, the wedding seems unnatural, but it proved fructuous. Patinkin's criticism of Lange's conception of the connexion between the macro and the micro models, his rejection of the horizontal supply curve of labor, led to the foundations of the disequililibrium theory developed in the 1970's. The method inspired by *Price Flexibility and Employment* helped Patinkin clarify the properties of the *IS-LM* model and showed the relevance of the Walrasian approach. Finally and ironically, Lange's influence played an important role in the contribution that convinced Lucas of the necessity of a Walrasian approach to macroeconomics.[20]

[20] See Lucas (2004: 15).

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